This document contains all of the 76 messages posted in the FAO moderated e-mail conference on "Strengthening partnerships in agricultural biotechnologies for the benefit of smallholders in developing countries: Discussing North-South, South-South, Public-Private cooperation and more" which ran from 14 November to 18 December 2011. The conference was hosted by the FAO Biotechnology Forum. For further information on the Biotechnology Forum see the Forum website. For further information on agricultural biotechnologies, see the FAO biotechnology website.
Note, participants are assumed to be speaking on their own behalf, unless they state otherwise.]

Messages are numbered in order of their posting during the conference.

Subject of Messages:

The Messages:

-----Original Message-----
From: Biotech-Mod1
Sent: 14 November 2011 11:39
To: 'biotech-room1@mailserv.fao.org'
Subject: Welcome to the FAO e-mail conference on partnerships and agricultural biotechnologies

Dear Colleagues,

Welcome to this FAO e-mail conference on "Strengthening partnerships in agricultural biotechnologies for the benefit of smallholders in developing countries: Discussing North-South, South-South, Public-Private cooperation and more" !! Thank you for joining.

Messages can be posted to the conference any day up until Sunday 11 December 2011 (send them to biotech-room1@mailserv.fao.org).

We hope that the conference will be interesting, constructive and beneficial and we encourage you to participate actively. We would like to briefly remind you of some of the main points about the running of the conference:

1. Participants should introduce themselves briefly in their first posting to the conference. They should also provide their full address at the end of the message. When a message is posted, we will replace @ in the e-mail address with (at) because of spamming.

2. Messages should not exceed 600 words

3. People posting messages are assumed to be speaking on their own behalf and not on behalf of their employers (unless they indicate otherwise)

4. The Background Document to the conference, sent by e-mail to members of the FAO Biotechnology Forum on 8 November, sets the scene for the conference and so we strongly encourage you to read it, especially Section 5 (reproduced below) which provides some specific guidance about the kinds of topics to be discussed in this conference. The document is available at http://www.fao.org/fileadmin/user_upload/biotech/docs/conf17bd.pdf (in PDF, 75 KB). Contact me if you want to receive the document by e-mail.

5. Messages posted in the conference will also be placed on the homepage of the Forum website, usually with a couple of days delay, at http://www.fao.org/biotech/biotech-forum/en/

6. No messages will be posted with attachments. If you receive a message during the conference with an e-mail attachment, just delete it without opening the attachment.

7. As mentioned in Section 3 of the Background Document, the conference encompasses applications of many different kinds of biotechnologies, involving crops, livestock, fish, forest trees and micro-organisms and different areas of application (e.g. for genetic resources management, disease diagnosis/vaccination or genetic improvement) and so brings together people who may have knowledge/experience from one or more of these topics, but not all of them. As terminology is occasionally sector/subject-specific, we ask participants to try and keep this in mind when writing their messages.

For those of you who joined the Forum recently, we can tell you that this is the 17th e-mail conference that it has hosted since its launch in the year 2000. All of the documents and e-mail messages related to these previous conferences are available on the Forum website, at http://www.fao.org/biotech/biotech-forum/en/

Finally, we encourage you to tell any potentially interested colleagues or contacts about this conference. A short notice is included below for this purpose.

With our sincere best wishes for a successful conference,

John

John Ruane, PhD
FAO Research and Extension Branch
Moderator, Conference 17
e-mail: mailto:biotech-mod1@fao.org
FAO Biotechnology Forum website http://www.fao.org/biotech/biotech-forum/en/
FAO Biotechnology website http://www.fao.org/biotech/

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Strengthening partnerships in agricultural biotechnologies – FAO e-mail conference

From 14 November to 11 December 2011, the FAO Biotechnology Forum is hosting an e-mail conference entitled "Strengthening partnerships in agricultural biotechnologies for the benefit of smallholders in developing countries: Discussing North-South, South-South, Public-Private cooperation and more". Its goal is to enable a fruitful discussion and exchange of experiences about partnerships in agricultural biotechnologies to benefit smallholders in developing countries, covering issues such as the potential pitfalls and benefits of different kinds of partnerships; lessons learned and best practices from past experiences; and relevant advice that can be provided to developing countries or their national research organizations on the subject. The conference covers the crop, forestry, livestock, fisheries/aquaculture and agro-industry sectors, and encompasses the broad range of biotechnologies that are used in these sectors. The conference is open to everyone, is free and will be moderated. To join the Forum (and also register for the conference), send an e-mail to mailserv@mailserv.fao.org leaving the subject blank and entering the following text on two lines:
subscribe BIOTECH-L
subscribe biotech-room1

People who are already Forum members should leave out the first of these two lines to register for the conference. A background document has been prepared for the conference and is available at http://www.fao.org/biotech/biotech-forum/en/. For more information, contact biotech-mod1@fao.org.

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[FROM THE BACKGROUND DOCUMENT]

5. Topics to be Discussed in this E-mail Conference

As with each conference hosted by this FAO Biotechnology Forum, the focus is on applications in developing countries. In this conference on strengthening partnerships in agricultural biotechnologies for the benefit of smallholders in developing countries, some of the specific questions that participants might wish to address in the e-mail conference are given below:

- What can we learn from specific past experiences of partnerships in biotechnologies (in crops, forestry, livestock, fisheries or agro-industry) for smallholders in developing countries? What were the key lessons learned? What were the problems and what were the features of the partnerships that worked?

- A number of specific kinds of partnerships (NSC, SSC, triangular cooperation and PPPs) were described in Section 4. Which of these (or, indeed, other kinds of partnerships) in the area of agricultural biotechnologies are most likely to be beneficial for smallholders in developing countries?

- Are there particular biotechnology-related areas of education/training or research that are more suitable for SSC or for NSC?

- When wishing to engage in biotechnology-related PPPs to benefit their smallholders, which kind of guidelines or best practices should developing country governments or organizations follow?

- A number of biotechnology-related partnership activities were described earlier in Section 2 (individual and institutional capacity development; joint research projects; sharing of biotechnologies, protocols and materials; and knowledge sharing). Which of these (or others not mentioned here) are likely to be most beneficial for smallholders in developing countries? Which kind of partnership (Section 4) is recommended for the different partnership activities?

- For each of the different sectors (crops, livestock, forestry, fisheries and agro-industry), in the context of agricultural biotechnologies, a) are there certain kinds of partnerships which are likely to be more beneficial for smallholders in developing countries? b) are there certain technical areas which can benefit most from partnerships?

- What kind of policy initiatives should developing countries undertake if they wish to strengthen partnerships for the development and use of agricultural biotechnologies to benefit their smallholders?

- Which institutional arrangements can be established to provide robust support to biotechnology-related partnerships to ensure their success and sustainability? What are the hurdles that can prevent effective international collaboration and how can they best be overcome?

- What is the most appropriate level for the establishment of biotechnology-related partnerships (for example, between countries, between institutions, between research laboratories/units or between individuals)? What incentives can be provided to foster collaboration at each of these levels?

-----Original Message-----
From: Biotech-Mod1
Sent: 15 November 2011 10:19
To: 'biotech-room1@mailserv.fao.org'
Subject: 1: Making agriculture profitable for smallholders - India

[Thanks to S. Seshadri from Chennai, India for sending in the first message of this FAO e-mail conference on "Strengthening partnerships in agricultural biotechnologies for the benefit of smallholders in developing countries: Discussing North-South, South-South, Public-Private cooperation and more"...Moderator].

I am S. Seshadri, a botanist by education associated with the Shri AMM Murugappa Chettiar Research Centre, Chennai, India. It is a non-profit research organization working for the improvement of the poor and marginalized in rural areas through benign technological interventions. For the past two decades, I am personally concentrating on promotion of biofertilizers and bio-inputs in agriculture.

This e-mail conference is very timely and, like the previous conferences, I hope will come out with ways means of promoting profitable agriculture beneficial to farmers. I wish to contribute to this conference by addressing some points I present hereunder,

As you all know, agriculture is at is low in India due to various factors and the productivity graph is day-by-day extending downwards due to various reasons viz. manpower, higher input costs, poor availability of water, lack of proper advice on agronomic practices etc. Despite the efforts by extension departments, their inherent weakness in the form of lack of adequate manpower, operational support, poor technical

skills/background the process is targeted solely towards implementation of public-sector schemes linked to subsidies and subsidized inputs etc. Often the intermittent advices leads to a confusing trend as they tend to promote products based on availability and order down the line. In parallel, there are/were a number of voluntary organizations who provide wonderful advice, especially the organic farming association that is not under the control of departments evolved on its own and flourishing well.

In this context, whenever we discuss such topics, as laid out in the background document, I would like to stress that we need to discuss the possible routes of making agriculture profitable for the rural small holdings/people involved primarily and, at a secondary level, the consumers/masses or other entities involved. A perfectly orchestrated public-private partnership (PPP) model would be beneficial for the farmers in rural areas as the farmers are now in a quagmire due to a number of several push and pulls in the sector.

In another context, India being a country with more arable lands but with less water availability, there should be a nationwide programme for promoting millets and grains that were not given enough attention in the past or the so called dying crops from dry lands which really needs support.

In general, to establish a workable model in agricultural biotechnology, it requires both a top-down and bottom-up approach. At a microlevel, formation of non-political village agricultural councils (made up of farmers alone) tied up with non-political regional agricultural councils (made up of informed farmer representative alone) tied to agricultural universities (institutional framework for evaluating the trials and assess the performance of crops alone), non-governmental/voluntary organizations involved in this sector (to get trained from various quarters and provide right advice on a day-to-day basis to farmers) / Financial institutions (lend hassle-free finance to the agriculturists) / Government departments (monitor the progress alone; data collection and passing on the information to Government) / Village level administrative bodies (for effective assistance in local administration related problems only) etc.

Along with this, a procurement agency/agencies to buy the produce would be beneficial. Moreover, the arrangement should be "participatory with commitment" and not advisory and should have only agriculturists and non-actors, politicians should not have any role in the partnership. It is also good to have a marketing linkage with a procurement agency upfront for all the commodities discussed in the partnership or search for a market for the agricultural produce by roping a procurement agency immediately after the formation of partnership. In worst cases, respective Governments should vouch and take up the responsibility of procuring the produce that does not find any procurement agency and the cost should be fixed according to the market and not upfront. The presence of voluntary sector, working as a watchdog and as a local agency with limited operation, will strengthen the implementation of technologies with much confidence. In addition, establishment of demonstrations/large-scale trials in the farmers' fields in all blocks/districts will add value to educate the farmers to get motivated. More importantly, assurance in terms of marketing the produce (buy back arrangement or an assured procurement mechanism or fixation of price for open market or Government procurement) is an important requirement for such process to succeed.

The best incentive for providing profitable any agricultural operations, including biotechnological interventions, would be the establishment of a "Single Window Concept" for all agriculture related activities including inputs to machinery for agricultural operations to harvesting and financial assistance to marketing. Some of the above can be read as overstated but this approach only will solve the problem of farmers in future. This requires extensive dialogue among the participating organizations, departments, planners, thinkers and implementers.

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-----Original Message-----
From: Biotech-Mod1
Sent: 15 November 2011 13:39
To: 'biotech-room1@mailserv.fao.org'
Subject: 2: Partnerships do better with neglected crops

This is from Nagib Nassar, Professor Emeritus with the Department of Genetics, University of Brasilia. I am originally from Egypt working with cassava in Brazil since 1974.
http://www.geneconserve.pro.br/nassar.htm

Talking about partnerships in agricultural biotechnologies for the benefit of smallholders in developing countries must begin by what biotecnology for the poor should address, first

- deal with neglected tropical crops normally overlooked by developed countries and their scientists, such as cassava, sweet potato and beans.
- improving varieties for severe conditions of drought, which is a limiting factor in undeveloped countries.
- developing techniques available for small farmers in poor countries. These, when practiced by them, may contribute to improve production and quality. We applied this idea at the University of Brasilia, Brazil and developed productive and nutritive cassava varieties by a simple interspecific grafting. The periclinal chimera produced by this technique proved very productive, tolerant to drought and rich in carotene.
[Periclinal chimera refers to a chimera in which one or more layers of tissue derived from one graft member enclose the central tissue derived from the other member of the graft (definition from the FAO biotechnology glossary, http://www.fao.org/biotech/biotech-glossary/en/) ...Moderator].

A partnership between scientists and small farmers through participatory projects shall prove ideal for evaluating performance of varieties in the field and by smallholders themselves. This will motivate the farmers to adopt selected varieties. Scientists will benefit from this evaluation in the field, and be inspired by observations of small farmers.

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-----Original Message-----
From: Biotech-Mod1
Sent: 16 November 2011 11:23
To: 'biotech-room1@mailserv.fao.org'
Subject: 3: Partnerships in cassava research - IDRC, University of Brasilia, IITA

This is from Nagib Nassar, again.

Talking about partnerships in agricultural biotechnologies for the benefit of smallholders in developing countries, I am happy to tell this story:

The Canadian International Development Research Center (IDRC) recognized cassava as an important food for West Africa and, aware that Brazil is the origin of this crop and the host of its important wild species, directed its support to the University of Brasilia and the International Institute of Tropical Agriculture (IITA, in Nigeria) so that they through a partnership develop cultivars resistant to cassava mosaic disease. This disease threatened cassava in Nigeria and Congo and almost led to a food catastrophe in these countries in the mid 1970.

In 1975, IDRC funded myself as a researcher, who collected wild species of cassava, mostly in the northeastern part of Brazil. At the time, I was part of a small minority of cassava scientists who valued wild species as a breeding tool. The wild relatives of cultivated cassava, are a rich source of new genes to improve the traits of the cultivated varieties. I was able to cross some high-protein wild species with cultivated varieties and produced hybrids with higher protein content. Cassava, unlike staple grains such as rice and wheat, contains very little protein. In the same time, I used the wild species I collected to breed hybrids that are resistant to cassava mosaic disease. My hybrids were then used by the IITA breeder S.K. Hahn to develop the family of cultivars called MS. These have since been adopted and planted by millions of farmers in sub-Saharan Africa. It is estimated that 4 millions hectares are planted now by this family of cultivars. Without these cultivars, Nigeria, the world's leading cassava producer, would have suffered greatly from mosaic disease.

Farmers in Brazil's Federal District also cultivate some of the nutritious and drought tolerant varieties which were developed and selected by the partnership of the IDRC and afterwards by the Brazilian National Council for Scientific and Technological Development (CNPq).

The above-mentioned resistant cassava proved instrumental in saving lives in Uganda too, where a highly virulent form of the cassava mosaic virus began devastating cassava. With support from IDRC, a team of scientists led by the Ugandan government's Cassava Research Program at Namulonge used these cultivars as a source of resistance to new strains of mosaic virus and could incorporate mosaic resistance from IITA's various cassava lines into the new Ugandan varieties. These new selected varieties were also successful for saving the country from imminent famine. The whole story is told by IDRC in this 2010 short article http://www.idrc.ca/EN/Resources/Publications/Pages/ArticleDetails.aspx?PublicationID=163

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[As an aside, an FAO press release today about a new cassava disease variant shows the continued relevance and importance of this topic for African farmers (http://www.fao.org/news/story/en/item/94313/icode/). The press release begins: "A new variant of a cassava disease is affecting large parts of East Africa, especially in the area's Great Lakes Region, putting a crucial source of food and income at risk, according to the UN Food and Agriculture Organization. FAO experts say Cassava Brown Streak Disease (CBSD) is on the verge of becoming an epidemic, and have called for an urgent increase in funding, research, training, surveillance and other measures to help farmers and breeders. The appearance of the disease in previously unaffected areas, and the lack of continued funding for research and development work to address CBSD in the region, have added to the threat already presented by Cassava Mosaic Disease (CMD)"...Moderator].

-----Original Message-----
From: Biotech-Mod1
Sent: 16 November 2011 12:36
To: 'biotech-room1@mailserv.fao.org'
Subject: 4: PPPs in Agribiotech

This is Dr. P S Janaki Krishna working as Associate Professor and Coordinator of the Post-Graduate Diploma in Management (PGDM) in Biotechnology at the Institute of Public Enterprise, Hyderabad, India.

Firstly, I would like to congratulate FAO for conducting this conference on such an important topic.

Here, in this conference, basically we are looking at two important aspects - the 'reach out' or 'social inclusion' and 'partnerships between public and private institutions', the 3 Ps. Maybe we can include the 4th P i.e., people which suffice this requirement. In fact, in India, public, private and civil society organizations are very active in the agriculture sector. Hence, it is possible to involve people in this public private partnership endeavour. However, we may add another P i.e., participatory. We may adopt some of the participatory processes, like participatory rural appraisal (PRA), participatory technology development (PTD) or interactive bottom-up (IBU), for problem identification, priority setting and projects formulation based on the nature of the project and local need assessment survey.

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-----Original Message-----
From: Biotech-Mod1
Sent: 17 November 2011 10:33
To: 'biotech-room1@mailserv.fao.org'
Subject: 5: Partnerships / Cassava / South-South cooperation

My name is Dele Raheem, my area of specialisation is food science and biotechnology. I run a consultancy on value addition to food crops.

The issue of partnership, as highlighted in this FAO email-conference, is timely as we have to be creative and innovative in utilising the natural resources in less industrialised countries. The application of biotechnology, or indeed any applied science, will make a huge impact by utilising these local raw materials that are readily available in a given country. Indigenous knowledge has to be studied, developed and applied to ensure food security. The dynamics for a successful partnership that will benefit all parties concerned will have to take into consideration any underlying factors that are likely to mitigate its success, since we are dealing with people - active/passive participation will be reflected. Science and (bio)technology tends to empirically deal with the issues following the rigour of experimentation, which is fine, but in the long run the problems that will affect the destiny of the intended beneficiaries, i.e the people, should embrace a policy that involve ways by which the dots can be connected.

The interesting example on Cassava (Manihot esculanta) can equally apply to other less popular crops. Cassava, also referred to as "hunger crop", is important in many African countries as rightly pointed out by Nagib Nassar (Message 3) who shared his experience on the efforts made to improve the quality of cassava which has made it to be widely cultivated in Nigeria. The next stage will be to formulate novel products with added value, create jobs from the by-products of cassava and other less known crops that can be help in transforming the lives of small farmers.

The Integrated Cassava Project (ICP, www.cassavabiz.org) consists of two complementary projects: The Preemptive Management of Cassava Mosaic Disease project (CMD), which primarily looks at mitigating the impact of cassava mosaic disease and increasing productivity in Nigeria, and the Cassava Enterprise Development project (CEDP), on the other hand which focuses on utilization and agribusiness development. But how far has the CEDP made changes in terms of job creation, cottage industries and novel foods is a challenge. *[As this conference is about partnerships, it can be mentioned that, according to the project website, the ICP is implemented by the International Institute of Tropical Agriculture (IITA, whose headquarters are in Ibadan, Nigeria), and funded by the Federal Government of Nigeria, the Niger Delta Development Commission, Shell Petroleum Development Company of Nigeria, United States Agency for International Development, and States in southern Nigeria....Moderator]*.

