High-Level Policy Dialogue on Technology Transfer for Smallholder Farmers

13 February 2013, Bogor, Indonesia

Ministry of Agriculture

AGRO INOVASI

UNITED NATIONS ESCAP
Economic and Social Commission for Asia and the Pacific

CAPSA
Centre for Alleviation of Poverty through Sustainable Agriculture

European Union

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Contents

List of Figures

Annexes

Abbreviations

ABEI	Agricultural and Biological Engineering Institute
AHP	Analytic Hierarchy Process
AIATs	Assessment Institute for Agricultural Technology
APCTT	Asian and Pacific Centre for Transfer of Technology
API	Indonesian Peasant Alliance
AR4D	Agricultural Research for Development
AsiaDHRRA	Asian Partnership for the Development of Human Resources in Rural Asia
AVRDC	World Vegetable Center
BAIF	Bharatiya Agro Industries Foundation
BAFRA	Bhutan Agriculture and Food Regulatory Authority
BARC	Bangladesh Agricultural Research Council
BTC	Bangladesh Tariff Commission
CAPSA	Centre for Alleviation of Poverty through Sustainable Agriculture
CARDI	Cambodian Agricultural Research and Development Institute
CEDAC	Cambodian Center for Study and Development in Agriculture
CIAT	International Center for Tropical Agriculture
CIFOR	Center for International Forestry Research
CiNi	Collectives for Integrated Livelihood Initiatives
CIRDAP	Centre on Integrated Rural Development for Asia and the Pacific
CoRRB	Council for Renewable Natural Resources Research of Bhutan
CRS	Catholic Relief Services
CSAM	Centre for Sustainable Agricultural Mechanization
DAE	Department of Agricultural Extension
DFID	UK Department for International Development
EU	European Union
FAO	Food and Agriculture Organization
FARD	Fiji Agriculture Research Division
FSC	Food Security Center
FSWG	Food Security Working Group
IAARD	Indonesian Agency for Agricultural Research and Development
ICAR	Indian Council of Agricultural Research
ICASEPS	Indonesian Center for Agricultural Socio Economic and Policy Studies
ICATAD	Indonesian Center for Agricultural Technology Assessment and Development

ICFORD	Indonesian Center for Food Crops Research and Development
ICRR	Indonesian Center for Rice Research
iDE	International Development Enterprises
ILETRI	Indonesian Legumes and Tuber Crops Research Institute
IPM	Integrated pest management
IPRAD	Institute for Policy Research and Development
JIRCAS	Japan International Research Center for Agricultural Science
KVKs	Krishi Vigyan Kendras
M4P	Making Markets Work Better for the Poor
MARDI	Malaysian Agricultural Research and Development Institute
MPA	Megh Pyne Abhiyan
NAFRI	National Agriculture and Forestry Research Institute
NARC	Nepal Agricultural Research Council
NARI	National Agricultural Research Institute
NGOs	Non-governmental organizations
NIF	National Innovation Foundation
OCCP	Organic Certification Center of the Philippines
OPM	Oxford Policy Management
PARC	Pakistan Agricultural Research Council
PIDE	Pakistan Institute of Development Economics
PRADAN	Professional Assistance for Development Action
PT	Paddy Thresher
SATNET Asia	Network for Knowledge Transfer on Sustainable Agricultural Technologies and Improved Market Linkages in South and South-East Asia
SCS	Student Community Services
SMEs	Small and medium enterprises
SPC	Secretariat of the Pacific Community
SRISTI	Society for Research and Initiatives for Sustainable Technologies and Institutions
SUN	Scaling Up Nutrition
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
VAAS	Vietnam Academy of Agricultural Sciences
ZT	Zero-tillage

Executive summary

Increasing agricultural productivity needs to be a major building block of a strategy that aims to reduce poverty in the Asia-Pacific region. Yet, while international and national research organizations have contributed tremendously to developing agricultural innovations, technology transfer and its adoption by smallholders continues to be a challenge in addressing agricultural productivity. Participation of governments, researchers, non-governmental organizations (NGOs), farmers' organizations and the private sector has been recognized as one of the key factors in building successful innovation systems.

As such, the Centre for Alleviation of Poverty through Sustainable Agriculture (CAPSA) of the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), in collaboration with the European Union (EU) and the Government of Indonesia, organized a High-Level Policy Dialogue on Technology Transfer for Smallholder Farmers. The event took place on 13 February 2013 in Bogor, Indonesia. Government officials from agricultural ministries, representatives of national agricultural research centres, universities, multilateral organizations and NGOs from around the Asia-Pacific region came together and called for joint efforts to support smallholders through policies that encourage transfer of agricultural technologies that are sustainable, productivity-enhancing and suitable to farmers' needs.

To ensure food security for a growing population, while reducing poverty and preserving the environment in the region, the dialogue was organized with the following objectives:

- Provide a discussion forum for policymakers, scientists and practitioners to address the challenge of technology transfer to smallholder farmers in the Asia-Pacific region.
- Enable dialogue on challenges and opportunities related to designing policies.
- Encourage investments with potential to facilitate knowledge transfer to and adaptation of agricultural technologies by smallholder farmers.

The meeting contributed to:

- Increased levels of knowledge and awareness of policymakers on challenges and options related to facilitating knowledge transfer to and adaptation of sustainable agricultural technologies by smallholder farmers in the Asia-Pacific region.
- Strengthened science-policy interface in the area of research and development that promotes technology transfer and adaptation to sustainably intensify food production, ensure food security, reduce poverty and preserve the environment in Asia and the Pacific.
- Enhanced South-South cooperation among participants through sharing of experience and best practices.

The meeting concluded that despite much advancement in agriculture, there is still a need to focus on improving technologies. However, improving technologies is also about adopting and adapting them in specific contexts. Therefore, more focus should be on processes for effective technology transfer. This needs to go hand in hand with empowering farmers to adopt improved technologies. As such, farmers should be recognized as researchers. Sustainability of agricultural research also depends on collaboration between research institutions, the private sector, NGOs, civil society and farmers. What is most important, however, is to look beyond production and productivity, and address processing and marketing. Without market access and production of products that are marketable, technology transfer will be less effective. Finally, governments need to facilitate technology transfer by promoting supportive policies. For example, they need to invest in education and infrastructure, provide social nets, facilitate market access, promote fair contracting between intermediaries and small farmers, and improve coordination between central and local governments. Specific policies need to reflect small farmers' heterogeneity – one-for-all policies will not work.

About the event

Government officials from agricultural ministries, representatives of national agricultural research centres, universities, multilateral and non-governmental organizations (NGOs) from around the Asia-Pacific region met in Bogor, Indonesia on 13 February 2013. They called for joint efforts to support smallholders through policies that encourage transfer of agricultural technologies that are sustainable, productivity-enhancing and suitable to farmers' needs. The Centre for Alleviation of Poverty through Sustainable Agriculture (CAPSA) of the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), the European Union (EU) and the Government of Indonesia partnered in the event. The Policy Dialogue was initiated by the Network for Knowledge Transfer on Sustainable Agricultural Technologies and Improved Market Linkages in South and South-East Asia (SATNET Asia), a 3-year EU-funded project implemented by CAPSA.

The day-long meeting (see Annex 1 for agenda) looked at two aspects of agricultural research: how to innovate without reinventing the wheel, and how to ensure that this knowledge benefits smallholder farmers. It urged policymakers and researchers to work together to provide farmers with the right means to ensure that there is more food, higher incomes and more incentives to protect the environment.

With a strong focus on learning and knowledge sharing, the format of the event consisted of a combination of statements, presentations and interactive discussions to address key issues in technology transfer and its adoption, and demonstrate successful experiences taking place around the Asia-Pacific region. A team of social reporters trained by CAPSA documented the event.

The meeting started with welcoming remarks followed by keynote statements. A moderated discussion between six experts representing government, national research institutions and a farmers' organization shared insights on how advances in science and research can better reach smallholders to promote sustainable agriculture.

Three parallel sessions on research activities took place in the afternoon. The first session showcased examples of improved technologies from Cambodia, Lao People's Democratic Republic, India, Indonesia and Pakistan. The second session demonstrated interesting cases of improved processes to enhance adoption of technologies by farmers in India, Indonesia, Nepal and the Philippines. The third parallel session demonstrated interventions for strengthening the market for technologies, drawing on experiences in Bangladesh and India.

The final session of the meeting was devoted to reflecting on how participants could apply the knowledge acquired during the meeting in their respective areas of work.

The event promoted discussion between senior officials and representatives from around the Asia-Pacific region. Specifically, discussions focused on options for policymakers to facilitate and enhance the transfer of sustainable agricultural technologies to smallholder farmers.

About the participants

A total of 96 persons participated in the event (see Annex 3 for list of participants). This included 62 government and NGO representatives from 20 countries as follows: Afghanistan (2), Australia (1), Bangladesh (6), Bhutan (1), Cambodia (4), China Taipei (1), Fiji (2), India (5), Indonesia (18), Japan (1), Lao People's Democratic Republic (3), Malaysia (2), Myanmar (3), Nepal (4), Pakistan (2), Papua New Guinea (1), Philippines (2), Sri Lanka (1), Thailand (2), and Viet Nam (1). Twenty-seven representatives from regional/international organizations (28 per cent), and seven Jakarta-based journalists (six Indonesian and one Australian) also participated in the event.

The majority of participants came from South-East Asia (40), followed by South Asia (24), and Australia and the Pacific (5). The rest of the participants (27) represented regional and international organizations. The high participation from South-East Asia is due to a large number of Indonesian participants (including six Indonesian journalists).

In terms of gender, 77 per cent of all participants were men and only 23 per cent of participants were women.

Regarding organizational type, 52 per cent of participants represented their government (staff from ministries and national research centres combined). About half of the participants (44 per cent) work in agricultural research centres – national and international. Eighteen per cent of participants came from NGOs, 15 per cent from United Nations/Intergovernmental organizations, 7 per cent from the media, and 6 per cent represented a donor. In terms of occupational level, 38 per cent of all participants were senior officials. This includes ambassadors, chairmen, directors, deputy directors and heads of organizations. The Figures below provide details about the participants in terms of geographical representation, sub-region, and organizational type. More information about gender, type and level of participants can be found in Annex 2.