On South-South cooperation to assist smallholders in these countries, I concur with the thinking of the late E.F. Schumacher in his book "Good work" where he advocated intermediate technology which is cheap, efficient and portable, he stated: "the solution for restoring dignity and autonomy to our work lies in the idea of intermediate technology – tools that come between the primitive tools of history and inaccessibly huge products of industry. For example, the machine-driven, oil dependent agricultural practices that we currently use are unsustainable, but we don't want to return to using oxen. Intermediate technology takes modern design ideas and technology, and uses them to create new, smaller solutions".

Dr. Dele Raheem
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-----Original Message-----
From: Biotech-Mod1
Sent: 21 November 2011 18:17
To: 'biotech-room1@mailserv.fao.org'
Subject: 6: Researcher/farmer - lessons learned from partnerships

This is from Nagib Nassar, Brazil.

Partnerships in biotechnology have taught me a lot, in addition to having improved the living conditions and health of small farmers in the Federal District, Brasilia, Brazil. In my project supported by the Brazilian council of Scientific Development (CNPq), small farmers were invited to meet at our cassava laboratory situated at the experimental biological station, University of Brasilia. They were asked to verbally report their evaluation of the performance of the varieties they received from us. What I heard from them brought to me the most valuable information I ever dreamed: "Variety UnB 205 is very resistant to formiga (ant) attack" said one farmer and "I note all varieties attacked severely by formiga, but this variety has never been attacked" said a second farmer. Attack of formiga in Central Brasil at the begining of seedling growth is one of the limiting factors in cassava growth and productivity in central Brazil. I myself didn't note the resistance, neither was it in my agenda but the small farmers meeting taught me a lot. These links may explain what I mean to say - http://www.geneconserve.pro.br/cassava_df_go.pdf and http://www.unb.br/noticias/unbagencia/unbagencia.php?id=5211 *[The first link provides a summary of an interspecific hybridisation project in Cassava, while the second presents a news story from the University of Brasilia about the meeting at the University's Cassava Genetic Improvement laboratory...Moderator]*.

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-----Original Message-----
From: Biotech-Mod1
Sent: 22 November 2011 10:23
To: 'biotech-room1@mailserv.fao.org'
Subject: 7: Re: Researcher/farmer - lessons learned from partnerships

This is from Damaris Odeny from the Agricultural Research Council (ARC) in South Africa.

Thank you very much to Professor Nagib for all your contributions on cassava. I have a lot of interest in cassava and its potential in alleviating food insecurity in Africa. I do agree that the bottom-up approach works best in addressing small-scale farmers' needs although most researchers tend to be driven by where the funds are.

One of the major factors limiting successful use of cassava to alleviate food insecurity in developing countries is the low root protein content, which a simple one way partnership of researcher-farmer may not solve. Reading from your publications, you have identified some wild cassava genotypes that are rich in root protein content. What would be your suggestion in terms of what partnerships are likely to create an impact and what would be the best research strategy for enhancing the root protein content of cassava?

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[This is a specific question about using research partnerships to increase protein content in cassava roots, but is also valid as a general question about getting research partnerships to improve any important trait for any food staple that is relevant for food security in developing countries, so comments on either are welcome...Moderator].

-----Original Message-----
From: Biotech-Mod1
Sent: 22 November 2011 15:56
To: 'biotech-room1@mailserv.fao.org'
Subject: 8: Policy initiatives to strengthen partnerships

This is from Norbert Tchouaffe, Cameroon. I am an Environmental Inspector in activity at the Ministry of Environment and Protection of Nature (MINEP) and am also a PhD student at the University of Dschang, Cameroon.

I would like to reply to the following question: "What kind of policy initiatives should developing countries undertake if they wish to strengthen partnerships for the development and use of agricultural biotechnologies to benefit their smallholders?". *[From Section 5 of the Background Document.. .Moderator]*.

My answer is: Good governance with emphasis on bottom-up approach (model of local governance). In many African countries, partnership has become a central feature of a new model of local governance, both creating and reflecting changing relationships between the three spheres of the state, the 'market' and 'civil society' (Farmers). But this new paradigm fails in my country, Cameroon, because of the top-down approach.

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-----Original Message-----
From: Biotech-Mod1
Sent: 22 November 2011 16:44
To: 'biotech-room1@mailserv.fao.org'
Subject: 9: Brokering partnerships for biotechnology innovation

This message is from Laurens Klerkx, assistant professor at Wageningen University, Communication and Innovation Studies.

My contribution is related to the earlier message (number 8) of Norbert Tchouaffe on policy initiatives needed to strengthen partnerships. Furthermore, it contributes to answering the following questions in Section 5 of the Background Document:
- "Which institutional arrangements can be established to provide robust support to biotechnology-related partnerships to ensure their success and sustainability? What are the hurdles that can prevent effective international collaboration and how can they best be overcome?"
- "What is the most appropriate level for the establishment of biotechnology-related partnerships (for example, between countries, between institutions, between research laboratories/units or between individuals)? What incentives can be provided to foster collaboration at each of these levels?"

Often, collaboration for innovation through partnerships (also often called innovation platforms, innovation networks) is hindered by gaps or divides, of a cultural or institutional nature. Such divides may be caused, for example, by different incentive systems for public and private actors, differences between local indigenous knowledge systems and formal scientific knowledge systems, social differences that cause exclusion of certain actors and ideological differences amongst different non-governmental organisations (NGOs). Also, people may be unaware of interesting cooperation partners, so a partnership may not form in the first place.

We found that there is an important role for systemic intermediaries which broker linkages and facilitate collaboration, so-called 'innovation brokers', which have three main tasks:

- Demand articulation: articulating innovation needs and visions and corresponding demands in terms of technology, knowledge, funding and policy, achieved through problem diagnosis and foresight exercises.
- Network composition: facilitation of linkages amongst relevant actors, i.e. scanning, scoping, filtering and matchmaking of possible cooperation partners
- Innovation process management: enhancing alignment and collaboration in heterogeneous networks constituted by actors with different institutional reference frames related to norms, values, incentive and reward systems.

These innovation brokers help reducing the transaction costs for engaging in partnerships, and make sure that actors at different levels (countries, labs, individuals, private sector, etc.) interact. Partnerships should also be seen as flexible, as new actors may be needed at times (depending on the problem/challenge at hand), while others may become obsolete. Partnerships usually cut across levels instead of being established at one level. Innovation brokers help to maintain such flexibility to be able to have a well-composed partnership. They also may help signalling problems related to inadequate incentives (e.g. researchers are rewarded for academic publications rather than working with stakeholders, non-appropriate intellectual property legislation) and make connections to policy makers and decision makers to help resolve these structural problems hindering innovation.

We found that there is a rich experience, including in specific biotechnology innovation, for example in negotiating access to intellectual property, or developing locally specific biotechnology applications. Many organizations may take such an innovation broker role. See http://tinyurl.com/cyleb4y for the full paper.

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[The full paper referred to is: Klerkx, L. Hall, A., Leeuwis, C. (2009). Strengthening Agricultural Innovation Capacity: Are innovation brokers the answer? International Journal of Agricultural Resources, Governance, and Ecology, Vol 8, numbers 5/6, p. 409-438...Moderator].

-----Original Message-----
From: Biotech-Mod1
Sent: 23 November 2011 10:52
To: 'biotech-room1@mailserv.fao.org'
Subject: 10: Re: Policy initiatives to strengthen partnerships

This is from Dr. Gado Zaki, biosafety expert, Ministry of Environment, Niger.

Developing countries must undertake their own initiatives to strengthen partnerships for the development and use of agricultural biotechnologies to benefit their smallholders, as the government is doing in my country by developing a new approach intitulated 3N, Nigeriens feed Nigeriens. It is a new model of good local governance taking into account preservation of environment, forest and agro-pastoral management, irrigation and research activities to increase food production and then provide a sustainable food security to all the population of the country.

Dr. Gado Zaki
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[The 3N initiative ("Les Nigériens nourrissent les Nigériens"), launched by the President of the Republic, SE Mahamadou Issoufou, after his election, aims to achieve food and nutritional security in the country. For more details, see e.g. http://www.ifad.org/operations/projects/design/104/niger.pdf (in French)...Moderator].

-----Original Message-----
From: Biotech-Mod1
Sent: 23 November 2011 10:53
To: 'biotech-room1@mailserv.fao.org'
Subject: 11: Innovation platforms // DONATA-OFSP

My name is Sarah Mayanja and I work with the International Potato Center (CIP) as Research Assistant, based in Kampala, Uganda.

I would like to contribute to Lauren Klerkx's discussion on innovation platforms and the use of innovation brokers.

The Dissemination of New Agricultural Technologies in Africa (DONATA) project, with which I work, promotes the use of Innovation Platforms for Technology Adoption (IPTAs) in 5 countries in East and Central Africa to promote Orange Fleshed Sweet Potatoes (OFSP). The composition of these platforms is varied across countries, and so are the themes. Some are focused on seed production, some on processing while some have a geographical focus. As a result, we have seen a rich and diverse range of technologies and innovations resulting from these interactions.

Who/what drives innovation? This is a complex and intertwined situation and I would say varies from place to place. In DONATA, for example, the common denominator is promotion of OFSP, which are beta-carotene rich and would therefore be a good source of Vitamin A. How this is done depends a lot on the kind of partnerships that evolve in the IPTAs.

A combination of research, farmers, processors, traders and other private sector players who provide services to the value chain actors (as platform members) has proven very useful in many instances. Translating research findings for the smallholder farmers consumption and commercialization are a daunting tasks without partnerships. But what is also crucial is to clearly spell out the terms of the partnership and, like Lauren Klerkx pointed out, realize that membership to such partnership is fluid, with partners moving in and out.

Lastly, documenting and sharing experiences would help a lot in moving ahead in the quest for improved livelihoods of smallholder farmer movement to which I subscribe.

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-----Original Message-----
From: Biotech-Mod1
Sent: 23 November 2011 10:55
To: 'biotech-room1@mailserv.fao.org'
Subject: 12: Re: Researcher/farmer - lessons learned from partnerships

This is from Nagib Nassar, Brazil, again.

To answer to Damaris Odeny's enquiry (message 7): enhancing protein in cassava cultivars can be achieved by one of 2 approaches.

The first approach is hybridization with wild species known for its high protein content in the root, such as Manihot Oligantha Pax. Note, there are species reported to have high protein content, such as M. tristis, but it proved to contain very high cyanide - hydrogen cyanide (HCN) content reaching 1000 mg/kg, making them useless for breeding. I believe M. tristis is no more than an escapee of cassava itself, i.e. a cassava cultivar with high HCN content. Such material when estimating its protein as total nitrogen content, may exhibit a false high protein content. So far all material other than M. oligantha belongs to this category.

Even when using M. oligantha as progenitor, the progeny obtained exhibits unfavoured characters such as difficulty of cuttings germination. Only in further generations, the protein content may be restored in cultivars that reproduce easily by cuttings.

The second approach is selecting for high protein content in indigenous cultivars. We found some selected cultivars, such as UnB 201 and UnB 205, to have protein as high as 5.5% compared with 1.5 to 2% protein in common ones. Surprisingly, we found these selected cutivars possess high carotene content and excellent palatibility. Both of them are resistant to ant and borers too. We consider this discovery is more important than transferring high protein from wild species to the cultivate. It seems high protein content improves cooking quality in cassava. Added to this, yellow color came from carotene. Both of the two characters attracted indigenous people to adopt and maintain these varieties.

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[Thanks to Nagib Nassar for this response to the message of Damaris Odeny regarding improvement of root protein content in cassava. This discussion thread is now cut...Moderator].

-----Original Message-----
From: Biotech-Mod1
Sent: 23 November 2011 11:16
To: 'biotech-room1@mailserv.fao.org'
Subject: 13: Public-Private Partnership / Framework

My name is Mathias Mondy, I work in the seeds and traits business of Bayer CropScience as a Market Acceptance manager for Europe, Middle East and Africa.

I would like to congratulate the organizers and the participants for the quality of the information reported and for the hope they generate. Like many of you I do believe that agricultural technologies will be a decisive element contributing to improve agricultural sustainability. By technology I especially mean high quality seeds resulting from modern breeding including the possibility to use native and GM traits allowing the crops to better perform in a given environment.

Bayer CropScience, and the industry at large, supports the development of public-private partnerships (PPPs) as a key mechanism to develop and deliver a reliable stream of technology in the face of changing demands. Collaborative partnerships can effectively bridge the gap between public and private sectors' distinctive competencies in order to meet farmers' needs. I would recommend you to have a look at the brochure from CropLife International on this topic: http://www.croplife.org/view_document.aspx?docId=2244. This document will give you a hint at the multiple PPPs already existing and their achievements.

That being said, what we have learned is that for a PPP to be successful and deliver the expected benefits it requires the commitment of the partners but also an enabling environment. Identifying which technology is the best suited to solve specific problems is only the beginning. To create trustworthy partnerships, early discussions will be mandatory to agree on elements like funding mechanisms, roles and responsibilities, intellectual property rights or commercialization schemes. It also necessitates that policies and the legal environment facilitate the development of technology through effective administrative framework, predictable and science based regulation and a pragmatic liability regime. If those elements are fulfilled then it can be expected that advanced technologies will reach the people in most need and that scientific discoveries will turn into new products in the hands of the farmers.

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-----Original Message-----
From: Biotech-Mod1
Sent: 23 November 2011 14:18
To: 'biotech-room1@mailserv.fao.org'
Subject: 14: Some examples of innovation brokers in biotechnology

Here is Laurens Klerkx again.

I agree with Mathias Mondy (Message 13) that many partnerships already exist, and that commitment and an enabling environment are needed, as well as agreement on elements like funding mechanisms, roles and responsibilities, intellectual property rights or commercialization schemes. Innovation brokers facilitate and mediate to achieve such agreement, and in creating an enabling environment when it is absent.

From our work I will give two concrete examples in biotechnology:

- The International Service for the Acquisition of Agri-Biotech Applications (ISAAA), a non-profit organisation established to broker access for developing country research institutes to technologies, genes and protocols owned by the private sector or held in public laboratories in developed countries. An example is the partnership it brokered between the Kenyan Agricultural Research Institute and Monsanto in the development of virus resistant sweet potato. Monsanto had the virus resistant gene and trained Kenyan scientists in genetic transformation techniques. The gene was then transferred into Kenyan sweet potato germplasm.

- The African Agricultural Technology Foundation, a non-profit organisation that negotiated a royalty-free licence with Monsanto to develop a transgenic cowpea variety resisting the pod-boring insect, Maruca vitrata, a serious field pest of cowpea that is estimated to cause significant grain yield losses. Local adaptations are being made to fit local conditions.

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-----Original Message-----
From: Biotech-Mod1
Sent: 23 November 2011 14:30
To: 'biotech-room1@mailserv.fao.org'
Subject: 15: PPP model in agriculture technology dissemination to smallholders

This is Seshadri again, from India.

I find the discussion is picking up slowly with inputs from various corners, of course pertaining to cassava and sweet potato experiences. Apart from biotechnology, in agriculture a number of such experiments takes place everywhere in the world. I would cite three examples from India viz. public-private partnership (PPP) model in sugarcane and contract farming in medicinal plants and pulp wood.

In the first model there is a definite relationship formed for years where the farmers (private) and industries (private and Government owned) work together to grow sugarcane till it gets crushed and sugar is extracted. Here the price for the sugarcane procurement is fixed by the Government (both Central and State) and the industries pay the farmers accordingly. The technical advice is given by the research institutes and the industries join hands with such research institutes, providing improved varieties to the industries who develop nurseries in the farmers' fields and the same is released for mass planting. Incidentally, the product price is also controlled by the Government to check the rise in prices and provide the commodity to the masses. There are also few hitches like delayed harvests, delayed payments due to various factors including over-ambitious approach by industries, inflation, poor sales, poor growth, etc. etc. This is a perfect model which ensures satisfaction in general to all those participate in such a collaborative

networking. It works in most of the states growing sugarcane (Tamilnadu, Karnataka, Andhra Pradesh, Maharashtra, Uttar Pradesh, Madhya Pradesh, Orissa etc)

The other model on pulp wood production is also a good model that works as well as sugarcane which provides long term solutions to degraded lands mainly but even to areas where farmers wish to carry out such practices.

The third model is the medicinal plants model which is criticized widely by many due to poor procurement or loosely arranged collaboration which most often fails to benefit farmers. This model helps the farmers to harness initially but during later years it leads to non-payment or poor procurement prices due to poor offtake by the companies or sudden fall in prices in international markets.

Irrespective of various models, the membership to such partnership is fluid, with partners moving in and out often, which is inevitable. The most important point to be stressed here is that the system will be strong enough to take care of its requirements provided a strong marketing mechanism is in place.

As indicated by Sarah Mayanja (Message 11), a combination of research, farmers, processors, traders and other private sector players who provide services to the value chain actors (as platform members) only can prove very useful in many instances. It is also true that translating research findings for the smallholder farmers consumption and commercialization are daunting tasks without partnerships.

As I was about to give finishing touches, I saw the message (number 13) from Mathias Mondy indicating the need for creating trustworthy partnerships, early discussions to agree on elements like funding mechanisms, roles and responsibilities, legal environments, intellectual property rights etc.

I would like to reiterate that for an agriculture-related technology to be successful at the smallholder levels or at grassroots level, it requires both a top-down and bottom-up approach where the participation of farmers through locally functioning non-political agricultural councils (made up of farmers alone) tied up with non-political regional agricultural councils (made up of informed farmer representative alone) tied to agricultural universities (institutional framework for evaluating the trials and assess the performance of crops alone), non-governmental/voluntary organizations involved in this sector (to get trained from various quarters and provide right advice on a day-to-day basis to farmers) / Financial institutions (lend hassle-free finance to the agriculturists) / Government departments (fix fair prices / monitor the progress/ offer guarantee to the farmers; data collection and passing on the information to Government) / Village level administrative bodies (for effective assistance in local administration related problems only) along with a marketing mechanism etc.

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-----Original Message-----
From: Biotech-Mod1
Sent: 23 November 2011 16:22
To: 'biotech-room1@mailserv.fao.org'
Subject: 16: Networks

This is from Norbert Tchouaffe, Cameroon, again.

I agree with Gado Zaki (Message 10) that for the sustainability of agricultural biotechnologies, we need a multi-sectoral partnership taking into account the preservation of environment. We also need, as many members mentioned, forum and stakeholders network to raise awareness about findings and opportunities, as you can see from the network of Croplife Cameroun - http://www.croplife-cm.org/.

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-----Original Message-----
From: Biotech-Mod1
Sent: 24 November 2011 17:15
To: 'biotech-room1@mailserv.fao.org'
Subject: 17: Addressing the 9 specific questions from the Background Document - Bolivia

[Many thanks to José Campero Marañón for this message, where he addresses directly all of the specific questions in Section 5 of the Background Document that we suggested that people might wish to address in the e-mail conference. Because of limited resources and for reasons of time, this e-mail conference takes place in English only and unfortunately does not take place in additional UN languages. In this case, however, my FAO colleague Charlotte Lietaer has very kindly assisted me today in translating José's message (which was in Spanish) to English. The English translation is provided first and the original Spanish message is provided after it. Note, José has also prepared a full 10-page WORD document - please contact him directly if you want to receive it. For the future, I ask participants to please only send me messages in English...Moderator].