Figure 1: Geographical representation of participants

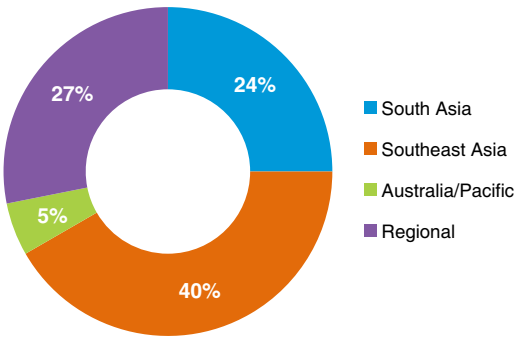
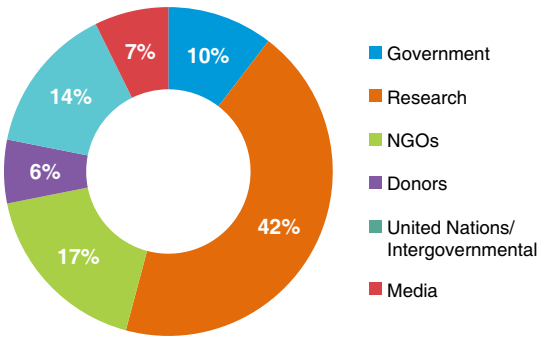
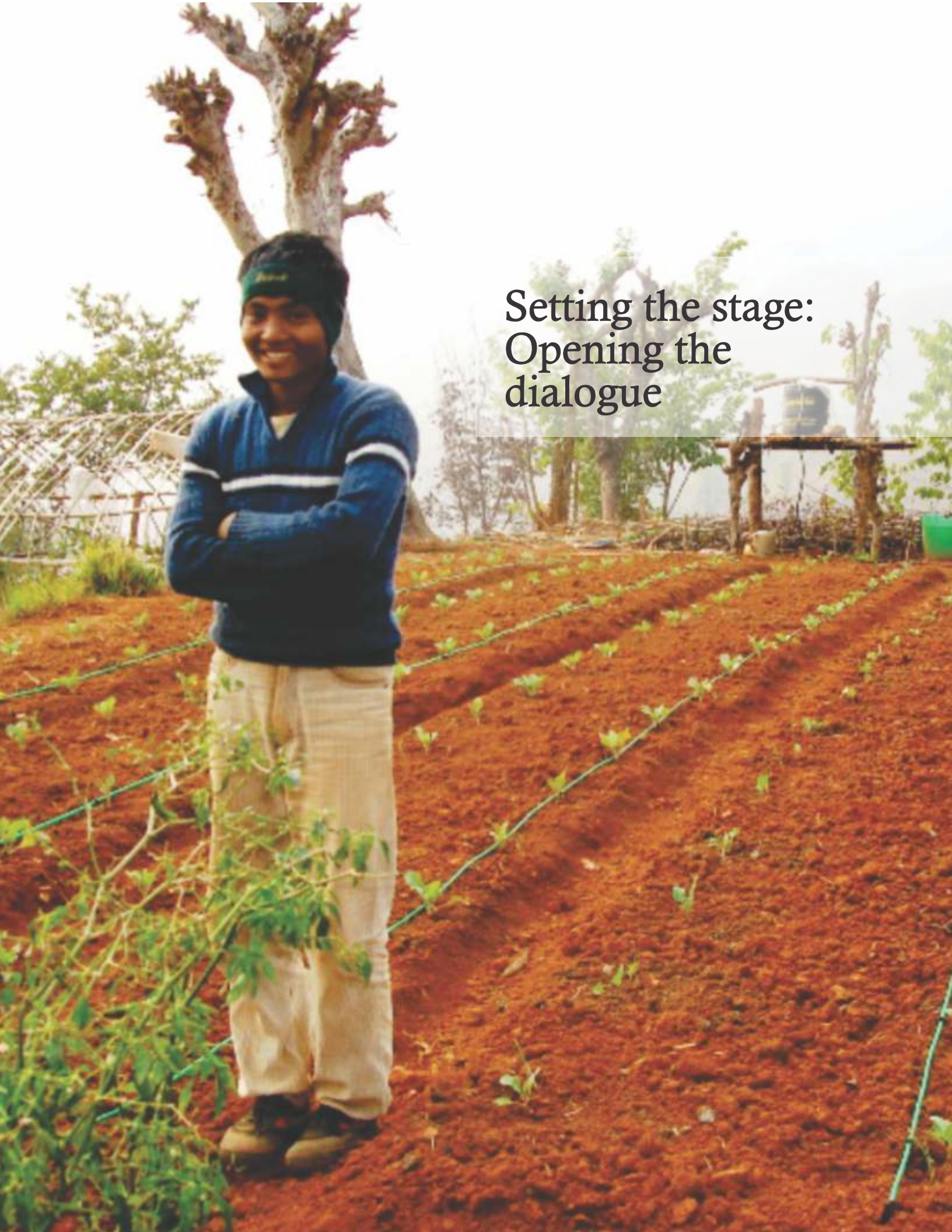


Figure 2: Organizational type of participants





Setting the stage: Opening the dialogue

Agricultural innovation is a pillar for sustainable agriculture

"Agricultural innovation is one important pillar for ensuring sustainable agriculture." This was the message delivered by Mr. Shun-ichi Murata, the Deputy Executive Secretary of UNESCAP in his welcome statement at the High-Level Policy Dialogue.

Furthermore, he stated that without innovation, agricultural productivity will continue to decline due to low fertility and degraded soils. Given that arable land is increasingly taken out of production for industrial purposes, the pressure on food systems to produce safe and affordable food for all is growing tremendously and requires an urgent paradigm shift in our thinking and actions.

Millions of smallholder farmers living in the Asia-Pacific region depend on agricultural land as the main or only source of their livelihoods. Mr. Murata noted that science and technology are fundamental in helping farmers improve productivity. The world needs farmers, but it also needs improved techniques to feed the world's growing population. Technology advancement in agriculture also requires active support from governments. Policymakers, extension workers, researchers, the private sector and smallholder farmers – in their different roles as producers, sellers, buyers and consumers – can all play important parts in addressing today's agricultural concerns.

Nowadays, agriculture has to be more appealing to youth. Introducing farm mechanization and adopting agricultural innovations that make land and labour more productive and agricultural businesses more profitable can provide such opportunities for young people.

"We believe that by working in partnership we can ensure that the right tools and policies are scaled up and will be applied to benefit smallholders and others in the value chain," Mr. Murata said in his closing.

The need for a new vision for future farming activities

Dr. Ir. Haryono, Director General of the Indonesian Agency for Agricultural Research and Development (IAARD), Ministry of Agriculture, Indonesia, opened the Policy Dialogue on behalf of H.E. Dr. Rusman Heriawan, Vice Minister of Agriculture of the Republic of Indonesia.

"The lives of smallholder farmers who grow agricultural products can be improved if innovative agricultural technologies are tailored to their needs and executed collectively," highlighted Dr. Haryono. In his view, establishing synergy among various stakeholders conditions the success of technology transfer. "This dialogue is therefore an opportunity to come up with new ideas on technology transfer to serve as an incentive in enhancing the productivity of smallholder farmers," added Dr. Haryono.

As the Asia-Pacific economies are experiencing escalating competition for resources, environmental changes and increased international trade, traditional farming is losing its comparative advantage. "There is a great need to develop a new vision for future farming activities in order to

strategically position investment, technology delivery and design policy reforms," Dr. Haryono concluded.

Food security: A priority of Europe Aid

In her opening speech, Ms. Adelina Nicolaie, Programme Manager, Technology Transfer for Food Security in Asia, European Commission, emphasized the commitment of the EU to fight food insecurity and malnutrition.

The EU contributes to food security, agriculture and rural development in the least developed countries of the world. To this end, the EU committed almost 3 billion euro through bilateral country programmes in 2010-2012. With the Technology Transfer Programme, Europe Aid provides 22 million euro for enhancing technology transfer on food security for poor farmers in the most food insecure countries of South and South-East Asia. The EU-funded SATNET Asia project that is supporting the Policy Dialogue is part of this initiative. The EU is also greatly engaged in the global fight against malnutrition and its coordination mechanisms, and it is the main initiator for The Global Scaling Up Nutrition Movement (SUN).

Ms. Nicolaie highlighted the importance of the High-Level Policy Dialogue in bringing together and engaging policymakers, scientists and development practitioners in a constructive dialogue to better reach smallholders with improved technologies and to promote sustainable agriculture. "The problems can't be solved within a day but this meeting can contribute to answering at least new questions," Ms. Nicolaie pointed out**.**

Constraints and opportunities for technology transfer to smallholders

During his keynote speech, Dr. Raghunath Ghodake, Director General, National Agricultural Research Institute (NARI), Papua New Guinea, highlighted key constraints and opportunities in technology transfer and adaptation processes for smallholder farmers.

Dr. Ghodake noted that the economies of scale are among the key constraints faced by smallholders that even affect scale-neutral technologies for technical efficiencies. Another constraints he noted was that research often focuses on certain issues, not the whole system approach. For example, programmes often emphasize improved food productivity, while farmers prioritize improved livelihoods. Such improved livelihoods/welfare are not always measured in terms of outputs (increased productivity) and outcomes (increased incomes). Non-farm activities including sociocultural aspects such as leisure must also be considered.

Another constraint is that biophysical technologies get assessed in partial contexts rather than in outscaled and upscaled contexts where demand and supply determine input and output prices. Partial analysis may indicate that technologies are efficient whereas, in the real world, they may not be. Finally, the necessary policy regime, institutional arrangements and enabling environment in terms of input supplies, output marketing, value chain, biosafety and

biosecurity, are often absent. Even though such measures might be in place, they are often not effectively facilitated and implemented.

There are significant opportunities for farmers to participate in agricultural innovations to improve sustainable resource use efficiency and increase welfare. Opportunities exist to build synergies and complementarities between various types of technologies. Planning and implementation of technology development through the Agricultural Research for Development (AR4D) paradigm can help achieve better impact.

Other opportunities relate to linking farmers to domestic and international markets, and enabling them to participate in value/supply chains and innovation processes. A range of partners and actors, such as NGOs, civil society, policymakers, the private sector, extension service providers and others, need to work together to deliver integrated actions that lead to overall improvement in livelihoods and welfare.

Lastly, Dr. Ghodake highlighted other challenges, such as how to: ensure farmer participation in research at all stages of technology development and adaptation of innovations; promote demand-driven research; protect smallholder farmers and balance competing interests of multinational and national companies; and provide access to innovations for small-scale farmers. “What is needed is facilitated or organized innovation,” Dr. Ghodake concluded.

Improving synergies among innovation, delivery and receiving systems

Dr. Kasdi Subagyono, Executive Secretary, IAARD, made his keynote remarks on behalf of Dr. Haryono, Director General, IAARD. Indonesian agriculture is dominated by smallholder farmers with low levels of education, operating on small areas of land of about 0.5 hectares. Dr. Subagyono noted that the number of smallholder farmers increases year by year. In 2012, Indonesia was home to 15.6 million smallholders compared to 13.7 million in 1993. Government policies therefore remain extremely important in supporting smallholder farmers.

IAARD, as a centre for agricultural research and development in Indonesia, realizes that a key issue in transferring technologies to Indonesian farmers lies in the variety of agroecological, cultural and socioeconomic conditions. Through its activities, IAARD develops new technologies suitable to these conditions and locations. Twelve IAARD research centres cover all areas of agricultural research. To deliver technologies from researchers to farmers, the organization has 33 Agricultural Technology Assessment Institutes (AIATs), which exist in every province in Indonesia.

Over the years, IAARD learned that for the technology innovation system to work for smallholders, it requires generation of appropriate, demand-driven or even market-driven technologies that are needed by farmers and other end users. As such, AIATs organize researchers and extensionists to work together and disseminate new

technologies to farmers. By involving farmers, AIATs conduct on-farm experiments at the village level so that farmers can directly learn how to apply new technologies and adopt them more easily. IAARD has also developed an approach called Multi-Channel Spectrum Dissemination that engages various stakeholders in technology dissemination by involving ministry-level institutions, local government, universities, the private sector and NGOs.

Dr. Subagyono stressed that creation of synergies among innovation, delivery and receiving processes is key for successful technology transfer. Small and medium enterprises (SMEs) can play an important role in this process. “A mutually beneficial business partnership between SMEs and smallholder farmers can be facilitated by providing incentives to drive more SME involvement in producing higher value added and profitable products,” Dr. Subagyono shared. “With higher value added, smallholders would also benefit and be encouraged to participate in the innovation process,” he concluded. To close his statement, Dr. Subagyono emphasized that it is necessary to continuously improve research and development and facilitate international cooperation to ensure that technologies are timely and serve the needs of smallholder farmers.

Supporting technology transfer in Fiji

During her keynote remarks, Mrs. Miliakere Nawaikula, Director of Research, Fiji Agriculture Research Division (FARD), Department of Agriculture, Ministry of Primary Industries, stressed that Fiji is a small country where technology transfer for smallholder farmers is still a main challenge. In addition, Mrs. Nawaikula said that the two main constraints that Fiji is currently facing are the lack of farmer extension worker resources and climate change issues.

However, Mrs. Nawaikula expressed that the Government of Fiji is now working to help smallholder farmers with existing resources in their communities. She shared a story about a programme in Fiji that is helping smallholder farmers to diversify their products for increased income generation in the long run. In the area of cassava production, the Government is helping farmers to process and develop cassava as an end product that could be sold in the market, leading to increased farmer incomes.

Agriculture officers in Bhutan participate in a capacity building activity
Source: BAFRA, Bhutan

How can advances in science and research better reach smallholders to promote sustainable agriculture?

The moderated discussion of the Policy Dialogue focused on how advances in science and research can better reach smallholders to promote sustainable agriculture. The panel included six guests, namely: H.E. Mr. Ghulam Sakhi Ghairat, Ambassador, Embassy of the Islamic Republic of Afghanistan; Dr. Kasdi Subagyono, Executive Secretary of IAARD, Ministry of Agriculture, Indonesia; Dr. Raghunath Ghodake, Director General, NARI, Papua New Guinea; Mrs. Miliakere Nawaikula, Director of Research, FARD, Fiji; Dr. Grace Wong, Senior Scientist, Forests and Livelihoods Programme, Center for International Forestry Research (CIFOR); and Ms. Ika N. Krishnayanti, International Relations Officer, Indonesian Peasant Alliance (API). Ms. Kate Lamb, Journalist, moderated the panel.

The Green Revolution has not covered all needs yet

Dr. Raghunath Ghodake stated that, despite much advancement in agriculture, there is still a need to focus on improving technologies. The Green Revolution, for instance, “didn't profit equally all the countries and we still find many neglected commodities, such as roots and tubers, or underperforming sectors such fishery and livestock.” Climate change is also generating new needs for research. Illustrating the technology needs in Fiji, Mrs. Miliakere Nawaikula underpinned that taro is one of the main crops in the Fiji islands. As such, it is a major staple food crop with both the foliage and root used as a food source. However, recurrent drought provoked by climate change and its effects on taro production is of great concern to the Fijians. The country needs drought-tolerant varieties of taro to better manage the effects of climate change and at the same time to help ensure food and nutritional security. Mrs. Nawaikula also pointed out that research on soil health and livestock feeding costs could greatly benefit farmers. Technology development in Fiji therefore needs to focus on these areas.

Technologies: Also a matter of adopting and adapting

Agricultural innovation is not only about finding the right technology, as reminded by Dr. Kasdi Subagyono. “How the technology is adapted and adopted matters as much,” he stressed. In a country as socioeconomically and agroecologically diverse as Indonesia, tailoring technology is certainly a major focus. Priorities also vary according to locations, as H.E. Mr. Ghulam Sakhi Ghairat illustrated. “After 40 years of war, our main focus for the moment is education, among other efforts in the agriculture sector,” he said. Afghanistan is also undergoing a necessary transition from opium farming, which implies promoting alternative crops and thereby adds on to the research needs at national level.

Farmers should be recognized as researchers

In our efforts to increase agricultural productivity, the way research engages with smallholder farmers needs to evolve, according to Ms. Ika N. Krishnayanti. “Researchers should look beyond the issue of production and productivity and encompass the area of processing and marketing,” Ms. Krishnayanti declared. As an example, Ms. Krishnayanti pointed out Ms. Maria Loreta, member of API's National Board of Peasants and Head of API's Peasant Women Committee, who was also present in the meeting. Ms. Loreta recently received an award for her conservation work

to protect local species as well as supporting successful rice adaptation by farmers in East Java to suit saline soil conditions. With this introduction, Ms. Krishnayanti stressed that “farmers should be recognized as researchers, and not only seen as scientific findings recipients.” Dr. Grace Wong stressed that participatory research has been underway in Indonesia for a number of years already. “It certainly worked well in some instances, but much less in areas where socioeconomic and biophysical constraints were high.” She concluded that the sustainability of research depends on the collaboration between research institutions, the private sector, NGOs and civil society.

Governments' role: A matter of synergy

Governments have a role to play in this collaboration too, according to H.E. Mr. Ghairat. By investing in education, infrastructure, and supporting foreign investment, they can create an enabling environment. Dr. Subagyono further elaborated that governments can influence that the right technologies reach smallholders by creating synergy between stakeholders and subsidizing initial investments that the farmers cannot finance on their own. Government can also facilitate market access, which certainly acts as a major bottleneck “as one can see in the soybean sector, which is neglected nowadays by farmers for the more profitable maize market,” added Dr. Subagyono.
In Indonesia, it is more profitable for farmers to produce maize. However, to reach the Indonesian Government's goal of being self-sufficient in rice, beef, sugar, corn, and soybeans by 2014, the Government needs to facilitate local production by providing incentives to local producers and linking them to markets.

“But how do farmers see government support?” was a question directed to Ms. Krishnayanti. “Unfortunately, what is seen at farmers' level is actually a lack of coordination between central and local governments,” responded Ms. Krishnayanti. She reminded participants that if farmers are turning their backs on soybean production, this is actually very much a result of import policies that profit US and Argentinian products at the expense of Indonesian soybean, despite its comparative quality advantage.

'One-for-all' policies are not an option

Dr. Wong observed that to create this enabling environment, specific policies should be supported in order to benefit smallholder farmers' access and adoption of agricultural technologies. A key aspect that should be taken into account is small-scale farmers' heterogeneity. “The one-for-all policies aren't working and must be replaced by declination to specific needs,” noted Dr. Wong. Outgrower schemes can be profitable to small-scale farmers in some remote areas if governments can provide the necessary incentives to larger plantations so that fair contracts can be established.
Dr. Wong noted that in other inaccessible regions, policies focusing on infrastructure and social net mechanisms will constitute the priority. Dr. Ghodake discussed limitations that policymakers face in designing and implementing these inclusive policies, and put forward time constraints for designing policies.

He also declared that: “policies should be prescriptive and descriptive and serve to empower farmers.”

The moderator invited questions from the audience that triggered reactions and feedback from participants. A participant re-emphasized the failure of mixed policies, stressing that small-scale farmers should have separate policies from large-scale farmers. It was noted that government should also protect small-scale farmers' markets and prescribe compulsory obligations from large-scale growers towards small-scale ones. Another participant initiated a debate over the role of the private sector. Dr. Subagyono added that governments cannot fix all farmers' needs and that much space was left for the private sector to address those gaps. Dr. Ghodake differentiated between large holders, who certainly have a role to play in exporting, processing and business, and service providers. To close the session, the moderator invited the panellists to emphasize once again their country priorities. In his attempt to determine the priority policy for small-scale farmers, Dr. Ghodake brought location specificity to the forefront once more when referring to Papua New Guinea. While climate change and resilient agriculture rank first in terms of Indonesian research needs, the private sector is more important for Fiji, and education is of top concern to Afghanistan.

Improved technologies benefiting smallholder farmers

Dr. Robert Holmer, Regional Director, The World Vegetable Center (AVRDC), East and South-East Asia, facilitated a session on improved technologies that have been proved to benefit smallholders.

How to pick the right technologies?

The identification of practicable technologies throughout the food system to sustainably improve the food and nutrition security for rural and urban populations in the Asia-Pacific region is a key issue. Agricultural extension agents and field workers find it difficult to get reliable and detailed information about innovations and technologies that are sustainable, productivity-enhancing and suitable for poor and vulnerable target groups. In her presentation, Dr. Simone Kathrin Kriesemer, Research Fellow, Food Security Center (FSC), University of Hohenheim in Germany, emphasized these complex issues and presented an analytical framework for identifying such technologies.

The SATNET Asia project collects agricultural technologies, evaluates their sustainability and suitability for poor and vulnerable people, and makes detailed information about these technologies available publicly. Once assessed and published, these successful technologies will be disseminated to other farmers and regions. The analytical framework to identify potentially suitable technology options and best practices was developed through SATNET Asia. It assembles three distinct tools for the collection and evaluation of technology options as well as for the validation of the evaluation results. The literature was reviewed to identify important criteria to assess the sustainability of technologies in the field of environmental, economic, and social sustainability as well as criteria that pertain to the technology itself. Main criteria were selected, integrated into the framework, and assigned weights of relative importance using the Analytic Hierarchy Process (AHP). Information about the sustainability criteria is collected for different technologies.

The assigning of weights to the framework criteria and contradicting viewpoints about the importance of some criteria were among the challenges encountered in the analytical work. To build consensus on the relative weights of criteria, selected experts will be consulted in a face-to-face meeting. This discussion will build on the results of the online survey based on weighting method and address any shortcomings in assigning consistent and concurring criteria weights. Regular calls for applications will be launched four times per year throughout the duration of SATNET Asia (2012-2014), so that the pool of available technologies can be enlarged successively.

In addition to collecting technologies through the calls for application, other online knowledge platforms providing information about agricultural technologies that could potentially be relevant to SATNET Asia are being screened. Technologies from other online sources and those identified from the literature are envisioned to be integrated into the knowledge base of SATNET Asia. This will include all collected technologies, along with fact sheets, descriptions of typical enabling environments, extension materials, recommendations for dissemination strategies, as well as links to regional experts.

In response to the presentation, one participant highlighted the importance of engaging

extension workers to understand which technologies are sustainable and which ones are not, since they are the ones that work directly with farmers. Dr. Kriesemer explained that there will be a comparison between technology and the 'scoring of technology', based on which sustainable technologies will be identified. A technology toolbox will be developed consequently and “extensionists for sure, will be involved,” Dr. Kriesemer pointed out.

For more information about the analytical framework, please contact Dr. Kriesemer at: sk.kriesemer@uni-hohenheim.de.