My name is José Campero Marañón, National Director of the Bolivian Alliance for Sustainable Development (Alianza Boliviana sobre el Desarrollo Sostenible - ABDES, www.abdes.org), a network of NGO networks that works in Bolivia on the Millenium Development Goals (MDGs), particularly MDG 1: Eradicate Extreme Poverty and Hunger to MDG 7: Ensure Environmental Sustainability and MDG 8: Global Partnership.

Our contribution to this forum is based on the results of a study on the production of small farmers and the production of commercial businesses. The population of the study are 146,983 economically active rural people distributed in 77,820 households, with a population density of 19.6 inhabitants per km2. The survey sample was 7,962 families (10.2% of the population) distributed over 961 communities and 29 rural municipalities. The survey was carried out between 2008 and 2010.

Here, I take the specific questions provided in the Background Document to this conference and address them:

1. a) "What can we learn from specific past experiences of partnerships in biotechnologies for smallholders in developing countries?"

Small farmers have adopted applied biotechnologies for livestock production, however biotechnologies have not yet been massively and sustainably adopted for normal production, despite the efforts of international cooperation and triangular cooperation in particular. In contrast, agricultural production is mainly traditional and with low productivity. Agro-industries are the ones that benefit most from technology transfer projects, including biotechnologies.

b) "What were the problems and what were features of the partnerships that worked?"

The main problems were a low participation rate of small producers in the research process and the fact that in most cases researchers focused their research on topics related to their academic background (deepening of research related to their Master's thesis or PhD, topics that do not tackle the complex problems around smallholder farming).

2. "Which of these in the area of agricultural biotechnologies are the most likely to be beneficial for smallholders in the developing countries?" *[For this question, José seems to be addressing the issue of which agricultural area is most likely to benefit from application of biotechnologies...Moderator]*.

I think that biotechnologies applied to milk production improved livestock production, although the extensive questionnaire did not reveal a massive use of these biotechnologies. This shows the need by small-scale farmers and animal producers for biotechnologies that are compatible and adopted to their social, economic and cultural needs.

3. "Are there particular biotechnology-related areas of education/training or research that are more suitable for SSC or for NSC?"

Yes. Biotechnologies related to the development and improvement of production levels should be addressed through South-South Cooperation (SSC). Biotechnologies for industrial livestock production systems on the other hand should be addressed through North-North or South-South Cooperation.

4. "When wishing to engage in biotechnology-related PPPs to benefit their smallholders, which kind of guidelines or best practices should developing country governments or organizations follows?"

Public-private partnerships (PPPs) should be focused on solving problems related to sufficient and productive land tenure, market access, access to credit, and the development of biotechnologies focusing on atmospheric nitrogen intake by the soil/plants system by other species than leguminaceae, improving harvest qualities (amino acids, vitamins and minerals), resistance to pests and diseases, shorter biological cycles to avoid the threat of droughts and frost, etc.

5. "A number of biotechnology-related partnership activities were described earlier in Section 2. Which of these are likely to be most beneficial for smallholders in developing countries?"

Without any doubt two: Institutional capacity development and sharing of technologies, protocols and materials.

"Which kind of partnership (Section 4) is recommended for different partnership activities?"
Triangular cooperation

6. "For each of the different sectors, in the context of agricultural biotechnologies a) are there certain kinds of partnerships which are likely to be more beneficial for smallholders in developing countries?"

Yes, Triangular cooperation

"b) is there certain technical areas which can benefit most from partnerships?"

Yes, the development of GMOs (already mentioned in point 4)

7. "What kind of policy initiatives should developing countries undertake if they wish to strengthen partnerships for the development and use of agricultural biotechnologies to benefit their smallholders?"

A national food sovereignty and food security policy based on the food production by smallholder farmers.

8. "Which institutional arrangements can be established to provide robust support to biotechnology-related partnership to ensure their success and sustainability?"

Networking of/cooperation among research institutions with financial and technical support from emblematic agricultural research instutitions worldwide

"What are the hurdles that can prevent effective international collaboration and how can they best be overcome?"

The main obstacle will be the different levels of agricultural development of different countries and regions and the typical national export strategies of developing countries. The first obstacle can be solved through different technological development and according to the specific needs of each country. The second one by assigning different/preferential export quotas and market niches that are inversely proportional to the national production level.

9. "What is the most appropriate level for the establishment of biotechnology-related partnerships?"

The answer is already mentioned above: Alliances between national research centres.

"What incentives can be provide to foster collaboration at each of these levels?"
Sufficient financial resources and individual and institutional capacity building programmes.

To complete the information, we find that (i) the three types of cooperation (NS, SS and triangular SS) were developed in Bolivia and in many cases they achieved the objectives and developed agricultural technologies, biotechnologies mainly related to the management and breeding of cattle for meat and milk, and soil and water management. And this mainly under the triangular cooperation under the initative of Japan; and (ii) smallholder production is very traditional and production and productivity levels are still very low. These cause problems of household sovereignty and food security at household and national level. It is also true that agro-businesses benefited most from biotechnology development.

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ORIGINAL MESSAGE:

Mi nombre es José Campero Marañón, Director Nacional de la Alianza Boliviana sobre el Desarrollo Sostenible (ABDES, www.abdes.org) una red de redes de ONGs que trabajan en Bolivia haciendo seguimiento a los ODM particularmente al ODM 1, reducción de la pobreza, al ODM 7 Sostenibilidad ambiental y al ODM 8, Gobernabilidad.

Nuestras contribución en este foro emerge de los resultados de una amplia caracterización de la producción de pequeños agricultores campesinos y la producción comercial empresarial. Este estudio involucró a una población económicamente activa rural de 146,983 habitantes, distribuida en 77,820 familias con una densidad de 19.6 habitantes por km2; de este universo fueron evaluados mediante encuestas un total válido de 7,962 familias que representó el 10.2% del total de familias, la prueba abarcó 961 comunidades y 29 municipios rurales y se realizó entre el 2008 y el 2010.

1. What can we learn from specific past experiences of partnerships in biotechnologies for smallholders in developing countries?

Para pequeños agricultores, la biotecnología aplicada a la producción pecuaria ha sido transferida; pero su aplicación en la producción habitual aun no ha sido masificado y sosteniblemente, pese al esfuerzo de la cooperación internacional y en particular de los esfuerzos de la cooperación triangular. En cambio, en la agricultura la producción es en su mayoría tradicional y de baja productividad. Ciertamente, la agricultura empresarial es la principal beneficiaria de los proyectos de transferencia de tecnologías incluyendo la biotecnología.

What were the problems and what were features of the partnerships that worked?

Los principales problemas fueron la baja participación de los pequeños productores campesinos en los procesos de investigación; y, por otra parte, los investigadores, en la mayoría de los casos continuaron investigando temas relacionados a los de su formación académica (profundizaron estudios relacionados con sus tesis de maestría o doctorado que difícilmente resolvían la compleja problemática asociada a la producción campesina)

2. Which of these in the area of agricultural biotechnologies are the most likely to be beneficial for smallholders in the developing countries? Encuentro que los desarrollos biotecnológicos aplicados a la producción de leche fueron los que mejoraron la producción pecuaria aunque su uso masivo no fue detectado por esta vasta investigación. Lo cual demuestra que los pequeños agricultores y ganaderos requieren de biotecnología aplicada y compatible con sus necesidades sociales, económicas y culturales

3. Are there particular biotechnology-related areas of education/training or research that are more suitable for SSC or for NSC?

Sí, la biotecnología asociada al desarrollo y mejoramiento de los niveles de productividad deberían ser enfrentados mediante la cooperación S/S. En cambio la biotecnología para sistemas agropecuarios de producción empresarial deben ser enfrentados tanto por la N/N como por la S/S cooperación.

4. When wishing to engage in biotechnology-related PPPs to benefit their smallholders, which kind of guidelines or best practices should developing country governments or organizations follows?

La cooperación Privada/Pública debe basarse en la solución de los problemas de tenencia de tierra suficiente y productiva, acceso a mercados, crédito, y al desarrollo de biotecnologías que permitan incorporar nitrógeno atmosférico en el sistema suelo/planta por especies distintas a las leguminosas, mejorar la calidad de las cosechas (aminoácidos, vitaminas y minerales), resistencia a plagas y enfermedades, ciclos biológicos cortos para escapar de sequias y heladas, entre otras.

5. A number of biotechnology-related partnership activities were described earlier in Section 2. Which of these are likely to be most beneficial for smallholders in developing countries?. Indudablemente dos: Institutional capacity development y sharing of technologies, protocols and materials.

Which kind of partnership (Section 4) is recommended for different partnership activities?
Triangular cooperation

6. For each of the different sector, in the context of agricultural biotechnologies a) are there certain kinds of partnerships which are likely to be more beneficial for smallholders in developing countries? ; Si, Triangular cooperation b) is there certain technical areas which can benefit most from partnerships? Si, desarrollo de organismos genéticamente modificados (ya mencionados en el punto 4)

7. What kind of policy initiatives should developing countries undertake if they wish to strengthen partnerships for Development and use of agricultural biotechnologies to benefit their smallholders? Una política nacional de soberanía y seguridad alimentaria con base en la producción agropecuaria de pequeños productores campesinos.

8. Which institutional arrangements can be established to provide robust support to biotechnology-related partnership to ensure their success and sustainability? El trabajo en redes de instituciones de investigación con apoyo financiero y técnico desde las instituciones de investigación agropecuarias emblemáticas del mundo entero. What are the hurdles that can prevent effective international collaboration and how can they best be overcome? La principal barrera será las diferencias entre países y regiones en desarrollo agropecuario y las estrategias de exportación nacionales que caracterizan a los países en vías de desarrollo. La primera, puede ser resuelta mediante desarrollo tecnológico diferencia y según las necesidades particulares de cada país; y la segunda, mediante la asignación diferenciada/preferencial e inversamente proporcional al grado de desarrollo productivo nacionales de cupos de exportación en nichos de mercado.

9. What is the most appropriate level for the establishment of biotechnology-related partnerships? La respuesta ya fue mencionada, "Alianzas entre centros de investigación nacionales". b) What incentives can be provide to foster collaboration at each of these levels? Recursos financieros suficientes y programas de capacitación individual e institucional.

Complementado la información encontramos que los tres tipos de cooperación: Norte/Sud, Sud/Sud y la cooperación triangula S/S se desarrollaron en Bolivia, en muchos de los casos alcanzaron sus objetivos desarrollando tecnología agropecuaria, biotecnología particularmente asociado al manejo y reproducción de bovinos para carne y leche y sistemas de manejo de suelos y riego, particularmente bajo la cooperación triangular a iniciativa del gobierno del Japón; y, segundo que la producción campesina se nutre de la tradición y que los niveles de producción y productividad permanecen aún muy bajos y originan problemas familiares de soberanía y seguridad alimentaria tanto a nivel familiar como de la nación en su conjunto. También es cierto, que la agricultura empresarial fue beneficiaria de los avances biotecnológicos.

-----Original Message-----
From: Biotech-Mod1
Sent: 25 November 2011 13:25
To: 'biotech-room1@mailserv.fao.org'
Subject: 18: The scope and depth of biotechnology PPPs: Moving beyond research

This is from Laurens Klerkx, the Netherlands, again.

I would like to react to the contribution of José Camparo Marañón (message 17), specifically in relation to a number of issues raised by him (and also others):

1) Regarding the scope of the partnership in terms of the diversity of actors involved:

José states that biotechnology public-private partnerships (PPPs) should focus on: "solving problems related to sufficient and productive land tenure, market access, access to credit, and the development of biotechnologies focusing on atmospheric nitrogen intake by the soil/plants system by other species than leguminaceae, improving harvest qualities (amino acids, vitamins and minerals), resistance to pests and diseases, shorter biological cycles to avoid the threat of droughts and frost, etc."

This remark hints at a first crucial issue: who should form part of PPPs? From José's remark, it becomes clear that adoption of biotechnology applications aimed at smallholders require many adaptations in the broader system in which farmers are embedded (in innovation studies language: this requires co-evolution between technology, and social, economic and institutional arrangements). However, often PPPs are brought back to research partnerships, and this is also the tendency in many of the contributions to this discussion. While an important part of the innovation puzzle, research in itself, and the technologies it generates (e.g. improved seeds, cultivation methods), is not innovation, because an enabling environment should be created to bring those technologies into use. Innovation is knowledge brought to economic and social use, otherwise it remains confined to an invention. Creating such an enabling environment, more often than not, is a struggle and a negotiation process, because actors with vested interests often have an interest in maintaining a status-quo. Often non-adoption is attributed to unwillingness or ignorance by farmers, but often it is the lack of changes in their context (the creation of the enabling environment) which hinders them in adoption of new technologies. So social, economic and institutional change is equally important as technological change.

So I would say that beyond creating better research PPPs, and alliances between national and international research institutes, PPPs should encompass all kinds of relevant actors: development agencies, farmers and their representatives, NGOs, governments, input suppliers and processors, the general public, funding agencies, etc. This sort of inclusiveness for innovation has recently be recognized through the innovation systems concept, and Andy Hall has written some on this which I deem quite relevant for this discussion (see http://tinyurl.com/cr8ex3w (freely accessible), or http://tinyurl.com/buh4n65 for the later peer reviewed article (not freely accessible), which is part of a special issue on pro-poor biotechnology

partnerships (see http://tinyurl.com/c7h5fy7) . This is also why we regard the earlier mentioned innovation brokers (see messages 9 and 14) as systemic intermediaries and not as technology transfer agents between research and farmers or agro-industries, as linkages between a great diversity of actors in an innovation system need to be made and facilitated. *[The first reference is to Hall, A.J. and J. Dijkman. 2006. Capacity development for agricultural biotechnology in developing countries: Concepts, contexts, case studies and operational challenges of a systems perspective, and is a 51-page publication in the UNU-MERIT Working Papers series, http://www.merit.unu.edu/publications/wppdf/2006/wp2006-003.pdf (266 KB). The second is to Hall, A.J. 2005. Capacity development for agricultural biotechnology in developing countries: an innovation systems view of what it is and how to develop it. Journal of International Development. Vol 19, 611-630. As Laurens says, this second article was published in a special issue of the Journal of International Development dedicated to "Perspectives on institutions, agricultural biotechnologies and development"...Moderator]*.

2) Regarding the depth of involvement of actors, especially farmers:

Another remark by José triggered another thought, also related to a remark made Nagib Nassar on learning from farmers (Message 6). José's remark was: "The main problems were a low participation rate of small producers in the research process and the fact that in most cases researchers focused their research on topics related to their academic background (deepening of research related to their Master's thesis or PhD, topics that do not tackle the complex problems around smallholder farming)."

This point highlights the crucial point of joint diagnosis of problems and possible solutions, demand articulation and research agenda setting. If, in an early stage, farmers are involved in agenda setting, researchers will most likely start working on those issues which are important to farmers, and making the research process a co-development process. This means that farmers should not be considered as being at the end of an R&D pipeline, and even goes beyond consulting farmers in some stages of the research process (e.g., testing varieties), but really making them owners of the process, co-deciding on priorities and funding allocation. We did some research on this (although not focused on biotechnology specifically, see http://tinyurl.com/cb82q4y and see also work by Prolinnova, e.g. http://ow.ly/1fOHBa). It should be taken into account that shaping such farmer-driven research agenda setting mechanisms requires considerable capacity building and institutional change both for farmers and researchers, including having the right incentive mechanisms in place (that not just the peer reviewed articles count in the yearly evaluation of researchers' performance). *[The first reference is to Klerkx, L. and C. Leeuwis. 2009 Operationalizing demand-driven agricultural research: institutional influences in a public and private system of research planning in The Netherlands. Journal of Agricultural Education and Extension 15, issue 2. The second link is to a presentation given by Ann Waters-Bayer, from the International Support Team for Prolinnova ('PROmoting Local INNOVAtion in ecologically oriented agriculture and natural resources management') a few days ago on "Farmer-managed innovation funds drive multi-stakeholder learning processes"...Moderator]*.

As a last contribution, in line with what we have called 'web-based innovation brokers', this initiative recently launched by Syngenta is nice, as it aims to stimulate new creative partnerships for biotechnology innovation, see http://www.syngenta-us.com/news_releases/news.aspx?id=157057 *[The link is to a press release about the launching of a new online portal, SyngentaThoughtseeders.com, to "stimulate and accelerate collaborations with external parties for the development of new, integrated solutions in agriculture"...Moderator]*.

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[The point made by José in Message 17, referred to also by Laurens in part 2 of his message above, about the motivation for researchers to engage in PPPs reminded me of one of the conclusions from Hartwich et al's analysis of 124 PPPs in agricultural innovation in nine Latin American countries, i.e. that the PPPs analysed were created mainly for three reasons, one of which was "The public sector researcher wants to continue working in his or her field of specialization, and in the search for funds realizes that partnering with the private sector will provide access to either public grants or private funds". Hartwich, F., Gonzalez, C. & Vieira, L.-F. 2005. Public-private partnerships for innovation-led growth in agrichains: A useful tool for development in Latin America? ISNAR Discussion Paper 1. http://www.ifpri.org/sites/default/files/pubs/divs/isnar/dp/papers/isnardp01.pdf (0.3 MB)...Moderator].

-----Original Message-----
From: Biotech-Mod1
Sent: 25 November 2011 13:27
To: 'biotech-room1@mailserv.fao.org'
Subject: 19: Appropriate levels for establishing partnerships

This message is from Julian Northey, Co-founder and chief executive officer (CEO) of Frontier Agri-Science Inc. based out of Ottawa, Canada.

I would first like to comment on the question from Section 5 of the Background document): "What is the most appropriate level for the establishment of biotechnology-related partnerships (for example, between countries, between institutions, between research laboratories/units or between individuals)? What incentives can be provided to foster collaboration at each of these levels?" and then hopefully tie this into some ideas and comments from the other participants.

I believe all levels are appropriate and should be involved in some capacity. For example, we recently had the privilege of attending the "2011 Canada-China Science and Innovation Platform Meeting in Agriculture and Agri-Food". The stated objective: "Discuss the opportunities for Canadian and Chinese government, university and industry representatives to strengthen science and innovation activities under the China-Canada Agreement in Science and Technology. Provide and exchange information to help access either country's markets or technologies for mutual benefits and promote the China-Canada Science and Innovation Platform in agriculture to the Canadian and Chinese industries and scientists."

This is a relationship that started approximately 30 years ago with a memorandum of understanding (MOU) between the two countries, evolving thereafter with particular agreements being formed between the various research institutions (national-based, university etc.). Practically, what we found to be incredibly useful was the opportunity each delegate member had to showcase/present their own research, objectives, and vision (or that of the institution they were representing) - essentially fostering the opportunity for collaborations to be established between delegates. It then distilled down to individuals (researcher/lab-to-researcher/lab, president of university-to-lab, president-to-CEO, CEO-to-lab etc.) talking and working out some of the broad ideas behind the collaboration. The key to the success of this forum I believe lay in the additional outline and discussion of accessible (e.g. private, government...IDRC (see Message 3 for reference), Canadian International Development Agency etc.) funding opportunities to help facilitate these potential collaborations. As Dr. Odeny mentioned in Message 7, research and development tend to be driven by where the funds are. An appropriate funding source with proper governance under the aforementioned forum can certainly provide the robust support to ensure success and sustainability.