Cassava boom in South-East Asia

Dr. R.D.B Lefroy, Regional Coordinator and Upland Systems Specialist, International Center for Tropical Agriculture (CIAT), shared experiences from Cambodia and Lao People's Democratic Republic (PDR) in improving the sustainability, productivity and livelihood impacts of smallholder cassava production. He focused on the transformation of cassava from being a food crop to being a major cash crop. This is because cassava is increasingly being used as industrial raw material, providing animal feed and starch and modified starches for food, pharmaceuticals, adhesives, sizing, ethanol, and more. Thailand, followed by Viet Nam, have been the major leaders and beneficiaries of cassava. Other countries such as Cambodia, Lao PDR and Myanmar are now benefiting as well. Yet, research and extension remains relatively minor relative to the importance of this 'forgotten' or 'orphan' crop.

Dr. Lefroy referred to the impact of new cassava varieties on farmers as a 'cassava boom.' Improved varieties cover about 90 per cent of the area of planted cassava in Thailand and Viet Nam, the two largest exporters of cassava products. These varieties are now being adopted in many other countries in the region such as the three mentioned above. The key benefit is that minimal extension is required, if the planting material is available. Increased production, as a result of these improved varieties, has generated benefits worth about US$ 12 billion over the last two decades.

“But increased productivity, sustainability and livelihood impacts rely on more than varieties,” Dr. Lefroy stressed. “There is a need to adopt improved measures such as soil fertility management, soil erosion control, labour productivity, pest and disease management, links to market and multiple use options,” he pointed out. These require adjustment for location and active extension for adoption.

In response to the presentations, two participants were interested to know more about sustainable cassava. For example, what the average yield of cassava is when there is a major pest problem, and whether there is any correlation between the use of chemical fertilizers and increased yield under such conditions. According to Dr. Lefroy, the average production is 22-23 t/ha in Thailand and 17-18 t/ha in Cambodia. There is no evidence about the correlation between the use of fertilizers and increased yields. One participant shared an example from East Timor where farmers are able to produce 100 tons of cassava per hectare, especially in highlands, with a high level of photosynthesis. But Dr. Lefroy was sceptical. According to him, even when applying 50 tons of organic matter, one can only harvest 30-35 tons of cassava per hectare.

For more information, please contact Dr. Lefroy at: r.lefroy@cgiar.org.

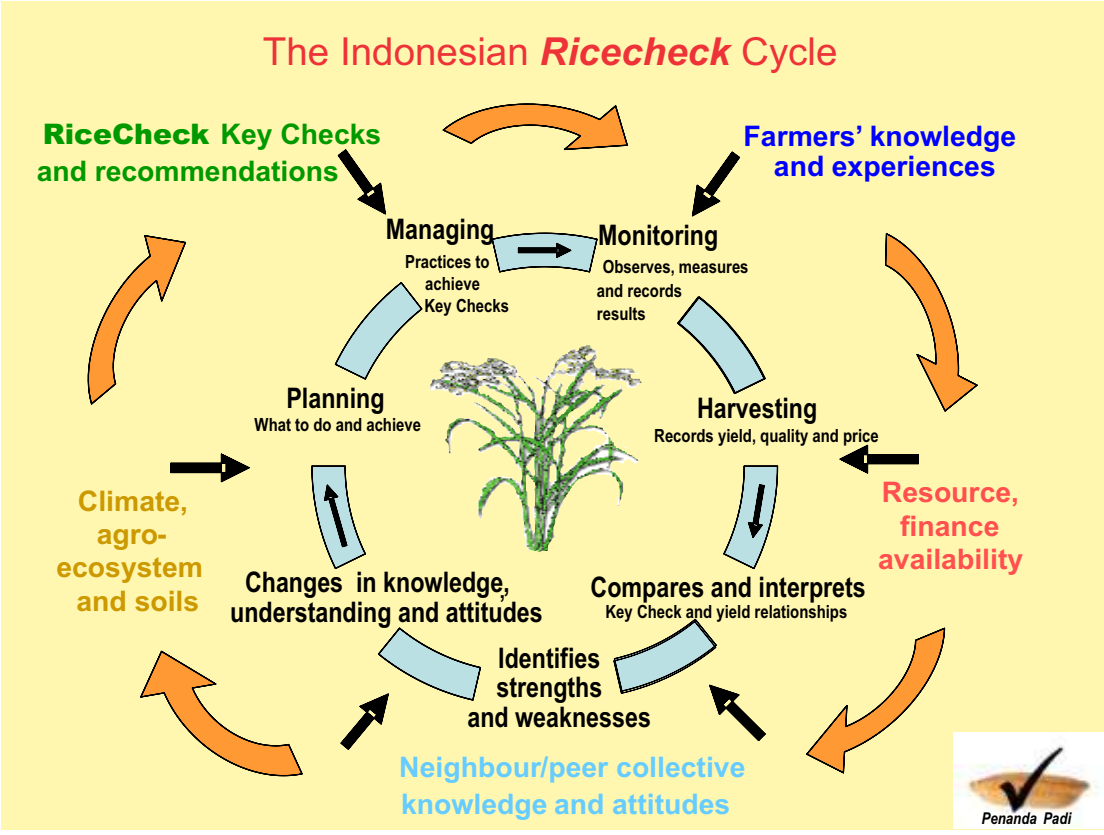
Indonesian Ricecheck procedure

Mrs. Erythrina, Agronomist/Senior Researcher, Indonesian Center for Agricultural Technology Assessment and Development (ICATAD) and

Dr. Zulkifli Zaini, IRRI Liaison Scientist for Indonesia and Plant Nutrient Specialist, Indonesian Center for Food Crops Research and Development (ICFORD), introduced the Ricecheck procedure to accelerate adoption of integrated crop management in Indonesia.

Ricecheck is a dynamic rice crop management system that enables to compare results of farmers' practice with best practice, and to learn through farmers' group discussions to sustain improvements in productivity, profitability and environmental safety.

The Ricecheck system in support of integrated crop management is based on the principle that yields would improve as adoption of the ten Key Checks increased. The most important feature of Ricecheck is to encourage farmers to monitor their crops to see how the crops compare to these Key Checks. The purpose of the ten Key Checks is to: (i) use locally-appropriate cultivars; (ii) use certified seeds with high vigour; (iii) ensure effective



Source: ICATAD/ICFORD

levelling and tillage management; (iv) synchronize seeding of the nursery; (v) establish sufficient plant population to ensure adequate grain-sink size for farmers' target yield; (vi) achieve enough tillers at panicle initiation; (vii) avoid excessive water or drought stress; (viii) ensure no yield loss due to pests; (ix) harvest at the right time; and (x) thresh at the right time.

In a two-season Ricecheck assessment engaging 78 farmers, grain yield and gross margin increased with the number of achieved checks. Farmers who achieved four Key Checks obtained 5.0 t ha-1 grain yields. Yields boosted to 8.0 t ha-1 as the number of performed Key Checks went up from 4 to 9. Achievement of all nine checks resulted in a 59 per cent increase in grain yield and a 91 per cent increase in gross margin. Farmers strive to adopt the Key Checks in order to improve yields. The assessment confirms that adopting more checks leads to higher yields.

Two participants responded to the presentation. It was noted that thousands of Indonesian farmers have been trained in integrated pest management (IPM). However, it was not clear whether the same farmers will also be trained in Ricecheck. According to Dr. Zaini, Ricecheck is one of the technology components of IPM. IPM addresses how to effectively use pesticides. However, there is a need to integrate all technologies, not only IPM but also others, to increase rice production. It was also pointed out that Bangladesh uses a similar tool called 'loan-check.' Experience shows that if the check process is managed by the Government, it might not necessarily be useful to farmers. Dr. Zaini responded that in Indonesia, research institutes work with formal farmers' groups that receive a subsidy from the Government, as well as together with extension workers.

For more information, please contact Mrs. Erythrina and Dr. Zaini at: Erythrina_58@yahoo.co.id and z.zaini@irri.org.

Herbal pesticide technology for controlling insects and pests in vegetable crops

Mr. Pawan K. Singh, Innovation Officer and Scientist, Sadbhav SRISTI Sansodhan Laboratory and National Innovation Foundation (NIF) in India shared a successful example of a land-to-lab-to-land approach.

India accounts for 15 per cent of total global vegetable production. However, vegetable plants suffer heavily due to infestation of sucking pests, shoot and fruit borers, viral attack, fungal and bacterial infections. Farmers around the world rely mainly on chemical pesticides, spending about US$ 9 million per year. Excessive use of pesticides has created many threats such as elimination of beneficial insects, depletion in microbial diversity, resistance in pests and deposition of toxic residues.

SRISTI, with the help of NIF-India has documented a large number of herbal agricultural grassroots practices for controlling insects and pests. It engaged in validation of claims of innovators and developed value added eco-friendly products.

Sristi Sarvatra is a herbal alternative to chemical pesticides
Source: NIF-India

One of their key outcomes is the development of a herbal pesticide called SRISTI Sarvatra. It implies a simple and fast production, low cost equipment and can be easily adapted and produced in the field. It is cheaper than other herbal pesticide products. SRISTI Sarvatra is now being used by farmers in different areas of Gujarat.

For more information, please contact Mr. Singh at: pawan@nifindia.org.

The paddy thresher and zero-tillage drill

Dr. Usman Mustafa, Chief, Project Evaluation and Training Division, Pakistan Institute of Development Economics (PIDE), Pakistan, presented the importance of mechanization for Pakistan's national economy, two technologies in particular. Use of the zero-tillage (ZT) drill significantly reduces the cost of land preparation. The Paddy Thresher (PT) is important to reduce the high labour cost, save time and help improve rice quality.

The Agricultural and Biological Engineering Institute (ABEI) located at NARC of PARC has designed and developed the ZT drill and PT to suit farming conditions. To date, it has made 5,500 ZT units available to farmers. During 2010, the ZT drill was used on 0.325 million hectares out of 2 million hectares for sowing wheat. Recently, its price decreased mainly due to higher production, improved design and materials.

The development process of the ZT drill continues and requires a close collaboration among international, national and local stakeholders. ABEI played a pivotal role in development and dissemination of locally-demanded machines. A national network for agricultural mechanization needs to be established to coordinate farm machinery and research and development activities for efficient utilization of available resources along with new proposals to meet farmers' needs.

The Paddy Thresher reduces the labour cost, saves time and helps improve rice quality
Source: PIDE

Dr. Mustafa also stressed the important role of the private sector, which should be particularly encouraged to contribute towards mechanization of Pakistan's agriculture sector.

For more information, please contact Dr. Usman Mustafa at: usman@pide.org.pk.