One of the more challenging scenarios to navigate in this scheme is the public-private relationship. As Mathias Mondy (Message 13) nicely outlined, companies require several (very particular) variables to be clearly defined so as to limit liabilities and generally maximize the opportunity for profit to the company (shareholders in a public company are a finicky bunch). Ultimately, in order to safe-guard the smallholder longterm, I believe one of the best practices for developing country governments or organizations is in a

"joint venture", perhaps first involving joint research projects (all other perks such as sharing of biotechnologies, protocols etc. can/will follow suit). If structured correctly it could foster mutual benefits and ultimately maximize value to the smallholder. For example, part of this structuring might require (re)defining an appropriate business model/commercialization scheme; appropriate to the technology being developed and implemented.

e.g. The current paradigm for marketing proprietary seed technologies ('seeds'), for instance, is limited to the eventual sale of developed 'seeds' to the farmer on a yearly basis, which is strictly enforced by intellectual property rights. However, there are other effective business models that can be used for the distribution and use of 'seeds' - ones that are not so unnecessarily oppressive to the smallholder farmer.

As an aside, I really appreciated message 15 by S. Seshadri.

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-----Original Message-----
From: Biotech-Mod1
Sent: 25 November 2011 13:41
To: 'biotech-room1@mailserv.fao.org'
Subject: 20: Addressing the first set of specific questions - India

This is Dr Janaki Krishna once again, from India.

Having worked for the "Andhra Pradesh Netherlands Biotechnology Programme for Dryland Agriculture" implemented by the Institute of Public Enterprise for almost a decade, I have gained some experience and learned a few lessons about developing and transferring biotechnologies to small and marginal farmers. Keeping these in mind, I would like to throw some light on the first set of specific questions raised in Section 5 of the Background Document.

1. "What can we learn from specific past experiences of partnerships in biotechnologies (in crops, forestry, livestock, fisheries or agro-industry) for smallholders in developing countries? What were the key lessons learned? What were the problems and what were the features of the partnerships that worked?"

When we look at the previous partnerships in biotechnologies in improving crops, forestry etc. for smallholders, it is understandable that unless a special focus is given to the end users the benefits may not reach them in the initial instance. By then, the progressive and rich farmers will benefit from these technological interventions. This happens particularly when we apply these technologies to the high value/cash crops. If the benefits of biotechnological interventions have to reach the small and marginal farmers, the crops and traits to be addressed have to be different as most of these sections of society live in dryland or highly vulnerable areas and their incomes are dependent on the type of crops they cultivate.

2. "A number of specific kinds of partnerships (North-South cooperation, South-South cooperation, triangular cooperation and Public-Private partnerships) were described in Section 4 of the Background Document (http://www.fao.org/fileadmin/user_upload/biotech/docs/conf17bd.pdf). Which of these (or, indeed, other kinds of partnerships) in the area of agricultural biotechnologies are most likely to be beneficial for smallholders in developing countries?"

As part of North-South Cooperation, the Andhra Pradesh Netherlands Biotechnology Programme (funded by Ministry of Foreign affairs, the Government of the Netherlands), implemented by the Institute of Public Enterprise, Hyderabad, India during the period 1996-2007, serves as a case study. The Programme, through partnerships between public institutions and NGOs and farming communities by using the 'Interactive Bottom up' (IBU) approach, could bring some of the benefits to farmers particularly in low-end biotechnologies like biopesticides, biofertilisers, medicinal plants etc. Also this Programme was able to bring awareness about biotechnology among farmers. However, in my opinion had the private companies participated are considered in this process and Networks in establishing the bioresource units in public-private-partnership mode involving the fourth 'P' (People), the farmers would have had access to the markets also. In fact, in the biofertiliser and biopesticide area there exists a demand supply gap and these inputs have to be supplied in JIT (Just in Time) mode in operational terms. Private companies having rich experience in bringing the products to markets, if involved in these networks with buy-back arrangements would have helped in training the farmers as producers and not as labourers or producers without buyers.

3. "Are there particular biotechnology-related areas of education/training or research that are more suitable for South-South or North-South cooperation?"

'Biosafety Regulations' and 'Coping with Climate Change through Biotechnological Interventions' are the two areas where we need more education and training in developing countries and North-South partnerships may contribute to this important area. This will also contribute to inclusive growth as the most vulnerable sections of the society are affected due to climate change as they mostly live in low-lying areas/areas affected by extreme climates.

4. "When wishing to engage in biotechnology-related Public-Private partnerships to benefit their smallholders, which kind of guidelines or best practices should developing country governments or organizations follow?"

The bottom line has to be 'win-win' situation and the bioenterprises involving farmers as stakeholders have to be established in rural areas.

5. "A number of biotechnology-related partnership activities were described in Section 2 of the Background Document (individual and institutional capacity development; joint research projects; sharing of biotechnologies, protocols and materials; and knowledge sharing). Which of these (or others not mentioned here) are likely to be most beneficial for smallholders in developing countries? Which kind of partnership (Section 4 of the Background Document) is recommended for the different partnership activities?"

Research proposals addressing the needs of smallholders in agriculture have to be encouraged by all the means addressed in the above question. Depending on the nature of the study, either institutions/individuals have to be engaged in these endeavours. Projects have to be funded to public institutions as part of capacity building and, through them, funds can be routed to other partners (private/NGOs/farmers) as public institutions as per their mandate are always accountable for public good.

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-----Original Message-----
From: Biotech-Mod1
Sent: 28 November 2011 13:54
To: 'biotech-room1@mailserv.fao.org'

Subject: 21: Re: Policy initiatives to strengthen partnerships

This is from Mahmoud M. Sakr, vice president of the Egyptian Academy of Scientific Research and Technology and Professor of Plant Biotechnology, National Research Center, Egypt.

In fact this e-mail conference is very timely and hopefully it will come with tangible conclusions and road map to move forward. I would like to reply to the following question: "What kind of policy initiatives should developing countries undertake if they wish to strengthen partnerships for the development and use of agricultural biotechnologies to benefit their smallholders?". *[From Section 5 of the Background Document...Moderator]*.

My answer urged tacking decisive actions in the following items:

1. Creation of an encouraging and enabling environment for biotechnology-based business through governmental incentives, venture capital, simplification of governing rules for launching new business, good intellectual property rights system and investment map for the country

2. Support the extension research, informal education and raising awareness and scientific culture of stakeholders

3. Governmental commitments for foreign investors

4. If possible, establishment of technological clusters (science parks)

5. Strengthening global relations

6. Issuing of country Biotechnology SMEs (small and medium sized enterprises) portfolio (Tissue culture industry, Microbial fuel cells, Biofilters, Biofertilizer and Biopesticides, Diagnostic kits, Organic farming,...etc).

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-----Original Message-----
From: Biotech-Mod1
Sent: 29 November 2011 09:29
To: 'biotech-room1@mailserv.fao.org'
Subject: 22: Partnership between the technology developer and the country introducing the technology

This is from Tassawar Malik, consultant cotton, Islamabad, Pakistan.

Very solid points were raised by Mahmoud M. Sakr (Message 21). I would like to share with all the worthy members of this e-conference the experience we gained from Pakistan.

Any technology, including "Crop-Biotechnology", is something new and novel for the stakeholders other than the developers. The originator of the technology is in the right position to help others to properly manage this technology. A genetically modified (GM) seed is a high technology end product indeed. It is usually highly standardized and performs well only developed through a specific protocol. These products definitely involve huge financing and heavy involvement of human capital and seed tech/business companies expect maximum financial output through marketing these products.

All this necessitates a strong collaboration and long term professional partnership between the developer and the concerned department of the host government where the technology is being introduced. Unluckily, in Pakistan the cotton breeders and biotechnologists fully exploited this technology without any kind of formal partnership with Monsanto or other company (though some Chinese and Indian companies did some work that was still not up to the standard). On the other hand, Monsanto was asking for a huge technology fee for the transfer of the same to Pakistan that was not affordable for the Pakistan government as the contribution of this technology to raise the yield bars were questionable due to prevalence of a lethal viral disease in Pakistan named cotton leaf curl virus (CLCV) - a Pakistan-specific issue but now a potential threat to regional and international cotton crop. So Bt cotton was not solving this topmost issue of Pakistan cotton. So, in spite of signing a letter of intent and later a memorandum of understanding between Monsanto and the Government of Pakistan, there was no development in this field and Pakistani farmers had to rely on poor quality single gene (Cry1Ac) Bt cotton developed through traditional breeding procedure. There was huge genetic uniformity and Bt toxin expression issues with this we can say informal and non-genuine Bt cotton. Seed companies, however, fully exploited its market putting farmers and cotton at stake. If there had been a compromise from both sides, Pakistani farmers had a better opportunity to get proper advantage of this technology through involvement of Monsanto and other sub-licensees. This signifies the importance of a strong venture/partnership between the technology developer and the country where this technology is to be introduced.

It is worth mentioning that seed and plant breeder legislation in any country promotes the availability, speed and quality transfer of such technologies and all this was lacking in Pakistan that resulted in hesitation of biotech companies to launch their Bt seed business in Pakistan.

Maybe FAO can establish a highly techncial forum that may evaluate the technology need of various nations and help both the technology developers and the concerned governments to create an enabling environment for promotion of such technologies in the best interest of all of us. This will help the companies to keep up their pace with technologies, to refine them and develop next grade technologies, and the farmers community will have equal opportunity to adopt it at the earliest. What may the benefit if Pakistani farmer has no access to Genuine Bollgard-I technology even in 2011-12? This is food for thought for FAO, technology developing companies as well as governments of developing countries.

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[Bt crops, such as Bt cotton mentioned above, are GM crops producing Crystal (Cry) proteins of the soil bacterium Bacillus thuringiensis (Bt). These proteins from Bt are toxins that kill insects feeding on the plant by binding to and creating pores in their midgut membranes...Moderator]

-----Original Message-----
From: Biotech-Mod1
Sent: 29 November 2011 10:24
To: 'biotech-room1@mailserv.fao.org'
Subject: 23: Best practices

This message is from Piet van der Meer. I have been for over 10 years responsible for the GMO regulations in the Netherlands, and the last 15 years I teach about biosafety and assist governments and international organisations with biosafety and biotechnology strategies.

First of all my compliments to FAO for hosting this debate, which is a very timely and important initiative, especially in the light of the preparations of the Rio+20 conference in June 2012, also called the UN Conference on Sustainable Development or "World Summit". Because the Rio+20 conference will be attended by heads of state who will be discussing key global issues such as food security, the Rio+20 will no doubt significantly influence the direction of - and future financial resources for - agbiotech research. For more information about the process of Rio+20, please consult http://www.uncsd2012.org/rio20/. I also take this opportunity to inform colleagues that the International Food Policy Research Institute (IFPRI)/PBS, the International Service for the Acquisition of Agri-biotech Applications (ISAAA), and the Public Research and Regulation Initiative (PRRI), will organise a number of regional workshops to address Rio+20, Cartagena Protocol on Biosafety, Convention on Bidoversity and Commission on Sustainable Development 20. Aim of the regional workshops is to discuss the topics of these events, how these global events are interrelated and outcomes of these events can be implemented at the national level. The first workshop will be held in January 2012 in Bangkok, Thailand. Information can be found on the website of the host organisation ISAAA.

Turning to the questions for this round of the e-conference, I follow up on the topic of "best practices".

As regards partnerships, I fully agree with the expressed views that a large variety of partnerships will be needed. As Sarah Mayanja from Uganda said (Message 11), "a combination of research, farmers, processors, traders and other private sector players who provide services to the value chain actors (as platform members) has proven very useful in many instances".

Having said that, I particularly agree with the point raised by Nagib Nassar from Brazil (Messages 2 and 6) and Janaki Krishna from India (Messages 4 and 20), about the importance of involving farmers - and especially small holder farmers - in shaping the agbiotech research agenda. Key question of course is how to best obtain that input. In this context, you may be interested in an approach taken in several meetings the last few months in countries in Europe, Eastern Europe and Central Asia, in which farmers and farmers organisations, scientists and government officials were involved in a discussion on the biotechnology research strategies.

To facilitate the debate, we produced a simple matrix in which in the first column we listed:
1) The 5 key crops in that country and
2) per crop, the key challenges in each of those crops, e.g. pests, diseases, weeds, drought etc.

In subsequent columns we listed:
a) current practices to address the respective challenges listed (e.g. existing resistant varieties, spraying, integrated pest management etc),
b) various biotechnological approaches that may assist in addressing the respective challenges, ranging from micro-propagation of virus free material for example, via new breeding techniques such as marker assisted selection, up to the introduction of novel traits via genetic engineering/transgenesis.

These simple matrices have proven to be very helpful start in structuring the debate about priorities in the research agenda.

Having said this, we should also recognise that working on a biotechnology research strategy requires that people are made familiar with the various technological solutions that are available, as well as their potential and their limitations. For this the role of the so called 'innovation brokers' can be extremely helpful, as illustrated by Laurens Klerkx from the Netherlands (Messages 9 and 14). His outline of the tasks of such innovation brokers is very helpful, i.e: 1) Demand articulation, 2) Network composition, 3) Innovation process management. As regards the "Innovation process management", I would advise to also include another important element that can 'make or break' innovations: guidance in complying with regulatory requirements.

As Laurens Klerkx and others have mentioned, there are many organisations around who can play such a role. One such organisation is the recently established International Industrial Biotechnology Network (IIBN), which is a collaboration between the United Nations Industrial Development Organization (UNIDO) and the Flemish Government. (for more information: http://indbiotech.net/)

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-----Original Message-----
From: Biotech-Mod1
Sent: 30 November 2011 10:37
To: 'biotech-room1@mailserv.fao.org'
Subject: 24: Pre-breeding research as a vital link in RD&E

This is Jorge Mayer, Manager for Yield and Quality Traits at the Grains Research & Development Corporation (GRDC) of Australia. I have been involved in the area of technology transfer to less-developed countries for many years, with stints at various institutions and organisations, like five years at CIAT (at the Biotechnology Research Unit) and three with AgrEvo in Colombia; six years at the Center for the Application of Molecular Biology to International Agriculture (CAMBIA), in Australia; and four years as Golden Rice Project Manager, based in Germany.

I have been reading through a number of very interesting and pertinent contributions from various participants in this conference, and now, after seeing a very good contribution from my good friend Piet van der Meer (Message 23), I thought it would be a good opportunity to hop into the ongoing discussion.

Over the years I have seen many efforts by less developed countries to establish collaborations and to get onto the bandwagon of biotechnology. For almost as many years, biotechnology has been dealt with as an almost stand-alone object in many of these forums, including at the political level, which is so important in making policy decisions regarding capacity building, regulatory frameworks, attracting international investment, etc.

I think it is my present role that best exemplifies how biotechnology should be handled, which is the way I always thought it should be. Biotechnology is not something that lives in isolation, and I don't think anyone in this conference has said anything to the contrary. But yet, here we are again, discussing how to establish partnerships in agricultural biotechnologies.

In my present role I manage a large portfolio of pre-breeding projects, i.e. projects around germplasm enhancement, molecular markers, genetics, genomics, other omics, etc, with a view to deliver outputs directly into breeding programs. As you noticed, I didn't use the word biotechnology in the preceding sentence. Researchers here don't do biotechnology. Biotechnology is just a set of tools that has enriched all of the above.

Many of the researchers funded by GRDC are involved in international collaborations with North and South. These collaborations are an important link between work that is done to solve problems that are specific to Australian agriculture and similar problems in other countries. There are, for example, very important collaborations in the areas of wheat rust, to tackle the expanding epidemic of new rust pathotypes in Africa, or working on crop adaptation to water-limited environments in India. These projects are about germplasm development and trait characterisation. And where is biotechnology? It's always there in some guise, be it as molecular markers, a diagnostic tool, and many more. These technologies are used as needed, and based on them being the most efficient way to hit the target.

And that's what caught my eye in Piet's contribution: a relatively simple process used to identify and prioritise targets. Farmers are at the beginning and the end of the technology development and deployment loop. They are essential in helping identify the targets, and at the end they are the beneficiaries, together with the consumers and the environment, hopefully. But they are usually not the ones that apply cutting-edge technologies to develop improved germplasm. Farmers grow and manage crops, and that is what they should be doing. They are of course good testing ground for improved crops or practices.

Which brings me to the point, what are some of the essentials to enable international germplasm enhancement partnerships. One good example are countries that have managed to adopt GM crops. In most cases this had happened because those countries had good breeding and healthy research programs, like South Africa or China. India and Bt cotton is another great example but which also brings us to one major obstacle that stymies progress: the lack of courage by policy-makers, i.e. the courage to make decisions that are best for farmers and consumers, rather than securing votes with activists, or else how could you explain the unnecessary delay in approving Bt brinjal? Who wants to be involved in partnerships condemned to stagnate because of the whims of regulators and policy-makers?

The countries named above are all in a position not only to adopt technologies and improved germplasm, but also to develop their own. That is not to say that other countries may not profit from improved crops, but it'll take longer and also, their specific problems may not be addressed as a matter of urgency.

Thus, the best access to international collaborations is given through good national research, development and extension (RD&E) programs. While upstream research can be left to developed countries, pre-breeders at the national level constitute the essential link to establish those collaborations. And besides, every country who has betted on promoting applied research has been able to repatriate excellent scientists to boost their programs, and in most cases these homecoming researchers have brought with them vital international connections for future partnerships.

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[Pre-breeding refers to all activities designed to identify desirable characteristics and/or genes from unadapted materials that cannot be used directly in breeding populations and to transfer these traits to an intermediate set of materials that breeders can use further in producing new varieties for farmers. It is a necessary first step in the use of diversity arising from wild relatives and other unimproved materials. For those interested in more information: In 2011, the Global Partnership Initiative for Plant Breeding Capacity Building (GIPB) released an e-learning course on "Pre-breeding for effective use of plant genetic resources", which was jointly sponsored by Bioversity International, FAO and the Global Crop Diversity Trust. The course is available from the GIPB website (http://km.fao.org/gipb/), under the "e-learning" tab on the left side of the screen. Alternatively, send a message to GIPB@fao.org to request a free CD-Rom...Moderator]

-----Original Message-----
From: Biotech-Mod1
Sent: 30 November 2011 10:43
To: 'biotech-room1@mailserv.fao.org'
Subject: 25: Constraints to partnerships

This is from Rafiq Chaudhry, the International Cotton Advisory Committee (ICAC), which is an intergovernmental organization working on production, marketing, trade and production research of cotton. ICAC is a recognized international Commodity Body on Cotton. I am personally involved in providing update on production research and facilitate communications among cotton researchers in the world.