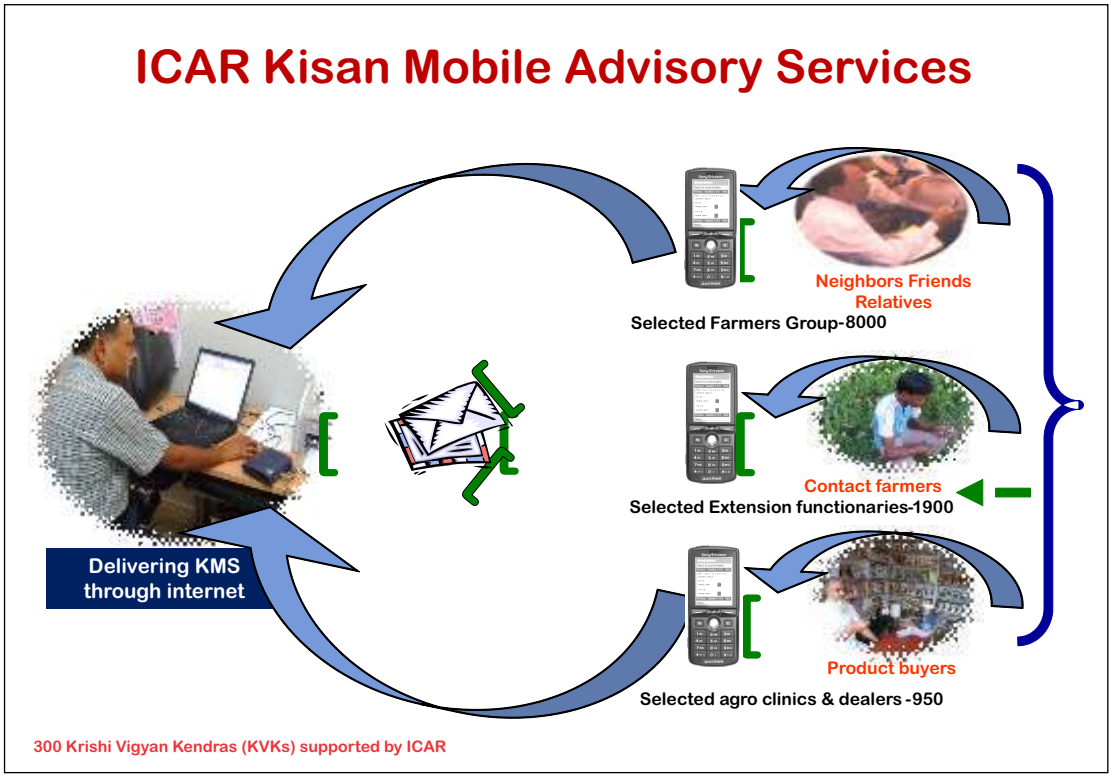
Improved processes to enhance adoption of technologies by smallholder farmers

Dr. Detlef Virchow, Executive Manager, FSC, University of Hohenheim, Germany, facilitated the session on improved processes to enhance adoption of technologies by smallholder farmers. Four presenters shared successful examples of such improved processes.

Mobile extension for empowering smallholder farmers

Dr. K. D. Kokate, Deputy Director General (Agricultural Extension), Division of Agricultural Extension, Indian Council of Agricultural Research (ICAR) in India, showcased how the broad use of mobile phones has been used by ICAR to deliver new information and technologies to farmers in India. ICAR cooperates with nine telecommunication providers to facilitate information sharing on what farmers need. Dr. Kokate noted that this project has brought many benefits to farmers.

For example, farmers can now communicate directly through text or voice messages with extensionists or experts. The project provides useful information in English, Marathi and Hindi languages. The information covers disease diagnosis, seed availability, updates on commodity and market prices, farming techniques, weather forecasts, availability of fertilizers and many other issues. The success of this project lies in ICAR's commitment to serve farmers by sending messages every



Source: ICAR

Tuesday and Friday (two messages per farmer per week) and providing this service free of charge, without posing extra expenses on farmers.

For more information, please contact Dr. Kokate at: kdkokate@gmail.com.

Solar powered aeration technology transfer for fish farmers

A student from the Department of Engineering Physics, Faculty of Engineering, Gadjah Mada University, Yogyakarta in Indonesia – Mr. Agus Setiawan – shared his perspective on technology transfer for fish farmers, together with his professor – Dr. Ahmad Agus Setiawan. They stressed that successful technology transfer springs from

A student is assisting farmers in nursery preparation
Source: Gadjah Mada University

good communication, which must be clear, honest and receptive. The higher the level of technology, the more intense the required communication is with farmers. This particular project was conducted in the aquaculture centre in Sleman, Yogyakarta, Indonesia. It is based on collaboration between undergraduate students under the supervision of their lecturer, and an expert from the Student Community (SCS) Services Programme.

The project disseminated solar powered aeration technology to fish farmers to help aeration in fish breeding and to assist future research projects on application of renewable energy. Local students assisted their community in project implementation as a way of bridging communication between academic, private and public institutions. They believe that their involvement can contribute to sustained relationships and collaboration among all stakeholders as an advantage in the future. The project received appreciation from participants as it empowers local students by involving them in technology transfer. It also provides a great opportunity to build students' technical and communication skills.

For more information, please contact Mr. Agus Setiawan and Dr. Ahmad Agus Setiawan at: syiluani@yahoo.com and a.setiawan@ugm.ac.id.

Decentralizing the farmer-to-farmer extension approach

Government extension services can sometimes be ineffective, inefficient and irrelevant for technology transfer, especially in remote areas. To address this issue, HELVETAS Swiss Intercooperation working in Nepal showcased how farmers are trained to provide agricultural extension services to other farmers by decentralizing the farmer-to-farmer extension approach.

Mr. Shiva Kumar Shrestha, Senior Programme Officer, Sustainable Soil Management Programme, HELVETAS Swiss

Intercooperation presented the project and highlighted its success in empowering local farmers as extensionists. The farmer-to-farmer approach has proved to be cost-effective in terms of its service delivery mechanism, especially in remote areas. Ensuring transparency in planning and budgeting garnered local support for this project.

To conclude, Mr. Shrestha noted some remaining challenges in agricultural extension. These include: limited capacity of local officials to support farmers; elite and political influences of the village development committee that might lead to funds being allocated to other sectors, particularly to infrastructure; and a gap in ensuring a pro-poor focus on policies relating to agricultural extension and decentralization policy.

For more information, please contact Mr. Srestha at: shiva.shrestha@helvetas.org.np.

Indigenous knowledge system and organic technologies: Farmers' access to community technology learning in the Philippines

Dr. Gina Villegas-Pangga, lecturer from the Farming System and Soil Resource Institute, Agricultural System Cluster, College of Agriculture, University of the Philippines, Los Baños, Philippines talked about indigenous agricultural practices in lowland and upland Filipino communities that have never been recognized and are being replaced by modern technologies.

“Local or indigenous knowledge is the knowledge belonging to a specific community or local group and that the people in a given community have developed over time, and still continue to develop,” said Dr. Villegas-Pangga. She provided evidence on existing farming practices and technologies that are environment-friendly, economically viable and that promote sustainable agriculture. Dr. Villegas-Pangga stated that documenting this information contributed to improved capacity of farmers, organic practitioners and other stakeholders in solving issues related to soil productivity. It also contributed to enhancing farmers' responsiveness to the weakening balance of the agroecosystem due to intensive agriculture.

Traditional *banderitas* keep birds away from rice fields.
Source: University of the Philippines

One example of an indigenous practice is the use of synthetic and natural materials such as *banderitas* (small flags as on the picture above) made from plastic or garments of different colours, sizes and shapes. These are attached to a long rope or plastic twine and placed across rice fields. The noise and movement created by the banderitas, as the wind passes through them, frightens birds and prevents them from feeding on maturing rice grains. The project concluded that the majority of Filipino farmers in the area were encouraged to adopt and adapt farming practices and technologies if their efforts led to an immediate economic yield. Some farmers are already obtaining organic certification from institutions such as the Organic Certification Center of the Philippines (OCCP).

For more information, please contact Dr. Villegas-Pangga at: gpangga@yahoo.com.

Role of markets and value chains to support smallholders to access agricultural technologies

Dr. Upali Wickramasinghe, Regional Adviser on Poverty Reduction and Food Security, CAPSA, led discussions on the role of markets and value chains to support smallholders to access agriculture technologies. He stressed that the world has over 500 million smallholder farmers who own land on less than two hectares and who often occupy marginal land far from markets, extension and basic services.

Issues around smallholder farmers are complex and interlinked within socioeconomic and political systems. The purpose of this session was to simplify these issues through research and case studies related to market and value chain options to support smallholders. To set the stage, Dr. Wickramasinghe shared an example of farmers from remote areas of Papua New Guinea, who transport their produce (especially peanuts) to market by river using simple rafts made with inner tubes from truck tyres. Once arrived, women spend the whole night in the market without any facilities to sell their produce the next day. These are the types of people and communities we need to work with and promote market participation to improve their living standards.

Involving the private sector to commercialize biofertilizer in Bangladesh

Mr. Md. Nurul Amin, Director – Operations, International Development Enterprises (iDE) Bangladesh, presented a case study on involving the private sector to commercialize Bradyrhizobium (biofertilizer) technology and the impact on soybean production in Bangladesh. iDE brings small-scale manufacturers and service providers together to promote agricultural technology by utilizing a market-based approach called 'Making Markets Work Better for the Poor (M4P)', the original framework of which has been developed by the UK Department for International Development (DFID) and Oxford Policy Management (OPM) in 2000. The framework encourages better analysis and understanding of the role of markets in achieving pro-poor growth to identify ways of strengthening the pro-poor functioning of markets and to guide policy formulation[1].

Most development interventions bypass the market system and deliver services without involving private investors. Thus, when the project finishes, the effects of these efforts cannot be sustained in the long run. The market mechanism can function well when linkages between producers and the private corporate sector are strong. Mr. Amin also stressed the concept of the 'Valley of Death' where a government-funded research project conducts research but fails to bring in private entities for dissemination of technology. On the other hand, the private sector shows limited interest to invest in basic research if it sees no clear benefit for itself.

[1]UK Department for International Development (DFID) and Oxford Policy Management (OPM), 2000. 'Making markets work better for the poor. A framework paper.' DFID and OPM. London

In Bangladesh, the Department of Agricultural Extension (DAE) has developed biofertilizer technology and implemented it on a small scale since the 1970s. But because there was no private sector entity that would market the technology, its development stopped. In response, iDE brings together sellers of agricultural inputs, monitors the demand for biofertilizer and communicates the demand to DAE. DAE includes iDE's information in its planning process for the production and marketing of the biofertilizer.

The research conducted by iDE shows positive results by proving a 15 per cent yield increase of soybean if using the biofertilizer. It also demonstrates a 15 per cent increment in farmers' income, however, other factors contributed to this improvement as well. With the growth of poultry development in Bangladesh, the demand for soybean has been boosting significantly. The use of biofertilizer has been increasing proportionately. Because the programme is in a very early stage, it is too early to draw conclusions on commercialization of and policy recommendations for the biofertilizer. However, it is clear that DAE cannot produce the required quantity of this biofertilizer. Hence, it needs to bring the private sector into the process to promote scaling up.

The presentation stimulated a number of reactions. Firstly, participants from Sri Lanka and Malaysia were interested in what has been used as a nitrogen source in the absence of biofertilizer. According to iDE, farmers have used cow dung and urea as the main fertilizer. However, biofertilizer can replace urea given its promising results with soybean production. As long as the technology is available, affordable and accessible, the farmers will adopt it.