Cotton is one of the main crops that embraced biotechnology at a much faster rate, only second to soybeans and maize. We estimate that 63% of the world cotton area in 2010/11 was under biotech cotton varieties. In the past, ICAC constituted two expert panels on biotechnology and currently we have a "Round Table" discussing various aspects of biotechnology applications to cotton. In my opinion, strengthening partnerships in agricultural biotechnologies for the benefit of smallholders in developing countries is handicapped by the cost of technology. Farmers in developing countries, particularly if they are conventional in production practices, are hesitant to make up-front payment for the outcome that still depends on many other factors at the end of the season. This includes weather more importantly under rainfed conditions. So, to me, not only high cost of technology but disparity among countries is limiting the spread of technology to many more countries.

The second constraint is the lack of information on agreements made between a country and a technology provider. I understand that it is used as a trade secret but I have seen that it is an important factor for potential new adopters to make decisions, at least in cotton which I familiar with.

Thirdly, I would like to let you know that many years back, ICAC decided to use the term "biotech" for genetically engineered or any other product developed using biotechnology including recombinant DNA. Biotech covers all the currently available and could also cover any future products where even a gene from the same species may have been inserted using biotechnology.

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-----Original Message-----
From: Biotech-Mod1
Sent: 30 November 2011 16:20
To: 'biotech-room1@mailserv.fao.org'
Subject: 26: Funding bodies targeting calls to specific countries/areas

This is Damaris Odeny again, from the Agricultural Research Council in South Africa.

I would like to respond to the discussion raised by Jorge Mayer (in paragraph 3 of Message 24) regarding the point on "biotechnology has been dealt with as an almost stand-alone object in many of these forums, including at the political level":

I do not think the problem here is in the style with which biotechnology has been approached in most developing countries, as much as it is the intention to get involved in the first case. In many cases, there seems not to be genuine interest to collaborate to help the "poor farmer". This is especially the case when a funding body posts a funding call targeting some countries in a specific subject area. This causes the "unfunded" scientist to do everything possible in order to acquire the funds and that might mean "making a

not-so-genuine-case" for a "poor farmer" who may not even need the technology, and collaborating with specific countries with which there may be nothing much to learn.

Maybe it is time that the major funding bodies stopped posting calls for funding but rather let the researchers in individual countries identify what is likely to work in their situation, then lobby for funding from specific organizations. I think this will lead to the creation of meaningful partnerships because there will have been a real need to be addressed. What happens when funding bodies make proposal calls to specific target countries in target areas of research is that they make researchers "create problems" that they will in turn wish to "address" with the pending "call for proposal". Once they get the funding, they will "try" to do the work for the sake of "producing results" but not because genuinely this is what is best for the country.

.....my opinion entirely.

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[Regarding Damaris' last few words, I would just like to emphasise that, unless otherwise stated, the opinions expressed are always assumed to be those of the individual who sent the message (and not of their employer). One of the key rules of the FAO Biotechnology Forum is that "People posting messages are assumed to be speaking on their own behalf and not on behalf of their employers (unless they indicate otherwise)"...Moderator].

-----Original Message-----
From: Biotech-Mod1
Sent: 30 November 2011 17:35
To: 'biotech-room1@mailserv.fao.org'
Subject: 27: Re: Pre-breeding research as a vital link in RD&E

This is Stefano Golinelli, intern at the EU Delegation for FAO and future PhD student on biotechnology governance.

I wish to comment on Jorge Mayer's contribution (Message 24), regarding the "lack of courage by policy-makers" and their role in the establishment of a favourable environment for partnership in the field of biotechnology.

While "green biotech" has enormous potentialities for crop intensification and, especially, for climate change mitigation, I think that biotechnology is not just a matter of science and that "scientists" should always keep in mind that the regulation of new technologies entails many reflections of a political nature. On that regard, I wish to make three points.

First, biotechnology regulation unfortunately is not exclusively about the promotion of partnerships devoted to smallholders' needs, which are highly desirable but represent a marginal aspect of the global biotechnological research. On the contrary, policy-makers should take into account the overall biotechnology sector and its implications for the society, which still raises several concerns both from an socio-economic perspective, as biotech's advantages for the poor and rural development are still not very evident into the practice, and from an ethical point of view, as issues like labelling and right to information remain very controversial.

Secondly, "science" is not the most adequate actor to unilaterally determine what the best decisions for consumers and farmers are. This longstanding pretension is comprehensible, but in many contexts has proved to be unworkable and risks endangering the public perception of the scientific community.

Thirdly, social activists should not be envisaged as an obstacle to biotechnology but, instead, as very important actors in promoting a demand-driven model that meets the goal of food security and the needs of small-holders. While there are associations opposing on principle to biotechnologies, most of civil society organisations (including non-governmental organisations, farmers associations, etc) are against the model through which biotechnological products are developed and commercialized. By changing this pattern, and partnership could be crucial in this shift, these constituencies could change their stance and could play a role in better identifying the problems faced by communities all over the world and enabling a functional management of green biotech.

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[Stefano's message is a response to paragraph 8 of Jorge's message regarding regulation of GM crops i.e. "Which brings me to the point, what are some of the essentials to enable international germplasm enhancement partnerships. One good example are countries that have managed to adopt GM crops. In most cases this had happened because those countries had good breeding and healthy research programs, like South Africa or China. India and Bt cotton is another great example but which also brings us to one major obstacle that stymies progress: the lack of courage by policy-makers, i.e. the courage to make decisions that are best for farmers and consumers, rather than securing votes with activists, or else how could you explain the unnecessary delay in approving Bt brinjal? Who wants to be involved in partnerships condemned to stagnate because of the whims of regulators and policy-makers?". At this stage, I would like to emphasise that this conference is not about regulation of GMOs and that participants should not send further messages following up on this topic. As stated in the Background Document to the conference: "While biotechnology is sometimes considered to be synonymous with genetically modified organisms (GMOs), it should be underlined that this is not the case in the Forum and that the conference covers a wide range of biotechnologies, of which genetic modification is just one. Discussions in this conference will therefore not consider the issues of whether GMOs should, or should not, be used per se or the attributes, positive or negative, of GMOs themselves. Instead, the goal is to discuss and exchange experiences on partnerships in agricultural biotechnologies to benefit smallholders in developing countries, covering issues such as the potential pitfalls and benefits of different kinds of partnerships; lessons learned and best practices from past experiences; and relevant advice that can be provided to developing countries or their national research organizations on the subject"...Moderator].

-----Original Message-----
From: Biotech-Mod1
Sent: 01 December 2011 14:17
To: 'biotech-room1@mailserv.fao.org'
Subject: 28: Re: Funding bodies targeting calls to specific countries/areas

This is Dr Janaki again, from India.

I agree with Damaris Odeny's comment (Message 26) on call for proposals. In my opinion, a paradigm shift has to take place in funding patterns. I feel a call should be given to identify the research problems in specific local areas, for which funds have to be allotted. Then, based on the research needs, calls for proposals have to be made to address that particular problem. Though we talk about 'bottom up' and 'participatory approaches' we still follow 'top down approaches' in funding. We need to have a product-based approach using a participatory process. Firstly, allot small budgets and assign the tasks of identifying

the local/field problems. We often define priority areas based on assumptions. First make a survey to identify the field problems then fix the actors (all stakeholders) and then funding can be made based on credibility of the proposals and proposers.

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-----Original Message-----
From: Biotech-Mod1
Sent: 01 December 2011 14:47
To: 'biotech-room1@mailserv.fao.org'
Subject: 29: Re: Funding bodies targeting calls to specific countries/areas

Laurens Klerkx again from Wageningen University,

In relation to the discussion on funding bodies' calls and top-down funding approaches (messages 26 and 28), I just want to point again to the alternative mechanisms for research agenda setting, prioritizing and funding allocation I talked about in my earlier message (point 2 in message 18). I think they can serve as examples on how to give stakeholders a real say. I must add that setting up this type of mechanism requires considerable investment in learning and capacity building on the part of those involved (farmers, citizens, researchers, industry), as it requires synchronizing expectations, being able to participate as equals in a discussion, being able to consider the interests of others. The benefit is that stakeholder ownership of the research process increases, and that research is better tailored to users' needs, so that technologies have a higher chance of being applied.

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[In Message 18, Laurens wrote "This point highlights the crucial point of joint diagnosis of problems and possible solutions, demand articulation and research agenda setting. If, in an early stage, farmers are involved in agenda setting, researchers will most likely start working on those issues which are important to farmers, and making the research process a co-development process. This means that farmers should not be considered as being at the end of an R&D pipeline, and even goes beyond consulting farmers in some stages of the research process (e.g., testing varieties), but really making them owners of the process, co-deciding on priorities and funding allocation. We did some research on this (although not focused on biotechnology specifically, see http://tinyurl.com/cb82q4y and see also work by Prolinnova, e.g. http://ow.ly/1fOHBa). It should be taken into account that shaping such farmer-driven research agenda setting mechanisms requires considerable capacity building and institutional change both for farmers and

researchers, including having the right incentive mechanisms in place (that not just the peer reviewed articles count in the yearly evaluation of researchers' performance)"...Moderator].

-----Original Message-----
From: Biotech-Mod1
Sent: 02 December 2011 13:35
To: 'biotech-room1@mailserv.fao.org'
Subject: 30: Making partnerships work

This message is from Jane Morris in South Africa. I have been associated for the last few years with the African Centre for Gene Technologies (ACGT), which itself is a multi-institutional partnership to create a virtual network of institutions working in biotechnology and bioscience R&D.

I have seen that a partnership will only thrive if there is a champion dedicated to driving and nurturing it and ensuring that all the role players remain committed. The ACGT has grown to formally include 5 institutions (three universities and two science councils), with networked links to many more institutions both in South Africa and other African countries, primarily because of the added value it can offer by having dedicated personnel to support the relationship. Similar relationships that are supported only by a Memorandum of Understanding or similar agreements go no further than a piece of paper.

Of course a partnership also needs to be supported by adequate project funding and this is often a limitation to South-South partnerships, since most of the funding originates in the North. Damaris Odeny (Message 26) has already addressed the issue of top-down agenda setting - more than this, those who provide the funds would often like to ensure that they can influence which role players should receive the funds. It is not very helpful when researchers in the North (well meaning though they may be), receive the majority of funds and take the lead in developing a solution to an agricultural problem in the South, and then merely transfer the technology to the recipients in the South. This embeds the culture of dependence and does not help the role players in the South to be able to tackle future problems themselves.

I believe strongly that South-South and triangular partnerships represent a real opportunity for the future. However as the saying goes, "he who pays the piper calls the tune". Until countries and institutions in the South wake up and commit more of their own resources to partnerships of this nature, we may not see significant changes occurring. This means that we all need to lobby our governments and institutions actively - it is no good being passive participants and hoping that "someone else" will sort things out.

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-----Original Message-----
From: Biotech-Mod1
Sent: 02 December 2011 15:58
To: 'biotech-room1@mailserv.fao.org'
Subject: 31: South-South Cooperation - TWAS

This is a message from Peter McGrath and Mara Marchesan, TWAS, Italy. Peter McGrath has a PhD and research experience in agricultural biotechnology, entomology and plant pathology. As TWAS Programme Officer, he oversees a variety of capacity-building programmes for scientific communities in developing countries. Mara Marchesan (MPhil, Behavioural Ecology) is collaborating as a consultant with TWAS and with environmental organizations and research institutes dealing with sustainable development, integrated environmental management, conservation and related issues. She is currently carrying out a PhD in

Sustainability Science and Policy; her project is on eco-innovation solutions to ecosystem services and resource-based development, with a special focus on Integrated Agriculture-Aquaculture Systems (IAAS).

TWAS, the academy of sciences for the developing world, is an international organization based in Trieste, Italy, that operates under the administrative umbrella of of the United Nations Educational, Scientific and Cultural Organization (UNESCO). Founded in 1983, it now counts more than 1,000 eminent scientists as members, more than 85% of whom come from the developing world. TWAS programmes aim to build scientific capacity and promote excellence in the South.

Over the years, TWAS has played a key role in enhancing South-South Cooperation (SSC) and supporting high-level training in research areas of global interest, including agricultural biotechnologies. In particular, the TWAS South-South Fellowships Programme provides over 300 fellowships each year tenable in various more scientifically-advanced developing countries for scientists from the developing world.

Two schemes are specifically dedicated to biotechnology research, the DBT-TWAS fellowship programme instituted with the Department of Biotechnology (DBT) of the Ministry of Science and Technology, India, and the BIOTEC-TWAS fellowship programme instituted with the National Center for Genetic Engineering and Biotechnology (BIOTEC), Thailand. Please see http://twas.ictp.it/prog/exchange/fells/fells-overview for an overview of all TWAS's South-South Fellowships.

The DBT-TWAS and BIOTEC-TWAS partnerships, in particular, are proving to be of high value for developing capacity in the area of agricultural biotechnologies, and they provide an excellent opportunity to share and transfer knowledge and technologies that could eventually benefit smallholders in developing countries. Considering the research focus of these fellowship exchanges, it is worth mentioning some areas of training that may be particularly suitable for SSC. These include crop plant genomics (e.g. legume, rice, potato genomics) and proteomics (e.g. proteomics studies on host-pathogen interactions and disease management), stored-product entomology (e.g. resistance to grain moths in cereals), food microbiology (e.g. molecular characterization and probiotic potentials of Bacillus species), ornamental plant culture techniques (e.g. cultivation of economically important orchids through tissue culture techniques), nutritional biotechnology in aquaculture (e.g. utilization of treated maize cob as co-energy source in the diet of farmed fish).

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[From the website of TWAS, whose acronym comes from its original name (the Third World Academy of Sciences), details are provided about the TWAS-DBT Fellowship Programme for Postgraduate Research; the TWAS-DBT Fellowship Programme for Postdoctoral Research; and the TWAS-BIOTEC Fellowship Programme for Postdoctoral Research. It also gives details about awardees (including nationality, home institution, scientific research field and host institution visited) from 2010 and 2009...Moderator].

-----Original Message-----
From: Biotech-Mod1
Sent: 02 December 2011 16:05
To: 'biotech-room1@mailserv.fao.org'

Subject: 32: Need for coordination among countries providing SSC

This is once again M. Rafiq Chaudhry of the International Cotton Advisory Committee.

Today my comments are limited to South-South cooperation. We have seen that a number of countries, particularly Brazil, China, India and Pakistan, have either already started or are aspiring to help African countries. I am familiar with at least two missions from these countries to the region. Some initial decisions have already been made as far as cotton in concerned. What we feel as an intergovernmental organization is that there is no coordination among countries who are willing to help. Each country is assessing needs on its own and deciding what they are going to do irrespective of what another is planning to do.

So, my point is that there is a need for coordination among helping countries.

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-----Original Message-----
From: Biotech-Mod1
Sent: 02 December 2011 16:36
To: 'biotech-room1@mailserv.fao.org'
Subject: 33: Re: Making partnerships work

This is Obidimma Ezezika at the McLaughlin Rotman Center for Global Health, Toronto, Canada.

I agree with Jane Morris (message 30) in the value of a "champion" in providing the enabling environment for south-south collaborations. In addition, I also think that the private sector can play a role here especially in the context of south-south entrepreneurial collaborations. My colleague, Halla and her team have been studying south-south collaborations in the health biotech sector and show that there is substantial South-South entrepreneurial collaboration in developing countries and firms are a key driving factor in these collaborations. Please see her article in the Nature Biotechnology journal: http://www.nature.com/nbt/journal/v28/n5/full/nbt0510-407.html. One of the challenges she and her team identified is the challenge of locating suitable partners to collaborate with. This is where a "champion" becomes vital. However, the importance of governments in developing countries in creating supporting activities that encourage south-south collaborations cannot be over-emphasized.

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[The reference above is to a recent paper by Thorsteinsdóttir H, Melon CC, Ray M, Chakkalackal S, Li M, Cooper JE, Chadder J, Sáenz TW, de Souza Paula MC, Ke W, Li L, Madkour MA, Aly S, El-Nikhely N, Chaturvedi S, Konde V, Daar AS, Singer PA: South-South Entrepreneurial Collaboration in Health Biotech. Nature Biotechnology 2010, 28(5):407-416. The paper, which seems to be available in open access, presents the results of a brief survey that was sent to 467 health biotech firms (288 replied) in six developing countries that have relatively strong health biotech sectors - Brazil, China, Cuba, Egypt, India and South Africa - and asked about their linkages with all other developing countries, in order to examine the level and characteristics of South-South collaboration. The Conclusion section of the paper is provided below - it is a bit long, but I think interesting and relevant to our agricultural biotechnology related e-mail conference:

"Our analysis indicates that South-South entrepreneurial collaboration in health biotech is substantial and that firms in developing countries are actively working together. These types of collaborations are on the political agenda of many developing countries' governments, and, as mentioned above, developing countries are increasingly signing collaborative agreements and setting up initiatives to promote scientific and technological collaboration among themselves. Our results show that in the health biotech sector, at least, firms have moved beyond the rhetoric of South-South collaboration. They are actively boosting trade in their countries by forming relationships with firms in other developing economies; to a lesser degree, they are working together to boost innovation, as seen in the development of new products or processes.

Apart from providing insight into the current extent and characteristics of South-South collaboration, our survey also establishes a baseline for future studies. As such, it can provide important information for evaluating the effects of policies and programs aiming to promote collaboration in developing countries. As with any survey, our study has limitations. For logistical reasons, we had to limit our data collection to a few countries - those that are likely to contain the bulk of developing countries' firms active in this field. Furthermore, we have not been able to receive information from every firm active in health biotech in the countries we focused on, and some firms may not have reported the extent and characteristics of all their South-South collaborations. Even so, as we obtained a relatively high response rate, we believe that the results represent the main characteristics of South-South firm collaboration in the health biotech field.

In summary, our findings lead us to several conclusions. First, we can see that South-South collaboration has become a widely chosen path for health biotech firms. One in every four firms that responded to our survey stated an active collaboration with other developing countries. Furthermore, developing countries' firms that engage in South-South collaboration are likely to be involved in several initiatives at a given time. South-South collaboration has therefore become a reality of the health biotech sector - a well-trodden route firms take in their entrepreneurial activities. Nonetheless, South-North collaborations are even more prevalent, with just over one in every two firms being active in collaboration with at least one developed country. There were also differences in the extent of South-South entrepreneurial health biotech collaborations depending on the location; countries with the smallest populations were most active in collaborating with other developing countries. This probably reflects the fact that small home markets can create the need to collaborate for the sake of a firm's viability.

Second, this survey shows that most collaborations involve linkages between the leading developing countries in health biotech. Despite distances, working together may amplify the competitiveness of relatively advanced developing countries. In addition, the results show a considerable number of regional collaborations between firms. Firms in South Africa, for example, have active linkages with other sub-Saharan countries, and enterprises in both Brazil and Cuba had active collaborations in Latin America. Thus, South-South collaborations have a dual purpose: to amplify the global competitiveness of leading developing countries in health biotech and to strengthen regional ties in health biotech.

Third, the health biotech collaborations between developing countries involve mainly end-stage commercialization activities rather than R&D. Commercialization activities such as distribution and marketing were by far the most common South-South collaboration activities, and more common than any research and developmental activities. This is true for all the countries surveyed in this study. The focus on end-stage commercialization is in line with 'access to markets' being the most common reason given for South-South collaborations and reflects a need for companies to export their products to other developing countries. The fact that the countries with the smallest populations were most active in South-South collaborations underscores this finding. Considering that some developing countries have proven track records in producing relatively affordable health biotech products, South-South health biotech

partnerships may increase the availability of relatively inexpensive health biotech products in developing countries' markets, as well as the accessibility of health biotechnologies in general.

Fourth, these collaborations contribute only marginally to innovation in health biotech. Few of the South-South collaborations reported in the survey involved knowledge-creation activities tied to innovation. For example, only 13% of the reported collaborations involve R&D and only 9% involve clinical trials. This may indicate that many of the firms we surveyed are not active in health biotech innovation. Instead, they may be licensing products from firms that are innovators in the field - typically from developed countries. Nevertheless, some firms from China, Cuba and India have increasingly been applying their innovative capabilities to the health biotech field. It will be of interest to repeat the survey in the future to see whether South-South collaboration will make a richer contribution toward innovation. It is also notable that collaboration involving R&D activities has a strong commercial side, with 'joint product on market' being the most frequently cited output for the R&D collaborations. This reflects the sizable product focus of R&D collaborations, which may translate into a stronger innovation track record once more firms have been able to build up innovation capacity.

Fifth, South-South collaboration is typically initiated by the participating firms themselves. The results of the survey show that little collaboration has been initiated by governmental organizations or by any other outside party; international organizations and expatriates have also had a limited role in encouraging South-South collaborations. As research on South-North collaboration between firms has suggested that a major challenge of health biotech collaboration is establishing the initial linkages with possible collaborators, it seems likely that this challenge is also experienced by the firms of developing countries. Our results may indicate an opportunity for greater governmental involvement. The example of the Brazil-Cuba collaboration on meningitis AC vaccine for Africa exemplifies the important role that international organizations can play in facilitating South-South collaboration. The involvement of other international organizations or philanthropic organizations might also be warranted to accelerate the formation of collaborations that provide affordable options for improving health in developing countries.

On the basis of our research, we can make several recommendations. Firms in developing countries should consider South-South collaboration as a way to expand their markets. Market demand has been expanding in many developing countries, and it is thus an increasingly lucrative strategy to target those markets. Setting up a collaboration with a firm in another developing country that has knowledge of the local regulations relating to product quality and product manufacture, as well as an established product distribution network, is an important first step toward accessing these markets. Firms in developing countries should realize that by working together they can leverage each other's strengths and develop more cost-effective products. In doing so, they can expand their markets considerably in the developing world, where a large proportion of the population can afford only low-priced health products. Firms in developing countries can start their cooperation by focusing on marketing and distribution, but as their collaboration deepens and trust is built, they can start to pursue further innovative activities with commercial partners.

Governments in developing countries should continue to place an emphasis on South-South collaboration. As more developing countries have built up capacity in health biotech, they now can use collaboration with other developing countries to build capacity in areas where knowledge is lacking. Technology transfer between developing countries can be a promising strategy to gain access to technologies that are typically more affordable and appropriate to developing countries' needs than the technologies from developed countries. Such collaborations can strengthen the capacity of firms based in countries currently weak in health biotech and can start bridging the divides between developing countries in this field.

Our survey also shows that even though South-South firm collaborations in health biotech are widespread and numerous, they rarely involve innovation. Developing countries are not yet reaping the full benefits of such commercial partnerships. With an increased innovation focus, developing countries could leverage their individual strengths and increase the pool of resources to address their shared problems. We thus recommend that governments in developing countries integrate South-South collaboration more closely in their innovation policies and provide support to firms from other developing countries that want to promote joint innovation in health biotech. To smooth the process of innovation, these governments may need to consider how their regulatory offices can work together to make the process of cross-border innovation easier and faster.

Finally, our survey shows that governments and international organizations have had a limited role in initiating South-South collaboration. Promoting a stronger innovation focus in South-South health biotech

collaborations should not be dependent solely on the activities of enterprises in developing countries; supportive activities that directly target the development of health biotech products and services are called for from both governments in developing countries and the international community. International organizations and philanthropic organizations that are engaged in promoting global health should pay attention to the power of South-South commercial collaborations in providing affordable health products. When health biotech firms in developing countries pool their respective strengths, there is potential for such collaborative efforts to be more cost effective and relevant than the work of health biotech companies in developed countries; thus, South-South collaborations may be able to provide health products that reach more poor people in the developing world."...Moderator].

-----Original Message-----
From: Biotech-Mod1
Sent: 02 December 2011 17:01
To: 'biotech-room1@mailserv.fao.org'
Subject: 34: Champions and innovation brokers should work in tandem

Laurens Klerkx again, Wageningen University.

Highly interesting and important the messages on the role of a champion from Obidimma Ezezika (message 33) and Jane Morris (message 30). In relation to my earlier message 9, I would like to highlight the importance of having a 'champion' and an 'innovation broker' working in tandem.

Champions usually are highly intrinsically motivated to push a technology/innovation, and have good networking skills, but also have a certain interest in representing a company or another party. Sometimes having a strong interest may lead to them following their own agenda (as Jane Morris also says) becoming less credible in the eyes of others to facilitate a partnership, especially when certain conflicts arise. Then an innovation broker as a relative neutral outsider may be useful, to mediate and resolve conflict. Furthermore, champions may be, because of their strong drive, too much focused on one vision/objective and correspondingly may exclude relationships with certain actors which can be highly beneficial. This may even lead to an innovation process which becomes stagnant. Here an innovation broker can provide a mirror for self-reflection and enable new types of relationships which may lead to highly creative combinations.

It is very important that champion and innovation brokers make very clear what are their roles and responsibilities, and also that an innovation broker leaves the partnership when it functions autonomously, which in a sense is what it tries to achieve. A problem is then that people forget about the innovation broker's contribution, which is not good in terms of its longevity (in terms of impact evaluation, funding - both public and private). So that's why they sometimes stay in too long, and actually start to be 'noise' in the partnership.

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-----Original Message-----
From: Biotech-Mod1

Sent: 03 December 2011 22:11
To: Biotech-Mod1
Cc: biotech-room1@mailserv.fao.org
Subject: 35: Partnerships in the Global context: Gates and G20

This is from Anne MacKenzie, Consultant, Animal Health and Food Safety. Formerly with the Canadian Food Inspection Agency and Editor of the OIE Revue scientifique et technique, Biotechnology Applications in Animal Health and Production, Vol. 24, 2005.

I would like to draw the attention of participants in the confernce to the Report that was presented to the G20 by Bill Gates in early November 2011 (http://www.gatesfoundation.org/press-releases/Pages/innovation-with-impact-g20-111103.aspx). The fact that Mr. Gates, a renowned entrepreneur and philanthropist, was invited to present to the G20 is unique in itself, as this had not been done before.

Although Mr. Gates does not speak specifically to Biotechnology, agricultural innovation is prominent in his address. Early in the Executive Summary, both "vaccines" (Health) and "seeds" (Agriculture) are highlighted and very good use is made of FAO data. What is particularly germane to this conference, are the ideas advanced in regard to Partnerships in the Global context. To conference participants who have made references to the importance of Policy Decisions at all levels, one would be hard pressed to find a stronger message on development, to donor countries, than has been advanced in this presentation.

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-----Original Message-----
From: Biotech-Mod1
Sent: 05 December 2011 09:41
To: 'biotech-room1@mailserv.fao.org'
Subject: 36: Re: Need for coordination among countries providing SSC

This is again Jorge Mayer, from GRDC Australia.

Rafiq Chaudry's mention (Message 32) of a number of countries in the South that are becoming hubs of various technologies brings me to their central role also as educational hubs. Brazil, for example, has been a champion of education for Latin American countries. It's not only more affordable to study in Brazil, but the education is of high quality and I would presume that many students also prefer to study in a surrounding that is culturally closer to their own. My impression is also that those who study in neighbouring countries have a higher tendency to return home after obtaining their degrees.

Not every country in the South will be able to become a centre of excellence for R&D but a few good ones will have a strong catalytic effect. This role needs to be duly recognised, with programs that foster those exchanges and provide more support for training of students from the region in the regional hubs.

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-----Original Message-----
From: Biotech-Mod1
Sent: 05 December 2011 09:47
To: 'biotech-room1@mailserv.fao.org'
Subject: 37: Re: Constraints to partnerships

This is from Julian Northey again, Co-founder and CEO of Frontier Agri-Science based out of Ottawa, Canada.

I would like to respond to Rafiq Chaudhry's message (number 25), specifically his comment: "In my opinion, strengthening partnerships in agricultural biotechnologies for the benefit of smallholders in developing countries is handicapped by the cost of technology. Farmers in developing countries, particularly if they are conventional in production practices, are hesitant to make up-front payment for the outcome that still depends on many other factors at the end of the season. This includes weather more importantly under rainfed conditions. So, to me, not only high cost of technology but disparity among countries is limiting the spread of technology to many more countries. The second constraint is the lack of information on agreements made between a country and a technology provider. I understand that it is used as a trade secret but I have seen that it is an important factor for potential new adopters to make decisions, at least in cotton which I familiar with."

I believe his first point is key to address if we are going to find the correct balance between corporate and public interests, partnerships etc. and a just use of seed technology that doesn't establish a system whereby corporations 'own' the right to seed through intellectual property regimes. Rather than having farmers pay upfront for technology with unknown outcomes, which in my opinion, is clearly designed to maximize value to the corporation, a system (i.e. business model) needs to be implemented that maximizes value to the smallholder farmer. For example, have the farmer/region/country pay based on a percentage of gross yield ("Pay as you grow") - it has the advantage of acting like a built-in crop insurance - if you produce little, you pay little. The additional advantage is that farmers who wish to do so can save and replant their own seed, breed and exchange without having to re-purchase each generation.

Regarding the second constraint, Dr. Chaudhry could you please clarify whether you are referring to the lack of information on the precise technology used or the actual terms of the agreement? I presume you are referring to the actual terms of the agreement...

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-----Original Message-----
From: Biotech-Mod1
Sent: 05 December 2011 10:38
To: 'biotech-room1@mailserv.fao.org'
Subject: 38: Beginning with the smallholders

This is Dr. A.K. Garg, Principal Scientist, Animal Nutrition Division, Indian Veterinary Research Institute (IVRI) cum Deemed University, which is involved in postgraduate teaching and research in the frontier areas of veterinary science and livestock development.

Firstly, I would like to congratulate FAO and organizers for conducting this kind of conference on such an important topic. Through this activity of FAO, I would like to invite all the knowledgeable persons to identify the proven technologies which may be of direct help to the farmers of India and similar other countries.

However, there are certain points which I feel most of us are well aware of. Still we may just refresh them for our convenience. For this it is most important to know who are the majority of livestock keepers in these countries i.e. their social and economic? How big are their land holding? What is their daily income, how many rupees/USD? What they can purchase with their income? How much do they get for their produce i.e. their purchasing capacity? In what kind of houses do they live? What is their educational status? How much do they understand about different technologies/biotechnologies? Which of them are useful and what is useful? What would happen if it does not turn out to their expectations? We may consider all these points before we suggest anything to them.

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[In this e-mail conference on "Strengthening partnerships in agricultural biotechnologies for the benefit of smallholders in developing countries: Discussing North-South, South-South, Public-Private cooperation and more", Dr. A.K. Garg's message is a reminder that initiatives involving partnerships for the benefit of smallholders have to begin with the smallholders, i.e. knowing their socio-economic situation, agricultural practices and their needs. The importance of a bottom-up approach, including mechanisms to enable it, have been touched on by Laurens Klerkx (messages 18 and 29), Janaki Krishna (Messages 4, 20 and 28) and José Campero Marañón (Message 17)...Moderator].

-----Original Message-----
From: Biotech-Mod1
Sent: 06 December 2011 09:41
To: 'biotech-room1@mailserv.fao.org'
Subject: 39: Meeting the challenges of PPPs that are beyond 'technical'

This is Obidimma Ezezika again, a Program Leader in Ethics at the McLaughlin Rotman Center for Global Health in Toronto, Canada, focused on navigating ethical/cultural challenges to innovation in developing countries.

I have enjoyed the discussions on public private partnerships (PPPs), especially where Nagib Nassar alludes to the importance of the farmer in guiding the research and agenda of partnerships (Message 6); the issue of building trustworthy PPPs mentioned by Mathias Mondy (Message 13). There have also been references to some of the challenges of PPPs such as those regarding their scope in terms of the diversity of actors as mentioned by Laurens Klerkx (Message 18), José Campero Marañón (Message 17) and others, including S. Seshadri's comment on the importance of farmer-participation in developing agricultural technologies that benefit the small-scale farmers (Message 15). In sum, many of these discussions acknowledge that there are other issues beyond the "technical" that need to be taken into account in PPPs and could involve ethical, social, cultural, commercialization and even institutional issues which are beyond the 'technical'. Also, these issues are not static and vary depending on the kind partnerships, commercialization/research goal, country locations and even timing.

The question arises: is there a mechanism/model by which such issues can be made palpable, accounted for in the planning and running of public private partnerships involved in agricultural biotechnology? Our center has been giving some thought to this and has recently developed a Social Audit model that can help bridge some of these gaps, identify issues which are beyond 'technical', align partners' goals, provide

stakeholders with a voice in the partnership, create accountability to stakeholders, foster a climate of transparency and provide farmers with a voice in the project development process, akin to what Laurens Klerkx (message 18) mentions about 'embedding' the farmer in the innovation process but more than that, embedding other actors in the process with the ultimate goal of creating 'trustworthy PPPs'.

The Model we have developed revolves around five critical stages: stakeholder identification, framework development, social audit, communications strategy, and impact (See Web site for more about the model: http://www.mrcglobal.net/social_audit_model). We are currently applying this model to a Public Private Partnership, the Water Efficient Maize for Africa project and learning some important lessons along the way.

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[As Obidimma notes, the Social Audit Model website cited above provides lots more information about the model, giving 1. an overview (with links to related publications), 2. a description of the model and its five stages and 3. information about its application to the WEMA project. According to the website, the purpose of the model is: "The Social Audit Model has been developed to identify and address ethical, social, cultural, and commercialization issues in public-private partnership projects with humanitarian goals. This model is intended to mitigate potential risks for management and funders of projects, mobilize voices of project stakeholders, and build trust among project partners and between the project and the public. Past application of the Social Audit Model has prompted existing public-private partnerships to address key ethical and commercialization issues in their project plans in areas such as, communication and engagement, capacity building, and partner relations. Consideration of these issues, often overlooked yet significant to project success, helps to improve management, accountability and ensure transparency in the project, with the goal of building trust among project partners and between the project and the public"...Moderator].

-----Original Message-----
From: Biotech-Mod1
Sent: 06 December 2011 10:08
To: 'biotech-room1@mailserv.fao.org'
Subject: 40: Triangular cooperation in agri-biotech & Public-Private collaboration in the developing world

This is from Anup Karwa, a bio-entrepreneur and R&D head of Krishidhan Seeds Group India. My company deals with research, production, processing and marketing of hybrids seeds in major crops. We also do biotech research, biotic and abiotic, in key crops.

I would like to share some thoughts and experiences on "Triangular cooperation in agri-biotech & Public-Private collaboration in the developing world".

There have been many national and international research partnership programs focusing on collaboration with India and several developed countries. However, the success largely depends on the partnership guidelines. In my experience, the Indian government has not been able to form international partnership schemes that would support and facilitate research in industry especially in public-partnership collaborations. Most of the program at this stage supports collaboration within national institutes and the terms that govern such initiatives are favorable and been able to forge some good consortiums. However, innovation-driven research is something that is missing due to such single-sided focus. Thus, the level of

intellectual property (IP) generation is slow compared to other parts of the world, especially "indigenous technology incubation". Further, international research networking encourages multidisciplinary partnership whereas an unfavorable funding policy slows down the progress where hopes are high. So the developing world needs to deal with a phenomenon challenge where "hopes are high and progress is slow". Another challenge is regulatory capability and a science-based regulation of emerging agri-biotech technologies. Presently, the agri-biotech pipeline traits are largely dominated by multi-national corporations in India and such activities, on the one hand, bring technology but, on the other, also a challenge of economics and legislation to ensure the cost-effectiveness of traits for marginal and smallholder farmers. Until now, most of the technologies in India are from the giant agri-biotech firms and the lack of competition makes the trait prices unaffordable for small farmers due to lack of choices in technology based crop seeds except options in genetics i.e., different conventional hybrids.

In order to deal with high hopes in the developing world, there is a dire need to support innovation-driven concepts and create self sufficiency for technology incubation by nurturing a country's own industrial research. India-Africa can develop partnership together along with other developed countries to expand the technology base and leverage three-way active research cooperation. Developing world requires some policy change(s) by assessing approach of developed countries so that corrective steps could be adopted. Some other challenges are already pointed by Rafiq Chaudhry (Message 25) and Julian Northey (Message 37) and the concept of "pay as you grow" is a good suggestion however will have regulation challenges (with complex layer of policy makers in India), need of building expertise to deal with such cases (diverse regions/agro-climates/multi-locations), and surveillance with information dissemination to farmers.

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-----Original Message-----
From: Biotech-Mod1
Sent: 06 December 2011 10:18
To: 'biotech-room1@mailserv.fao.org'
Subject: 41: Re: Constraints to partnerships

This is once again M. Rafiq Chaudhry of the International Cotton Advisory Committee.

In response to the question at the end of Message 37 from Julian Northey. *[Julian asked for more information about the comment in Rafiq's Message 25 that one of the constraints (to partnerships) was "the lack of information on agreements made between a country and a technology provider. I understand that it is used as a trade secret but I have seen that it is an important factor for potential new adopters to make decisions, at least in cotton which I familiar with"...Moderator].*

Let me begin with an actual situation but I will not name countries for obvious reasons. The country "A" contacted an international organization and sought help to identify a person who could negotiate the technology fee and other conditions on their behalf with a technology developer. It is apparent that the country did not know where to start with and how much cushion they had to negotiate the fee. Another country "B" contacted us and requested if we could help them in commercializing the technology, trials had already been done. The point I am trying to make is that countries do not know what kind of

agreements/conditions the adopters have decided with the technology developers. Consequently, they seek help from outside and fail to get it because nobody knows the details of all the agreements. I am not saying that the agreements between adopters and technology developers should be made public. What I am trying to say is that at least a generic information could be made available. We already know the technology fee in cotton for various events, I hope the situation is the same in other crops. To me it is good for potential adopters as well as technology owners.

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-----Original Message-----
From: Biotech-Mod1
Sent: 06 December 2011 10:46
To: 'biotech-room1@mailserv.fao.org'
Subject: 42: Partnerships and small farmer communities - Mexico

This is from Violeta Ruiz Carrera, Universidad Juarez Autonoma de Tabasco, Mexico. The text in Spanish is given at the end and its English translation is given first.

I am Violeta Ruiz Carrera, Professor - Researcher in the Academic Division of Biological Sciences at the Universidad Juarez Autonoma de Tabasco, Mexico. I have a masters degree in biotechnology and a PhD in Ecology and Management of Tropical Ecosystems. My research has focused on in vitro biotechnologies in plant genetic resources leading food and ornamental, as well as aquatic plants of high ecological value.