Some concern was expressed about how multinational corporations are driving contract farming by providing imported technology and inputs; in particular, how farmers' interests might be protected in this context. According to iDE, the private sector and service providers from different sectors need to work together to provide required packaged inputs for small-scale farmers. Another concern raised by participants from Bangladesh and Myanmar referred to why the production of biofertilizer has not been picked up. Mr. Amin responded that this limitation might lie in its short shelf life compared to chemical fertilizer. This seems to be one of the reasons why private investors do not want to engage in its production. There is no subsidy from the Government to motivate the private sector to produce biofertilizer. Since chemical fertilizers play an important role in the farming system, the issue of how to engage more private companies in the production of biofertilizer remains a challenge.

For more information, please contact Mr. Amin at: Nurul.amin@ide-bangladesh.org.

Diversifying agriculture to high-value crops in the Central Indian Tribal Belt

Mr. Kumar Ayan Deb, Coordinator of Knowledge, Monitoring and Learning, Collectives for Integrated Livelihood Initiatives (CiNi), India, presented a joint study conducted by CiNi and BAIF Development Research Foundation (formerly registered as the Bharatiya Agro Industries Foundation) on the experience of diversification of agriculture to high-value crops with smallholders in the Central Indian Tribal Belt.

The objectives of the study were to: (i) identify innovative models benefiting small and marginal farmers through short gestation land-based interventions on small plots; (ii) conduct a situational analysis of factors facilitating adoption of high-value agriculture by poor farmers; (iii) provide a source of learning for

A farmer demonstrating trellis-based vegetable cultivation
Source: CiNi

practitioners and policymakers for improved programme design.

The presenter stressed that the trial was not intended to secure seeds for farmers as farmers rely on private companies for seed supply. The cultivation of high-value crops focused on lowlands where land is easy to access. As part of the study, CiNi analysed models such as agro-horti-forestry promoted by BAIF Development Research Foundation, creeper-based vegetable cultivation promoted by Sadguru Foundation and market-oriented year-round vegetable promotion promoted by Professional Assistance for Development Action (PRADAN).

Agro-horti-forestry
Forest trees are long-term crops that do not generate short- and medium- term income. Thus, to help farmers earn short-term income, BAIF Development Research Foundation introduced a jasmine plantation for 2,000 households. As the local market could not absorb the production, BAIF helped organize collective access to the regional market in New Delhi. Training of local people and logistical support played a vital role in enabling jasmine farmers to access the regional market.

Creeper-based vegetable cultivation
The creeper-based vegetable cultivation project was initiated by Sadguru Foundation in Dahod, Gujarat for 2,000 households. The key strategy involved providing individual support such as initial support costs and quality monitoring. The products are mainly targeted for the local market where a high demand for vegetable creeper plants already exists.

Market-oriented year-round vegetable promotion
PRADAN initiated the project on market-oriented year-round vegetable promotion for 3,000 households. The key strategy was organizing an agriculture production cluster, establishing a common nursery and collective procurement system to ensure the right quality, quantity and timing.

The presenter highlighted that 96 per cent of early adopters are families with secured food from their own farm. The use of family labour reduced the cost of production as two to three family members are engaged in agriculture. This experience, as well as an effective organizational approach that emphasized the importance of perseverant effort, creative use of subsidy, learning, capacity-building at extensionist and farmer levels, and market access to timely inputs, contributed to the success of the project. As a result, the participating households were able to increase their income by 80 per cent compared to the baseline. Today, vegetable cultivation in the project area contributes to over 50 per cent of the overall income of participating households.

However, there have been some areas that still need to be explored, such as the reasons for early and late adoption, drop outs, risk mitigation, post-harvest losses and links with government policy on revitalization of Green Revolution lessons and the interests of smallholder farmers.

For more information about the analytical framework, please contact Mr. Deb at: ayan.d@cinicell.org.

Reflections on the Policy Dialogue

Ms. Kate Lamb and Ms. Martina Spisiakova, who moderated the final session, selected ten participants to share their reflections on what they learned during the meeting, what they are taking home and most importantly, what opportunities they see for applying this knowledge in their respective work areas.

Mr. Bruce Wallner, Counsellor of Agriculture, Australian Embassy, shared that technology transfer is not just about technology. It is about the production system, how to add value to small farmers, how to access and transfer technologies. “Today we learned that support to rural communities is needed, for example, in the form of subsidies from government,” he reflected. “We have also learned from the good experiences of our scientists,” he pointed out. He concluded by asking about whether policymakers have to just build new things or maintain existing technologies.

“What I have learned during this one-day meeting are other possible technologies that can help our smallholder farmers to compete with imported products,” reflected Mr. Tengku Dato' Mohd Ariff, Director, Economy and Technology Development Research Institute, Malaysian Agricultural Research and Development Institute (MARDI). In addition, he learned about economic issues, incomes in particular, of smallholder farmers. “As technology transfer has become more challenging and the needs for technologies are increasing, the framework of technology transfer has to change to be more participatory,” he added.

Representing the NGO sector, Ms. Ohnmar Khaing, Coordinator, Food Security Working Group (FSWG), Myanmar, shared that her key learning was how to strengthen or build up the abilities and skills of smallholder farmers to absorb new technologies. She stressed that: “Agricultural investment and development have to respect the socioeconomic conditions and culture of smallholder farmers.”

Mr. Tashi Samdup, Director, Council for RNR Research of Bhutan (CoRRB), found all presentations and discussions very important. However, knowledge transfer remains the most important of all. “I have learned that the Government of Nepal is facing challenges with human resources and providing financial support to smallholder farmers. To address this challenge, it has engaged the private sector to provide them with support,” he said. “This is a good lesson learned for us in Bhutan,” he concluded.

The most important lesson that Mr. Tek Bahadur Gurung, Director, Livestock and Fisheries, Principal Scientist, Nepal Agricultural Research Council (NARC), is taking home is that the agricultural system in mountain areas costs around two to three times more than in other areas. “I have also learned about organic and non-organic farming as well as lessons from the Green Revolution,” he added.

“Technology transfer needs the cooperation of all stakeholders,” according to Mr. Ty Channa, Deputy Director, Cambodian Agricultural Research and Development Institute (CARDI), Ministry of Agriculture, Forestry and Fisheries. The links between extension workers, researchers and policymakers are crucial. He stressed that the process of gathering information and then prioritizing the most appropriate technologies, as introduced by SATNET Asia, is important to avoid confusion among farmers.

Mr. Eklavya Prasad, Managing Trustee, Megh Pyne Abhiyan (MPA), India, represents an organization that works in flood-prone areas of North Bihar and that has a substantial population of smallholders. “The space created by CAPSA has reiterated and strengthened our resolution towards an 'out of the box' approach to technology transfer,” he reflected. “At the outset of the Policy Dialogue, I was extremely sceptical as generally, discussions around technology transfer are technology-centric and heavy,” Mr. Eklavya admitted. “But it was heartening to be part of a balanced discourse where processes were given the same importance as technologies,” he added. While he agreed that process-oriented work can be time consuming, it can generate far more impact on smallholder farmers and ensure sustainability. He encouraged participants to continue this debate and highlight these crucial aspects of technology transfer on a regular basis so that this 'out of box' thinking can lead to positive results.

“One thing that I learned is how to moderate the conflict issue arising from technology transfer,” highlighted Dr. Iftikhar Ahmad, Chairman, PARC. “Smallholder farmers have different levels of knowledge and understanding and that is why the creation of the environment to enable farmers to absorb technologies is quite important,” he stressed. “I also learned about experiences in advocacy that make me think about advocating these issues with my Government to focus more on smallholder farmers,” he added. In his final remarks Dr. Ahmad stressed that market access of smallholder farmers still remains a major problem, which needs to be continuously addressed.

“The issue of land access and country experiences of how the Government can help farmers interested me most,” shared Dr. Zulkifli Zaini.

“The focus on rural farmers is becoming more and more important for policymakers in governments as well as researchers,” shared H.E. Mr. Ratu Seremaian Tunausori Cavuilati, Ambassador, Embassy of the Republic of Fiji. “What researchers and extension workers should know is what technology transfer or climate change mean to the farmer,” he pointed out. He concluded that knowledge transfer and the focus on South-South cooperation is very significant and needs to continue.

Finally, Mr. Shun-ichi Murata reflected on the day-long discussions. He emphasized the need to think about the economic, social and environmental aspects of technology transfer. Moreover, the gap between researchers, policymakers and farmers must continue to be addressed. “Rural development requires a long-term development infrastructure rather than a short-term one,” he said. “Another point to think about is the direction of the technology transfer. Who will we target as extension workers? Young rural people or the old people?” he pointed out when referring to rural-urban migration in the view of more attractive opportunities in cities.

Closing the dialogue

Shifting attention from technologies to processes

"Are we changing the way we think and act?" This question was raised by Dr. Katinka Weinberger, Director of CAPSA, in her closing remarks. While there is agreement that a paradigm shift is required to ensure that our food systems produce safe and affordable food for all, we may not be doing enough to make that shift happen fast enough to help smallholders adapt to the challenges our world is facing.

In responding to these issues, Dr. Weinberger emphasized a shift towards more attention being paid to processes, rather than on technology development only. However, she underlined that there continues to be scope for improving these processes for technology transfer, in particular in the way farmers are considered as partners in the discussion. She stressed that technology transfer should not to be seen in isolation, but that there needs to be a connection in terms of provision, delivery and end users of technologies, including looking beyond production and productivity and addressing processing and markets. Dr. Weinberger urged all participants to work together to enable farmers to have access to the right technologies as well as the accompanying processes to put the technologies into use.

"This very eventful day highlighted two bottom lines of agricultural research: how to innovate without duplicating already established technologies, and how to ensure that this knowledge benefits smallholder farmers," she stressed. She registered a very strong agreement that technologies need to be location-specific and adapted to specific situations. In terms of policies, there was a strong call to distinguish between agricultural policies for subsistence and small-scale producers, and policies for farmers that are well integrated into markets. To conclude, four key outcomes emerged from the meeting:

Improved technologies AND improved processes

In the past half-century, the Asia-Pacific region has made tremendous progress in food security. Across the region, farmers have boosted agricultural productivity and outputs, especially of rice and wheat, making food available at affordable prices and lifting millions out of hunger. Nevertheless, the region still faces persistent poverty and hunger. It is home to about 65 per cent of the world's hungry people. Therefore, despite much advancement in agriculture, there is a continued need to focus on improving technologies due to unequal benefits of the Green Revolution, the existence of many neglected commodities, an underperforming fishery and livestock sector, as well as an urgent need to address climate change adaptation and mitigation.

However, technological innovation needs to be addressed in the context of adoption and adaptation. Therefore, much more focus needs to be on processes, including access to credit, support to cooperatives and infrastructure. Technologies need to be tailored to countries that are socioeconomically and agroecologically diverse and address their local conditions.

Empowering farmers

Governments have in the past often neglected the roles and rights of farmers and farmers still have relatively limited involvement in the formulation of national policies for the agricultural sector. Although farmer empowerment has been put on the agenda, a consistent strategy that contributes to the empowerment of farmers and strengthens civil society is still lacking in many countries of the region. Given that smallholders are the backbone of agriculture in the Asia-Pacific region, if rural poverty is to be alleviated it is necessary to increase production, create employment, and increase demand for services in rural areas to support economic development processes. For this to happen, there must be a process of dialogue between government and the farmer community as equal partners. While it is recognized that the process of effective technology transfer needs to go hand in hand with empowering farmers to adopt improved technologies, we are yet to fully recognize farmers as providers and not only recipients of research and give farmers the necessary space to share their views and findings. Supporting mobilization and strengthening of farmer organizations can be an effective means to achieve farmer empowerment. In addition, facilitating the access of farmers to information, networking and linking them to other organizations at the same or higher levels, and providing support to groups for development of service provision were all discussed during the Policy Dialogue as viable mechanisms to strengthen and support farmers and thus facilitate the process of technology transfer.

Developing business partnerships

Effective agricultural innovation systems that work for smallholders require generation of appropriate, demand- or market-driven technologies. Yet, many development interventions bypass the market system and deliver services without involving the private sector. Many participants stressed that private companies can play an important role in delivering successful innovations to smallholder farmers. However, while investing in production and productivity, we also need to promote technologies through processing, marketing and scaling up. This can help facilitate market access and production of products that are marketable. Without these actions, some participants were concerned that technology transfer will be less effective. Collaboration with the private sector can also contribute to sustainability of agricultural research. Some participants felt that governments cannot fix all farmers' needs and that greater involvement of the private sector could help fill those gaps. The private sector therefore could become an important partner of other development actors such as government, NGOs, civil society, extension services and others, in delivering integrated actions together leading to improved rural livelihoods and overall welfare.

Governance for sustainable agriculture

It is unlikely that great strides towards sustainable agriculture will be made without substantive government buy-in and strong public investment into the sector. Governments need to respond to continuing food price volatility and keep food prices affordable while also supporting adequate scientific, technical, policy and institutional options that address a degraded and shrinking natural resource base. In the context of technology transfer, investment into research, education and infrastructure is required. Also, bottlenecks related to markets and value chains need to be addressed to facilitate smallholder market access. This can include the promotion of fair contracting between intermediaries and small farmers. Furthermore, the provision of financial and fiscal incentives to SMEs could help facilitate a mutually beneficial business partnership with smallholders. This could drive SME investment and involvement in producing higher value added and profitable products that would benefit smallholders and increase their participation in value chains and agricultural innovations. Some participants in the dialogue pointed out that coordination between central and local government is a critical area that needs improvement to ensure better implementation and enforcement of policies and thus support technology transfer to farmers. Much discussion during the meeting also centred on the need for specific policies to reflect the heterogeneity of farmers. There was strong agreement that rather than implementing one-for-all policies, different policies need to be implemented for subsistence and small-scale farmers and for farmers that are well integrated into markets.

Annex 1. Agenda

8:30 Registration

9:00 **Opening remarks**

Moderator: Ms. Kate Lamb, Journalist

- Mr. Shun-ichi Murata, Deputy Executive Secretary of the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP)
- Dr. Ir. Haryono, Director General, Indonesian Agency for Agricultural Research and Development (IAARD), Ministry of Agriculture, on behalf of H.E. Dr. Rusman Heriawan, Vice Minister of Agriculture, Government of Indonesia
- Ms. Adelina Nicolaie, Programme Manager, Technology Transfer for Food Security in Asia, European Commission, Directorate-General for Development and Cooperation EuropeAid, Brussels

9:30 **Keynote remarks**

Moderator: Ms. Kate Lamb

- Dr. Kasdi Subagyono, Executive Secretary, Indonesian Agency for Agricultural Research and Development (IAARD) on behalf of Dr. Haryono, Director General of IAARD, Ministry of Agriculture, Indonesia
- Mrs. Miliakere Nawaikula, Director of Research, Fiji Agricultural Research Division, Department of Agriculture, Ministry of Primary Industries, Fiji
- Dr. Raghunath Ghodake, Director General, National Agricultural Research Institute (NARI), Papua New Guinea

10:00 Coffee break / Photo session

10:30 **Moderated discussion**

Moderator: Ms. Kate Lamb

How can advances in science and research better reach smallholders to promote sustainable agriculture?

- H.E. Mr. Ghulam Sakhi Ghairat, Ambassador, Embassy of the Islamic Republic of Afghanistan
- Dr. Ir. Haryono, Director General, Indonesian Agency for Agricultural Research and Development (IAARD), Ministry of Agriculture, Indonesia
- Ms. Miliakere Nawaikula, Director Research, Fiji Agricultural Research Division, Department of Agriculture, Ministry of Primary Industries, Fiji
- Dr. Raghunath Ghodake, Director General, National Agricultural Research Institute (NARI), Papua New Guinea
- Dr. Grace Wong, Senior Scientist, Forests/Livelihoods Programme, Center for International Forestry Research (CIFOR)
- Ms. Ika N. Krishnayanti, International Relations Officer, Indonesian Peasant Alliance

12:00 Lunch

13:00 **Parallel presentations on research activities**

Improved technologies that have been shown to benefit smallholder farmers (Royal Ballroom)

Facilitator: Dr. Robert Holmer, Regional Director, The World Vegetable Center (AVRDC) – East and South-East Asia

- How to pick the right technologies? Assessing high potential agricultural innovations for sustainability, Dr. Simone Kathrin Kriesemer and Dr. Detlef Virchow, Food Security Center, University of Hohenheim, Germany
- Improving the sustainability, productivity and livelihood impact of smallholder cassava production – Experience from Lao People's Democratic Republic and Cambodia, Dr. R. D. B. Lefroy, Regional Coordinator and Upland Systems Specialist, Centro Internacional de Agricultura Tropical (CIAT)
- Herbal pesticide technology for controlling insects and pests in vegetable crops, Mr. Pawan K. Singh, Innovation Officer/Scientist, Sadbhav SRISTI Sanshodhan Laboratory and National Innovation Foundation, India
- Indonesia ricecheck procedure: approach for acceleration of adoption of integrated crop management, Ms. Erithrina, Agronomist/Senior Researcher, Indonesian Centre for Agricultural Technology of Assessment and Development (ICATAD), and Dr. Zulkifli Zaini, IRRI Liaison Scientist for Indonesia and Plant Nutrient Specialist, Indonesian Center for Food Crop Research and Development (ICFORD), IAARD, Indonesia
- The paddy thresher and zero tillage drill – Experience from Pakistan, Dr. Usman Mustafa, Chief, Project Evaluation and Training Division, Pakistan Institute of Development Economics (PIDE), Pakistan

Improved processes to enhance adoption of technologies by smallholder farmers
(Botany 1 & 2)

Facilitator: Dr. Detlef Virchow, Executive Manager, Food Security Center, University of Hohenheim, Germany

- Mobile extension for empowering smallholder farmers, Dr. K. D. Kokate, Deputy Director General (Agricultural Extension), Division of Agricultural Extension, Indian Council of Agricultural Research (ICAR), India
- Solar powered aeration technology transfer for fish farmers – A student perspective, Mr. Agus Setiawan and Dr. Ahmad Agus Setiawan, Department of Engineering Physics, Faculty of Engineering, Gadjah Mada University, Yogyakarta, Indonesia
- Decentralizing the farmer-to-farmer extension approach to the local level, Mr. Shiva Kumar Shrestha, Senior Programme Officer, Sustainable Soil Management Programme, HELVETAS Swiss Intercooperation, Kathmandu, Nepal
- Indigenous knowledge systems and organic farming technologies – farmers access to community technological learning in the Philippines, Dr. Gina Villegas-Pangga, Farming Systems and Soil Resources Institute, Agricultural Systems Cluster, College of Agriculture, University of the Philippines Los Baños, Philippines

Role of markets and value chains to support smallholders to access agricultural technologies (Botany 3)

Facilitator: Dr. Upali Wickramasinghe, Regional Adviser on Poverty Reduction and Food Security, Centre for Alleviation of Poverty through Sustainable Agriculture (CAPSA)

- Strengthening low-cost technology market systems, and involvement of the private sector for commercialization of Bradyrhizobium technology: impact on soybean production in Bangladesh, Mr. Rajiv B. Pradhan, Country Director, International Development Enterprise (IDE), Bangladesh
- Study on experience of diversification of agriculture to high value crops with smallholders in the Central Indian Tribal Belt, Mr. Ayan Deb, Collectives for Integrated Livelihood Initiatives (CiNi), India

14.30 Coffee break

15:00 **Moderated policy discussion and reflection on the day's learning**
Moderators: Ms. Kate Lamb and Ms. Martina Spisiakova, Knowledge Management Officer, CAPSA

16:30 **Closing remarks**
Dr. Katinka Weinberger, Head, CAPSA

Annex 2. Gender, organizational type and level of participants

Country	Gender		Organizational type						Level	
	Male	Female	Government	Research	NGO	Donors	UN/ intergov.	Media	Senior officials	Others
South Asia										
Afghanistan	2		2						1	1
Bangladesh	5	1	1	1	4				2	4
Bhutan	1			1					1	
India	5			2	3				1	4
Myanmar	2	1	1		2					3
Nepal	4			3	1				3	1
Pakistan	2			2					2	
Sri Lanka	1		1							1
Sub-total	***22***	***2***	***5***	***9***	***10***				***10***	***14***
South-East Asia										
Cambodia	3	1		1	3				1	3
China Taipei	1			1						1
Indonesia	18	6	1	15	2			6	7	17
Japan	1			1						1
Lao PDR	3			2	1				1	2
Malaysia	2			2					2	
Philippines	1	1		2					1	1
Thailand	1	1	2						1	1
Viet Nam	1			1					1	
Sub-total	***31***	***9***	***3***	***25***	***6***			***6***	***14***	***26***
Pacific										
Australia	1	1	1					1		2
Fiji	1	1	1	1					2	
Papua New Guinea	1			1					1	
Sub-total	***3***	***2***	***2***	***2***				***1***	***3***	***2***
Regional/international organizations										
Regional	4	1			1	2	2		2	3
International	14	8		6		4	12		7	15
Sub-total	***18***	***9***		***6***		***6***	***14***		***9***	***18***
Total	**74**	**22**	**10**	**42**	**17**	**6**	**14**	**7**	**36**	**60**
%	**77%**	**23%**	**10%**	**44%**	**18%**	**6%**	**15%**	**&%**	**38%**	**62%**

Annex 3. List of participants

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Annex 4. Evaluation

Fifty-one participants completed the evaluation questionnaire. This lower number (as compared to the number of participants) of received questionnaires is mainly due to some participants (speakers) leaving before the evaluation took place and some participants not filling in the questionnaires. However, the number of questionnaires received provides a good baseline for improving similar events in the future. The Knowledge, Attitude, Practice section will provide a basis for evaluating how much knowledge acquired in the meeting will actually be put in use.