I have tried to link biotechnology research and the biological knowledge of the inhabitants of rural and indigenous areas, which has led me to considerations such as the ones addressed in this conference. I agree on two points mentioned by the participants, the first is on the absence or delay of international support to target the benefits of biotechnology to small farmers and their ecosystems, and the second is that the support for bottom-up biotechnology initiatives will favor their appropriate development. At the same time, the communities must be empowered and informed to make appropriate and technically feasible decisions.

Another point for discussion is to define the mechanisms to protect the knowledge, and the derived biotechnologies, brought by the indigenous communities of farmers, including indigenous farmers. The formation of national and international scientific networks will be crucial in this context.

I appreciate the invitation by FAO to participate in this debate and the opportunity to identify ways of international cooperation in research and development of biotechnology in rural Mexico.

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Texto en Español

Soy Violeta Ruiz Carrera, Profesora - Investigadora de la División Académica de Ciencias Biológicas de la Universidad Juárez Autónoma de Tabasco, México. Cuento con Maestría en Biotecnología y Doctorado en Ecología y Manejo de Ecosistemas Tropicales. Mi trabajo de investigación se ha enfocado a generar biotecnologías in vitro en recursos fitogenéticos alimenticios y ornamentales de vanguardia, así como plantas acuáticas de alto valor ecológico.

He procurado vincular la investigación biotecnológica y los conocimientos biológicos de los pobladores de las zonas rurales e indígenas, lo cual me ha llevado a reflexiones como las que ahora se abordan en esta conferencia. Concuerdo en dos de los puntos mencionados por los participantes, el primero es sobre la ausencia o rezago de los apoyos internacionales para orientar los beneficios de la biotecnología hacia los pequeños agricultores y sus ecosistemas, y el segundo que los apoyos para las iniciativas biotecnológicas en orientación ascendente favorecerán su apropiado desarrollo. Al mismo tiempo, las comunidades deben estar capacitadas e informadas para tomar decisiones oportunas y técnicamente viables.

Otra reflexión para el debate es definir los mecanismos para proteger el conocimiento aportado por los agricultores comunitarios e indígenas y de las biotecnologías derivadas. En este contexto será fundamental la formación de las redes científicas nacionales e internacionales.

Agradezco la invitación de la FAO de participar en este debate y la oportunidad de identificar las formas cooperación internacional para la investigación y el desarrollo de la biotecnología a nivel rural en México.

-----Original Message-----
From: Biotech-Mod1
Sent: 07 December 2011 05:58
To: biotech-room1@mailserv.fao.org
Subject: 43: Applying lessons learned from the US experience - PPPs

I am Keith Jones, Executive Director of Washington State University Research Foundation. I am a practitioner responsible for technology transfer and commercialization from Washington State University, a land-grant university that conducts a considerable amount of research in Agriculture. I have commercialized varieties of many crops, wheat, potatoes, apples, raspberries, etc. I have also formalized multiple plant and animal biotech commercial agreements and have been instrumental in setting up research consortia with industry, university and government partners. I have also observed and advised multiple international entities around agricultural technology commercialization.

I have been fascinated by the discussion. I, perhaps, view the public-private partnerships (PPPs) from a different angle than many involved in this discussion. I recognize that there is no one “right” answer to the opportunity created by our researchers. What I will describe is the commercial model widely used in the US and some other countries for all technologies arising from university research. A look at the AUTM survey statistics supports that this model is successful when used appropriately. *[Refers to statistics from the Association of University Technology Managers (AUTM, https://www.autm.net/home.htm), "a living, dynamic, global network of more than 3,200 technology transfer professionals who work in academic, research, government, legal and commercial settings. AUTM is dedicated to promoting and supporting technology transfer through education, advocacy, networking and communication"...Moderator]*.

It is important for each of the partners to recognize their role in the partnership and to excel and be creative within their role:
Universities are technology creators – our scientists and their quest for new knowledge and solutions is one of our greatest assets.
Private companies are technology adapters and developers that apply the “raw” research and create products that are then available to end users or customers.
Farmers, perhaps through middlemen e.g. seed dealers, are customers of the private companies that develop the products.

Obviously, this linear model is over simplified. There are many feedback loops, farmer influence on the university, company cooperation and funding of university research, etc. but underlying all the complexities is the need to move technology as linearly as possible from lab to farmers field.

In several of the examples that have been discussed in this conference it appears to me that well trained, experienced, confident technology transfer professionals representing the public research institutions would be able to "grease the wheels" of the PPP. The professional technology transfer individual can ensure roles were understood, manage the feedback loops, negotiate understandings of path to market and appropriate rewards (maybe financial but can also include access to products or other benefits to certain stakeholders) and then put in place appropriate documentation. I think it would be very valuable to explore how to build a vibrant "community of practice" in agricultural technology transfer in the National Academy of Sciences (NAS) and universities to "level the playing field". This would enable research institutions and developing country NAS to interact with commercial entities with confidence and together achieve transformational results. Such a community of practice would be able to facilitate interactions of all shapes, sizes and directions!

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-----Original Message-----
From: Biotech-Mod1
Sent: 07 December 2011 11:30
To: 'biotech-room1@mailserv.fao.org'
Subject: 44: Observations on partnerships in agri-biotech and benefit to the resource poor

This is Datta Rangnekar from Ahmadabad, India. I am a verterinary graduate with a PhD in animal nutrition. I was with an NGO for more than 4 decades involved in planning and coordinating implementation of crop - livestock development based sustainable livelihood development programmes focused on the resource poor rural families. These programmes had built-in components of extension and applied research. I have long association with the Indian Council of Agriculture Research and have some insight of the National Agricultural Research System in India.

My compliments to the FAO for organizing this e-mail conference providing the opportunity to exchange experiences and views on biotechnology for the benefit of small holders from developing countries. Preoccupation and traveling precluded me from interacting since the start in this interesting and educative exchange - I hope to catch up with lost time.

I have studied the first thirty messages and find it very interesting and informative. While the objective of the e-conference is to discuss about biotechnologies for the benefit of small holder farmers, there is need to analyze the situation more critically. I wish to be little provocative and may be pardoned for that.

Some issues which I wish to draw attention to:

- I do not find messages from the animal science and/or veterinary field although the role of livestock production in the livelihood of small holders and resource poor rural families and the strong linkage between poverty and livestock keeping is well recognized.

- Hence, I propose to base my comments mainly on livestock-related aspects.

- The small holder producer/farmer is not a singular uniform entity. The background document and many of the messages refer to small holders as a singular category while these should be further categorized according to resources and social strata since these aspects, in turn, influence management practices and technology adoption.

- There is hardly any biotechnology research based on problems/needs of the small farmer or rather the resource-poor (the main contributor to crop - livestock production in the developing world). Much of the biotechnology research looks like 'duplication or repetition of research' in the developed world.

- Duplication or repetition done as a genuine effort to adopt technology from developed countries to our conditions/needs would be welcome but that does not seem to be the case in most of the research projects.

- Technology to be classified as good/useful should not only be technically sound, economically beneficial but should also be socially acceptable/adoptable. Unfortunately, the last aspect is not considered and even the economic benefit is generally not assessed from the perspective of the resource poor farmer.

Having said all that, let me turn to some other equally critical issues:

- Public-private partnerships are highly unlikely to benefit the resource poor farmers through agric-biotechnology. Such partnerships may be formed and supported by the Government (under the garb of benefit to the small holder) but are not likely to benefit the resource poor since private parties are interested in growth and not development of the resource poor.

- There is hardly any agric-biotechnology research based on the needs of the resource poor but it is mainly the commercial interest or scientific curiosity. There is virtual absence of a system for situation analysis and assessment of needs of the resource poor farmers and generate research programmes/projects. Such an approach needs a 'Paradigm Change' and change in mindset of concerned persons.

- I am glad some participants have suggested that farmers should be included in the partnership - 'this is more easily said than done'. There are three hurdles in this arrangement as I see it. Firstly, resource poor farmers are not organized to be able to participate. Secondly, mindset of most researchers to accept farmers as equal partners. Thirdly, the private party will dominate the proceedings.

- Some examples from the animal science field are:
a) Absence of thermo-stable or thermo-tolerant vaccines even though the problem of maintaining a cold chain in rural areas is well known. I am told one of the hurdles is limited market for thermo-stable vaccine. *[Vaccines lose potency over time, especially if exposed to heat (or, in some cases, if frozen) so it is important to maintain a 'cold chain' that the proper vaccine temperatures are maintained during storage and handling of the vaccine to preserve potency. For a good overview on animal vaccines, the World Organisation for Animal Health (OIE) dedicated two special issues (26(1) and 26(2))of the OIE Scientific and Technical Review to the topic back in 2007, freely available at http://www.oie.int/en/publications-and-documentation/scientific-and-technical-review-free-access/list-of-issues/ ...Moderator].*
b) Research on biological treatment of cereal straws continues, even though limitations of this technology were clearly indicated more than a decade back.

Some suggestions:

- Consider developing 'Public - farmer' partnership for agric-biotechnology research. Partnership with farmers could be through farmer organizations, wherever these exist, or though NGOs where farmer organizations are not there and NGOs are working with resource-poor farmers. However, even in such cases there is need to orient the researchers, farmers and NGOs for effective participation (something like participatory technology development [PTD]).

- The funding agencies (whether Government or World Bank or organizations like the M&B Gates Foundation, Ford Foundation) should provide 'Pre-project funding' to carry out situation analysis and needs assessment on the basis of which the project proposal is developed.

- The funding agencies should be flexible to change research plan/approach in case needed. Most funding agencies, whether national governments or international organizations are fairly rigid and it is difficult to make changes. A good example of flexibility that occurs to me is that of the 'Indo-Dutch project on Bio-conversion of crop residues' a bilateral project that involved the Indian Council of Agricultural Research (ICAR) and Wageningen Agricultural University. The project was implemented (about two decades back) through involvement of National Dairy Research Institute, and an NGO - the Bharatiya Agro-Industries Foundation (working for rural development). The project plan/work were changed from only research on treatment of crop residues to developing techniques for production systems study, situation constraints analysis and testing of technologies. The project also helped to identify situations in which treatment of crop residues is likely to be beneficial for the farmers. *[This project is also mentioned in a recent FAO publication on 'Successes and failures with animal nutrition practices and technologies in developing countries' (http://www.fao.org/docrep/014/i2270e/i2270e00.pdf) ...Moderator]*.

I hope the views and comments would be of some interest/use to the participants and organizers of the E-conf.

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-----Original Message-----
From: Biotech-Mod1
Sent: 07 December 2011 11:33
To: 'biotech-room1@mailserv.fao.org'
Subject: 45: Re: Making partnerships work

This is from Abubakar Abubakar, Deputy Director of the National Office for Technology Acquisition and Promotion (NOTAP), Abuja, Nigeria. I am an agricultural engineer by profession, but I studied bioethics in India, and my paper is on biotechnology.

I agree with Obidimma Ezezika (Message 33) that firms in developing countries should realize that by working together they can leverage each others strengths and develop more cost effective products. In Nigeria, the biotech development agency is very much doing that with other African countries to see that collaboration and promote joint innovation in biotech. The International Institute of Tropical Agriculture (IITA) Bioscience Center bridges this gap by linking developing countries with advanced research institutes around the world to apply the benefits of biotechs.

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[The IITA is one of the 15 international research centre belonging to the Consultative Group on International Agricultural Research (CGIAR). The website of the IITA Bioscience Center (http://www.iita.org/web/bioscience-center/home) states: "Biotechnologies are recognized as essential tools for the effective development of new research products. The staple foods of Africa (e.g., cassava, yam, cooking-banana, plantain, and cowpea) feed hundreds of millions of poor people, yet receive little attention from the biotechnologies research community, as they are not considered as major cash commodities. IITA,

through its Bioscience Center, bridges this gap by linking developing countries with advanced research institutions around the world to apply the benefits of biotechnologies to these under-researched crops.". A launching ceremony for the upgraded Bioscience Center was held at IITA, Ibadan, Nigeria on 21 April 2011 - photos and more information at http://www.flickr.com/photos/iita-media-library/sets/72157626686456025/detail/ ...Moderator].

-----Original Message-----
From: Biotech-Mod1
Sent: 07 December 2011 11:37
To: 'biotech-room1@mailserv.fao.org'
Subject: 46: Re: Applying lessons learned from the US experience - PPPs

Here a small note again from Laurens Klerkx, Wageningen University.

In reaction to this interesting message (number 43) from Keith Jones, I must say I think that maybe the term 'technology transfer' does not capture adequately anymore what the Association of University Technology Managers (AUTM) and similar organizations do. In my view, what Keith Jones calls 'greasing the wheels' is exactly the function which organizations we describe as innovation brokers (see message 9) have. The process which Keith describes, instead of 'transferring' ready-made technologies, is rather about enabling a process of technology co-production in several iterative steps, turning inventions into innovations by ensuring collaboration and creating an enabling environment. I would also say that, sometimes implicitly, farmers, middlemen etc. are also co-producing the technology instead of being 'passive' customers (sometimes even being actively involved as lead users, through approaches like open innovation, participatory technology development).

I do not want to say that we all need to start talking about innovation brokers, but I think that the term 'technology transfer' here evokes too simplistic images of bringing research into use, or more broadly what is needed to realize innovation, and that the image of technology transfer that is often evoked is thus not adequate to capture all the types of activities organizations affiliated to AUTM perform. An insider like Keith Jones and other participants to the discussion know that technology transfer should not be seen narrowly, but I suspect that many others do cling to the simple linear model when thinking about technology transfer (i.e. seeing it as mere dissemination of technical messages).

I support the idea of the community of practice!

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-----Original Message-----
From: Biotech-Mod1
Sent: 07 December 2011 14:48
To: 'biotech-room1@mailserv.fao.org'
Subject: 47: Re: Applying lessons learned from the US experience - PPPs

I am Olusola Oyewole, from the University of Agriculture, Abeokuta, Nigeria.

Let me comment on the current discussion involving "technology transfer" and "innovation". The challenge is that technology transfer may not necessarily facilitate innovation. I will rather suggest the need to promote "technology adaptation", which implies the application of innovation to an existing technology which can now be modified to meet the requirements and environment that are different from where the technology originates. Technology adaptation will involve the collaboration of users, researchers in both sectors of the technology and will not deprive either of the ownership and inputs which they have made into the process. It does not remove the right of the original innovator but creates room for value addition. It creates an environment of collaboration for the betterment of life, without the greed of wanting to lay credit beyond what has been inputed by the various players.

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-----Original Message-----
From: Biotech-Mod1
Sent: 08 December 2011 07:06
To: biotech-room1@mailserv.fao.org
Subject: 48: The current status of NSC (Australia-India, my personal perspective and experience)

I am Rachel Predeepa, currently working as a Lecturer in India, who four years ago went to Australia with lots of hopes and dreams that life is going to change on return, when I got an honourable opportunity to participate in an eventful programme that is being offered only for five years time span under an Association of South-East Asian Nations (ASEAN) programme as Australian Scholarships with India and other Asia-Pacific countries.

I went to Australia and had been working hard earnestly of returning back home with a doctoral degree in Plant Sciences in flying colors. However, the university failed to pressure that they let politics win in decision making. I am now back home with lot of data that are worth a plenty of contribution for future application in the biotechnology discipline. To summarise, my personal experience with this memorandum of understanding (MoU) has not been as positive as promised. I am once again looking forward to complete a PhD degree in India, for the heck of getting a degree, without which itself I am proud that I have gained prominence as a good researcher with the limited research exposure that I have received in terms of funding within India. Given a chance, I am confident that I will be a very good research leader. (I am not interested in sharing further details about this issue personally).

I believe that there are very many people who are deprived of the information of the opportunities available due to lack of dissemination of information. I am glad that a conference like this is happening and continues to happen that the future generation like me will be educated. However, more efforts and awareness are required to be taken at the country level either to take these funding and North-South cooperation (NSC) linkages down to the private sectors, or create opportunities for those in the private sectors to work in cooperation with the public sector.

I am hopeful that I have made some useful contribution to this conference at a personal level.

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-----Original Message-----
From: Biotech-Mod1
Sent: 08 December 2011 11:35
To: 'biotech-room1@mailserv.fao.org'
Subject: 49: Re: Applying lessons learned from the US experience - PPPs

This is from Abubakar Abubakar again, Deputy Director of the National Office for Technology Acquisition and Promotion (NOTAP), Abuja, Nigeria.

I want to comment on the current discussion on technology transfer. Technology is a valuable tool for economic growth and national development. Nations all over the world engage in transfer of technology. To raise the level of technology, it is however important that certain support structures are necessary to be put in place to be able to achieve the desired results from the process of transfer of technology. These support structure include availability of technical know-how, development of indigenous capability, availability of well equipped research laboratories, research centers and availability of raw materials needed.

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-----Original Message-----
From: Biotech-Mod1
Sent: 08 December 2011 13:07
To: 'biotech-room1@mailserv.fao.org'
Subject: 50: Re: Applying lessons learned from the US experience - PPPs

This is Tassawar Malik again, Cotton Consultant, USDA-Pakistan Project.

There is no denying the fact that each and every technology is financially driven and fiscally oriented and each business company wants to sell it at a highest cost and for a longer period as well until the advent of next grade technology. But, on the other side, usefulness and maximum utilization of this technology for food and feed safety, alleviation of poverty and improvement of livelihoods may also be considered. It is not money all the time and round-the-clock that matters. Human well-being should be taken care of as well. If a technology earns a particular income from the limited users for a defined period of time, it may earn the same from double the number of users in the same period if made available at a rather acceptable cost thus benefiting more to humanity as well.

Some (biotech) companies directly prefer to access to the direct user without the involvement of a local partner or a facilitator that has the capacity to strengthen itself to manage the technology and more effectively manage the ongoing and pipeline technologies. Illegal and unethical exploitation of the technologies is equally not appreciated. But in case of seeds, it is the usual observation that high technology costs limit the proper and valid use of technology and it becomes an incentive for its illegal use. Excessive corporate greed and monopolisation of the technologies, especially biotechnologies, needs to be discouraged.

It has also been observed that, unluckily, throughout the world there is a blind trend towards the latest (sometimes so called) technologies while the traditional approach is still effective. One should decide very carefully before moving to a technology whether it will lead to sustainability or not. Mostly, technologies offer a solution at the cost of sustainability. Increasing and effective role of FAO in proper understanding of the biotechnology by using all means is appreciating and the same must continue to maintain and develop a better world - the human need at all.

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[This discussion thread began with Message 43 by Keith Jones, who described public-private partnerships (PPPs) from the angle of the commercial model widely used in the United States and some other countries for technologies arising from university research. Any further messages on this thread should bring the discussion firmly back to the topic of partnerships/PPPs in the context of agricultural biotechnologies...Moderator].

-----Original Message-----
From: Biotech-Mod1
Sent: 09 December 2011 10:48
To: 'biotech-room1@mailserv.fao.org'
Subject: 51: Technology sources of PPPs

I am Adrian Dubock, writing from Switzerland. I am an independent consultant and Golden Rice Project Manager, for which I have negotiated almost all licenses and Material transfer agreements (MTAs) from both the private sector and the public sector over the past 11 years.