Usefulness and quality of the meeting

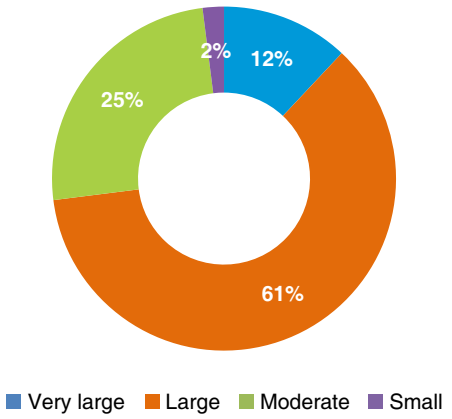
Participants were invited to rank the usefulness and quality of the meeting in terms of its content, processes and logistics, from 'excellent' to 'poor'. Table 1 below shows results with four evaluation criteria (excellent, good, fair and poor). In terms of content, participants evaluated each key session. The three sessions that most participants evaluated as excellent include: **policy discussion and reflection of the day's learning** (51 per cent), **parallel session 1 on improved technologies** (46 per cent) and parallel session **2 on improved processes** (44 per cent).

In terms of the process of the event such as agenda and flow, knowledge sharing, facilitation and feedback, as well as logistics, most participants ranked them as 'good', except for pre-meeting communication which most participants ranked as excellent.

		Excellent	Good	Fair	Poor
Content	Statements of eminent speakers	31%	**63%**	6%	
	Moderated discussion: How can advances in science and research better reach smallholders to promote sustainable agriculture?	24%	**67%**	6%	2%
	Parallel session 1: Improved technologies benefiting smallholder farmers	**46%**	**46%**	8%	
	Parallel session 2: Improved processes to enhance adoption of technologies by farmers	**44%**	41%	15%	
	Parallel session 3: Role of markets and value chains to support smallholders to access agricultural technologies	28%	**60%**	12%	
	Policy discussion and reflection of the day's learning	**51%**	41%	8%	
Process	Agenda and flow	43%	**55%**	2%	
	Facilitation and feedback	45%	**47%**	8%	
Logistics	Pre-meeting communication	**49%**	43%	8%	
	Meeting facilities	45%	**51%**	4%	
	Accommodation	44%	**48%**	7%	
	Food	41%	**53%**	6%	
	Administrative assistance during the training	44%	**50%**	6%	

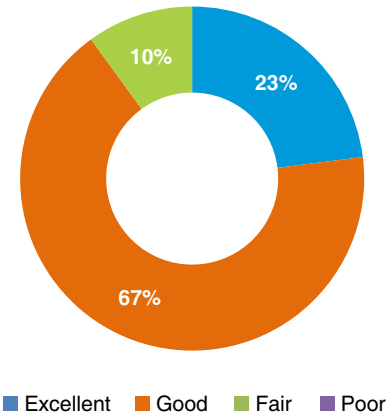
Expectations

The majority of participants (61 per cent) indicated that the meeting met their expectations to a large extent.



Overall ranking of the meeting

The majority of participants (67 per cent) ranked the meeting as good; no participants ranked it as poor.



Aspects to be improved in the future

This section indicates the key areas that will be taken into consideration in the organization of similar events by CAPSA in the future. These areas are based on the suggestions that participants expressed during the evaluation (see the next section for more detailed comments).

Organization

- **Participants:** Different types and levels of participants need to be invited to the meeting. In terms of types, farmers and/or representatives of farmers' organizations, as well as the private sector, need to be invited to the meeting to make it more balanced. In terms of level, more efforts need to be made to bring in high-level participants from government ministries, as well as Indonesian representatives.
- **Speakers:** Better and clearer instructions need to be given to speakers to ensure that their statements are short (5-10 minutes maximum). The moderator needs be briefed to remind participants to provide short comments/reactions rather than long monologues.
- **Timing:** Consider a two-day meeting to cover more issues on technology transfer.
- **Hotel:** Check the sound system the day before any future events, and internet availability in rooms.
- **Transportation:** Consider identifying a better meeting point at the airport.
- **Field trip:** If it is not possible to facilitate participation of farmers in future events, a field trip could be considered.
- **Pre-event communication:** Better communicate expected outcomes, logistics and share papers before the meeting.

Detailed suggestions for improvement of future events

The following sections offer an overview on detailed comments about the quality and usefulness of the meeting that participants provided for improvement of future events of this type. A number of comments highlighted that the meeting was a useful forum to discuss issues of dissemination and adaptation of technologies with a diverse set of participants. For example:

- Meeting was excellent: it enlightened different dimensions of technology transfer and covered enabling policies for different levels of farmers – small and large.
- Creating an enabling policy environment and capacity development of rights holders and duty bearers is equally important as aspects for dissemination/adoption and adaptation of technology.
- Very well thought-out.
- The meeting was good – well prepared, organized and managed.
- Meeting well organized and moderators very good.
- Very impressed by the style and organization.
- Brilliantly executed programme.
- The process was good.
- Good diversity of participation/representation at the meeting including the variety of views and perspectives.
- Good diverse mix of participants.
- Hope that more dialogue will be organized on similar issues.
- Most presentations from parallel sessions are good, it's difficult to balance between sessions.
- After this event, an in-country workshop on policy dialogue should take place especially in Lao People's Democratic Republic, Cambodia and Thailand).
- The dialogue is a very good experience and opportunity for learning. It was an occasion to meet a number of eminent scholars.

Participants

Five participants strongly felt that farmers/farmer representatives were missing in the event and need to participate in the future. Three additional people specifically mentioned that if the High-Level Policy Dialogue is to take place in a participatory manner, farmers and private sector inputs need to be incorporated into the agenda. The following are some suggestions by individual participants:

- Considering the title of the meeting and the stated and implied aim of the meeting, the actual participants in the meeting were not really what was expected for a High-Level Policy Dialogue. Unfortunately, the Vice-Minister of Agriculture was unable to attend but even if he had, the participants that were present were not really high-level policy people.
- Senior officials/scientists and more policymakers need to participate in the meeting.
- There is a need to bring a different level of stakeholders to the meeting.
- While good efforts were made to involve eminent persons, experts and others in the dialogue, domain experts related to the theme of the dialogue may be involved in future.
- Why were there so few staff of Indonesian Agricultural Ministries present?
- The number of participants was very high for a day-long meeting and should be kept to maximum 50 in order to allow for more fruitful discussion.

Content

Overall, there was a feeling that the theme of the Policy Dialogue was very relevant, timely and focused, leading towards attainable and implementable recommendations. Four participants felt that the Policy Dialogue was very general. It could have been focused on few key issues and actions related to technology transfer, with more specific and in-depth discussions, papers and presentations. Two other participants mentioned the need to see more results of studies on technology and success stories on specific technologies that are being transferred. Individual participants made the following suggestions:

- In order to have a dialogue on technology transfer for smallholders, it is essential to combine technologies, process and markets. As Katinka Weinberger said in her closing remarks "Twenty years ago when doing my PhD, a major discussion point was the need for more participatory approaches. Are we still discussing this? Have we made no progress?" I agree with her completely, except she could have even said 25 or 30 years! Given that, the lack of a more integrated approach to technology transfer was glaring in the agenda.
- There was very little discussion on how the processing/agribusiness sector can be better linked with smallholders, especially as this is one area by which governments (e.g. through management of concessions) can have an influence, but it is not working very much.
- The policy issues covered in the meeting need to relate to farmers' engagement in the decision-making process.
- The role of the private sector in technology transfer for smallholders needs to be explored.
- Video presentations on experiences in technology transfer could be part of the agenda.
- Technologies of smallholder farmers (rather than "for") were missing in the agenda.
- Include more success stories about the implementation of green technologies.
- Discussions should concentrate on identifying a model of dissemination of eco-friendly, cost-effective and sustainable farming technologies that can provide permanent food and nutrition security, and drive poverty alleviation.
- The meeting should concentrate on productivity increases of agro-products free of chemicals/pesticides to enable stakeholders to trade carbon (carbon sequestrated through increased soil organic matter) to save the world from the present crisis.
- Add a paper from a dissemination specialist.

Opening remarks and keynote statements

Two participants felt that statements need to be more aggregated and focused. Two other participants found statements and individual comments of participants too long. Some specific comments by three other participants include:

- Keynote remarks need to focus on high-level policies rather than lower implementation levels.
- Statements could have been used to trigger discussions.
- Selection of eminent speakers for keynotes could improve.

Moderated discussion
The moderated discussion was difficult to mediate according to one participant. Two participants felt that more time was needed for the open forum to enable more participants to ask questions to the panellists and have more interaction.

Policy discussion and reflection of the day's learning
Two participants provided comments on the need to improve policy discussion in the future. One noticed that these discussions could have been conducted first in smaller groups and then presented in plenary. This might have enhanced participation in the discussions. Second, policy discussions required more time and needed to be more focused on some key issues and actions.

Parallel sessions
Two participants felt that the parallel sessions needed to be more focused. For example, presentations during Session 3 on the role of markets and value chains to support smallholders to access agricultural technologies were felt to be irrelevant to the topic by one participant. “It would have been much more interesting if the presentations focused on this topic,” the participant mentioned. According to other two participants, parallel sessions and discussions needed more time. The following are some suggestions by individual participants:

- Presenters should have handouts and make their presentations clear and easy to follow.
- Break-out group sessions were quite good. They gave a chance for everyone to share ideas on issues of their interest.
- The content of some presentations was very theoretical and needed to be more practical by sharing field experiences.
- Parallel presentations should be very specific and selective depending on the issue and impact regarding geographical regions.

According to four participants, combined presentations in plenary would be more worthwhile than parallel sessions, as all participants would have an opportunity to contribute (whether through a presentation or iscussion) and the three areas would be discussed together. However, time is a constraint.

Timing of sessions
The schedule was too tight to cover an enormous area and discussion related to policies on technology transfer according to four participants. Two participants suggested extending the meeting by one more day to provide more time for discussion. This would allow for more issues on technology transfer to be covered, which were not addressed during the moderated discussion or in parallel presentations.

Logistics
Three specific comments were made regarding logistics:

- It would have made a difference to have a better sound system to better hear speakers.
- Transportation arrangements from the airport were confusing and need to improve.
- Non-availability of Internet in the hotel rooms was an issue for some participants.

Field trip
Two participants felt that there is a need to consider bringing the meeting directly to smallholder farmers through a field trip and having discussions on site. This would help better understand the situation of smallholder farmers.

Participants' engagement
Two people felt that despite a good level of interaction, there was a need to have more discussion and less monologues. The following are some suggestions of individual participants:

- It is important to plan the meeting in advance to assure good participation and contribution to the meeting, as well as to provide sufficient time for interaction.
- Both talkative and silent types of people need to be involved to ensure that all participants contribute to the meeting agenda and outcomes.
- Interactions between representatives from similar ecological and hydrogeological settings should also be explored in the future.
- Organizations that are mandated to serve a wide group or different countries should have more space and opportunities to share their views.
- A balanced dialogue among South and South-East Asia should be taken into consideration.

Communication
According to two participants, prior to the meeting, the organizers should clearly state specific expected outcomes. Four people stated that pre-meeting communication on logistics needs to improve. One participant suggested sharing presentations and papers before the meeting.

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