I am responding to points made by Tassawar Malik in Message 50, and tangentially by several others in this interesting conference.

There is no prima facie reason why the crop products of genetic engineering should only be available from company sources, which naturally wish to repay the investors in their creative research by profits. Public sector institutions and scientists can also create de novo products with the same tools. Public sector institutions can also take advantage of gaps in patenting (granted patents, even if valid, are not international in scope) or patent expiry (the first biotech traits were filed more than 20 years ago, and so many are no longer protected, even where nationally granted) to make such crops. This is especially the case for what may be (internationally) called orphan crops (eg not mainstream internationally traded row crops) but which may be very important locally, or for crops which are not exported. (Interestingly, "conventional breeding" techniques involve very many more gene alterations, than genetic engineering.) Even if patents appear to be in place, was the effect exemplified in the crop in question? If not, the "patent" may be invalid. It is for the patent office to grant patents. Only the courts determine validity.

Why are the public sector not doing more to create and develop their own versions and varieties? A significant issue is the anticipation of regulatory costs. In a curious paradox, the suspicion caused by often anti globalisation activists against GMO crops (but not GMO food processing materials - eg cheese, beer,

or medical applications - eg insulin, and many new drugs) has reinforced an "environmentally justified" set of regulatory hurdles which only large companies can afford. So the anti-globalisation activists have "shot themselves in the foot". There is no scientific justification for these high regulatory costs. Both conventional and genetic engineering approaches to trait development involve random genome alteration from which useful varieties can be selected, and from which others can be rejected for further breeding. All internationally credible science institutions have come to the same conclusion: there is no specific health or environmental risk from the techniques used in genetic engineering of crops compared to any other form of crop breeding.

The use of this additional technology to extend the potential of earlier forms of plant breeding should not be denied, especially to the public sector in developing countries. Food security, both for macro and micronutrients, and the agriculture and health needs of the world's population must be considered with greater weight than unproven environmental suspicions. The agriculture and health communities must speak loudly to demand this. And international conventions, such as the Convention on Biodiversity (CBD) only apply to "transboundary movement of living genetically modified organisms". For many "orphan crops" in a country, local national sovereignty to decision making can and should apply.

Next year at "Rio +20" (the origin of the CBD was Rio 1992 "The Earth Summit") agriculture and health and maybe other functions affected, must make their voices heard such that the interpretation of these treaties at least takes into account benefits, and takes a significantly less precautionary approach to so called "environmental concerns". Without change to these instruments, the public sector will continue to find the only route to access the now well demonstrated utility of the "new technology" is via the private sector. Who normally will expect to be paid.

In the case of Golden Rice, the technology originated in the public sector, and in a negotiated cross licensing deal with the private sector, through division of access by market ('developing countries for defined humanitarian uses' to the inventors and their licensees, commercial exploitation rights to the company) it was possible to secure free of charge for the public sector regulatory support from the private sector and private sector improvements. There are many models for partnership, but one has to have clear objectives, and preferably more than money - for example technology - to trade with.

Alternatively, when faced with the uncertainties of analysis, courts, time etc it may be cheaper and less stressful and quicker to come to a commercial licensing agreement with a technology provider. But you need to know your options, to be able to evaluate the best route, and maybe to obtain a better deal through negotiation. The seller also wants to sell.

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-----Original Message-----
From: Biotech-Mod1
Sent: 09 December 2011 10:50
To: 'biotech-room1@mailserv.fao.org'
Subject: 52: A few general points about crop partnerships
This is Denis Murphy from the UK. I was lead consultant for the FAO background document on Crop Biotechnology that formed part of the series of background documents for the FAO-organized international technical conference on "Agricultural biotechnologies in developing countries" (ABDC-10), which took place in Guadalajara, Mexico in 2010.

I have been following this online conference with considerable interest and would like to make a few general points about crop partnerships from the perspective of a Europe-based plant geneticist who also

works on tropical crops such as oil palm. I am focusing here on the 'big picture' rather than on individual projects but I wish to add that I have also learned a great deal from the contributors to this conference.

1. The most notable breeding successes in terms of food production have come from public sector-led ventures

- especially where developing countries have had strong inputs (and in some cases were the lead players). Examples include hybrid rice (China), hybrid sorghum (Sudan/USA), New Rice for Africa (NERICA) (West Africa). In many cases a key facilitator has been the Consultative Group on International Agricultural Research (CGIAR) network, often backed up by university researchers within North-South cooperation (NSC) and South-South Cooperation (SSC).

2. We should not equate crop biotechnology with genetic engineering (or GM) technologies.

GM methods are still only applicable for the manipulation of a very small fraction of those crop traits of most interest to developing countries. Obviously, there have been notable successes in NSCs and Public-private partnerships (PPPs) in a few GM crops like cotton (mainly in India) and maize (mainly in South Africa). However, in general over the past two decades GM has had little impact on major subsistence crops, many of which remain orphan species from the viewpoint of applying modern breeding methods.

3. The rapid development of genomics/informatics-based approaches to breeding offers considerable opportunities for enhanced NSCs.

For example, the technologies involved in next-generation genome sequencing and development of DNA-based markers in model plants and commercial (Northern) crops could be applied to orphan crops via NSCs. With some exceptions (e.g. larger countries such as Brazil, India, China etc), it is generally more efficient in time and funds to utilize such existing technologies via NSCs or SSCs than for all developing countries to embark on the laborious and uncertain process of building their own capacities.

4. There is an important role for PPPs but in many cases this will mainly involve downstream aspects of crop improvement such as seed production, clonal propagation, and sales and marketing.

In a few cases PPPs may also be beneficial in more upstream areas such as trait selection. However, for commercial reasons PPPs tend to be restricted in time and scope and are more likely to be one-off ventures aimed at one specific target. They are also more likely to be subject to the vagaries of the marketplace and the past two decades have witnessed many instances of PPPs that expired or were terminated long before they had a chance to fulfill any promise.

5. One of the major limitations to smallholder participation in many aspects of crop management is often the lack of well trained extension services in developing countries.

Other limitations such as poor infrastructure, lack of access to finance, and poverty may be equally or more important in many cases but are beyond the scope of this conference.

6. Many Northern countries, especially in Europe, are still lagging in giving biotechnology NSCs the priority they deserve.

Many of the best collaborations are undoubtedly long term 'organic' ventures between individual groups of researchers/breeders etc. rather than complex 'top down' government projects which may be politically driven and vulnerable to short term policy changes.

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[Denis refers to the ABDC-10 conference (http://www.fao.org/biotech/abdc/).
1. In June of this year, FAO published the ABDC-10 proceedings, entitled "Biotechnologies for Agricultural Development". The 592-page proceedings are organized in two main sections. The first contains ten chapters with an extensive series of FAO background documents prepared before ABDC-10 took place. They focus on the current status and options for biotechnologies in developing countries in crops (Chapter 1 that Denis refers to in his introduction), livestock, forestry, fisheries/aquaculture and food processing/safety, as well as on related policy issues and options, in particular about targeting agricultural biotechnologies to the poor; enabling research and development (R&D) for agricultural biotechnologies; and ensuring access to the benefits of R&D. The second section contains five chapters dedicated to the outcomes of ABDC-10, namely the reports from 27 parallel sessions of sectoral, cross-sectoral and regional interest, most of which were organized by different intergovernmental and non-governmental organizations and regional fora; keynote presentations; and the conference report adopted by delegates in Guadalajara on the final day of ABDC-10. The proceedings are freely available on the web at http://www.fao.org/docrep/014/i2300e/i2300e00.htm. If anyone would like to receive a copy, send an e-mail message to sandra.tardioli@fao.org, providing your full postal address.
2. On a related issue, one of the parallel sessions at ABDC-10 was dedicated to PPPs, where Denis gave a presentation on "The increasing roles of PPPs in developing countries", discussing also biotechnologies for oil palm improvement. The presentations and Summary Reports from the 27 parallel sessions are available at http://www.fao.org/biotech/abdc/parallel/en/ (the PPP session is number C.8)...Moderator].

-----Original Message-----
From: Biotech-Mod1
Sent: 09 December 2011 14:06
To: 'biotech-room1@mailserv.fao.org'
Subject: Extension of the FAO e-mail conference on partnerships and agricultural biotechnologies - to 18 December

Dear Colleagues,

We have decided to extend the conference by one week, so that messages can be posted to the conference any day up until Sunday 18 December 2011. These final messages will be posted on Monday 19 December and the conference will then be closed. As usual, send your messages to biotech-room1@mailserv.fao.org

This e-mail conference gives us the possibility to learn from each other and to share our experiences and I encourage all of you, especially those who have not yet done so, to participate actively in the time that remains of this conference on "Strengthening partnerships in agricultural biotechnologies for the benefit of smallholders in developing countries: Discussing North-South, South-South, Public-Private cooperation and more".

The conference began slowly, but the tempo picked up from the second week onwards and there have been a large number of very enjoyable and interesting messages and I, for one, have learned a lot. Many of the messages have been about Public-Private partnerships, South-South cooperation and the importance of involving smallholders. There have been relatively few messages about North-South or North-South-South (also called Triangular) cooperation. While some specific examples of partnerships in agricultural biotechnologies have been mentioned, it would be great to learn more from the experiences of people who have already participated in partnerships involving use of biotechnologies in crops, livestock, forestry, fisheries/aquaculture or agro-industry. What has also struck me is that when people have referred to specific sectors, it has been mainly about the crop sector and that there has been little discussion about partnerships involving biotechnologies in livestock and none about forestry, fisheries/aquaculture or agro-industry.

As a reminder, the main kinds of issues we would like people to discuss are provided at the end of this message. This is from Section 5 of the Background Document, which is available at

http://www.fao.org/fileadmin/user_upload/biotech/docs/conf17bd.pdf. All the messages posted (Archives) are available from a PDF file which is periodically updated on the Forum homepage, at http://www.fao.org/biotech/biotech-forum/forum-home/en/.

With all best wishes, and looking forwarding to your active participation between now and 18 December !

Regards

John

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- What can we learn from specific past experiences of partnerships in biotechnologies (in crops, forestry, livestock, fisheries or agro-industry) for smallholders in developing countries? What were the key lessons learned? What were the problems and what were the features of the partnerships that worked?

- A number of specific kinds of partnerships (North-South cooperation, South-South cooperation, triangular cooperation and Public-Private partnerships) were described in Section 4 of the Background Document. Which of these (or, indeed, other kinds of partnerships) in the area of agricultural biotechnologies are most likely to be beneficial for smallholders in developing countries?

- Are there particular biotechnology-related areas of education/training or research that are more suitable for South-South or North-South cooperation?

- When wishing to engage in biotechnology-related Public-Private partnerships to benefit their smallholders, which kind of guidelines or best practices should developing country governments or organizations follow?

- A number of biotechnology-related partnership activities were described in Section 2 of the Background Document (individual and institutional capacity development; joint research projects; sharing of biotechnologies, protocols and materials; and knowledge sharing). Which of these (or others not mentioned here) are likely to be most beneficial for smallholders in developing countries? Which kind of partnership (Section 4 of the Background Document) is recommended for the different partnership activities?

- For each of the different sectors (crops, livestock, forestry, fisheries and agro-industry), in the context of agricultural biotechnologies, a) are there certain kinds of partnerships which are likely to be more beneficial for smallholders in developing countries? b) are there certain technical areas which can benefit most from partnerships?

- What kind of policy initiatives should developing countries undertake if they wish to strengthen partnerships for the development and use of agricultural biotechnologies to benefit their smallholders?

- Which institutional arrangements can be established to provide robust support to biotechnology-related partnerships to ensure their success and sustainability? What are the hurdles that can prevent effective international collaboration and how can they best be overcome?

- What is the most appropriate level for the establishment of biotechnology-related partnerships (for example, between countries, between institutions, between research laboratories/units or between individuals)? What incentives can be provided to foster collaboration at each of these levels?

-----Original Message-----

From: Biotech-Mod1
Sent: 12 December 2011 05:32
To: biotech-room1@mailserv.fao.org
Subject: 53: Re: Technology sources of PPPs

This is Tassawar Malik again, from Islamabad.

Nice comments by Adrian Dubock (Message 51).

There is no denying the fact that technologies are developed by the public sector (like golden rice) but limitation of required manpower and resources and other limiting factors restrict the ability of the public sector to develop high grade technologies as it requires high cost and a good team of scientists with harmonious coordination that usually lacks in the public sector especially in developing countries. In the case of developed countries, the technology giants don't directly or indirectly allow the public sector to engage in their business of interest. Also, the public sector mostly relies on funds donated by international non-governmental organisations (INGOs) belonging to these technology developers.

Even if a high grade technology is developed by the public sector it does not have infrastructure and capacity for its large scale production, maintenance and release as per technical protocol. Hence, this necessitates the involvement of the private sector, maybe one or more parties through sub-licencing, franchising, under a memorandum of understanding (MOU) etc.

Use of outdated technologies by the developing countries is no doubt an excellent idea. Pakistan did it in the last few years when Monsanto was asking for huge technology fee and other demands that were not manageable for the current government regime. The gene/event of Bollgard-I technology (Cry1Ac) with expired patent period was more or less effectively utilized by the local biotechnologists and breeders with controversial success but again I believe that management of technology is best practised by the originating/developing company only and its use by pirates is not much effective while biotech companies should also make some compromise for promotion of all grade technologies to all the nations.

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-----Original Message-----
From: Biotech-Mod1
Sent: 12 December 2011 15:10
To: 'biotech-room1@mailserv.fao.org'
Subject: 54: India - PPPs - crops

This is from Dr K K Vinod, the Indian Agricultural Research Institute, India.

At the outset I congratulate FAO for organizing this conference. As I am a plant breeder, I will restrict my comments to crop improvement aspects of agricultural biotechnology especially in developing countries like India. As we all know, being the second largest nation with respect to population, in India problems of agricultural production are multi-faceted. I will try to enumerate a few of them.

a) Most of the agriculture production is in the small scale sector, wherein resource poor farmers do a great deal of subsistence farming
b) Increasing population is constantly pressurizing for more agricultural production, so high yielding, disease and pest resistant varieties are essentially required
c) Most of the production areas are marginal, with low productivity; drought, salinity, vagaries of monsoon are major constraints - again abiotic stress resistance is essentially required in the varieties (climate change is a new challenge now)
d) By the sheer volume of this unorganized sector of crop production, the agricultural system in India is a huge market for chemicals, fertilizers and seed
e) Most of the farmers are technologically unsound, so taking advantage of ignorance (exploitation) is a common practice. So, indiscriminate application of fertilizers and chemicals have started polluting the environment; irrigation with effluents causes salinity and heavy metal toxicity - again low nutrient tolerant, heavy metal tolerant varieties are required.

Although conventional breeding approaches are widely used to address these issues, agricultural biotechnology can accelerate the crop improvement process.

Having listed these problems, the experience so far shows that most of the farm biotechnology in India is public funded. (This is in stark contrast to the bio-medical system, wherein most of the funding is through the private sector.) Being public funded means that whatever is done under this is under the Right to Information Act. So anyone can get any information in the public funded system, whereas private players can keep their secrets. Although, there are many private players, but, in general, they address certain specific issues such as pest resistance and hybrid seed production. They run their own extension mechanisms to woo resource-poor farmers and sell their products much more efficiently than the public sector institutions. They harvest short term benefits and move on. One of the major bottlenecks in the public funded system is response time. Funding is slow and is procedural, while the private sector achieves this in right time and they reap the benefits. Another issue is that public sector biotechnology aims for quantitative improvement, such as yield quantitative trait loci (QTLs), drought QTLs etc., which is slow and uncertain; while the private sector looks for qualitative biotechnology such as disease resistance.

Coming to Public-Private partnerships (PPPs), now there are many attempts going on in various sectors, but again it is more or less one-sided. The major problem is the integration of two different outlooks; public research is service oriented but private research is profit oriented - but both are targeted to one consumer, the poor farmers. So triangular co-operation (public sector-private sector-farmer) skews into a one-sided flow, because farmers expect more from service sector because its cheap or free, but they pay for the profit to private players. Public-private cooperation is also one sided - the private sector requires all information from the public sector, but they keep their trade secrets.

Having listed a few points (I believe this is only a tip of the iceberg), what we need in India is strong legal setup to thwart exploitation, and mechanisms for fair business. As some participants has mentioned, social auditing is essential in co-operation. We have seen incidents of private companies approaching public institutions in the name of co-operation for the sake of getting huge collection of germplasm alone. Further, multinational players exchange germplasm world-wide, without honoring farmers and breeders rights. *[I presume, Dr. Vinod is refering to Message 39 of Obidimma Ezezika, who described a Social Audit Model that had been developed to identify and address ethical, social, cultural and commercialization issues in PPP projects with humanitarian goals...Moderator]*.

I have not attempted to discuss any technology as such for co-operation, because there are many avenues where partnership can be built up. I wish private players should widen their perspectives to address problems of marginal farmers, and need to re-orient their sole profit-based approach to a balanced service-profit approach. The triangular co-operation should be bi-directional so that all the co-operating partners survive equally in the system.

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-----Original Message-----
From: Biotech-Mod1
Sent: 13 December 2011 05:44
To: biotech-room1@mailserv.fao.org
Subject: 55: Research partnerships in microbial biotechnology

This is from Huberto Noriega. I am a biologist - microbiologist, with a Master of Science in Biotechnology and Bioengineering. I am a Peruvian national and national representative of the IOBB (International Organization for Biotechnology and Bioengineering). I am pleased to participate in this conference and thank you.

Research proposals and integration among South-South institutions, North - North Central and South:

1. In farmers fields, they can install modules for plant micropropagation, that allow plants to efficiently provide material certified free of virus and virus-like potential to generate better performance in agricultural production, reducing costs and increasing profits. Your monitoring activity increases research possibilities closer to reality, with minimal materials and equipment that enable students and professionals in plant biotechnology have a working opportunity to conduct monitoring and research to draw up grading your thesis. You need a greenhouse for acclimatization of in vitro plants. The coordination and supervision of the modules can be monitored with the creation of a national or international biotechnology network. This network can have a reference research laboratory that would undertake the development of new diagnostic technologies, plant selection, in vitro culture media, enhanced micro modules, pest control using biocontrol, selection of microorganisms that live in the rhizosphere for use as inoculants in plant risks, evaluation of soil microbial interactions and nutrient transport system to the selected plants.

2. In the forestry sector, trees can be selected with a wider range of heat resistance or tolerance to changes in greenhouse avoiding so Ribulose inactivate the enzyme responsible for the fixation of carbon dioxide in the process of photosynthesis (for otherwise the tree would have a high rate of fixation of oxygen and a small carbon dioxide)

3. Can also evaluate the selection of microbial inoculants for animals, which could increase the efficiency of conversion of cellulose to glucose in the rumen, increasing milk production and biomass development

4. Implement several lines of research developed in parallel with universities and research institutes in coordination with a National Council for Science, Technology and Innovation or the Ministry of Science and Technology in each country and seek international support from FAO, UNESCO Microbial Resources Center (MIRCEN), IOBB or collaboration with universities and foreigners.

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-----Original Message-----
From: Biotech-Mod1
Sent: 13 December 2011 11:34

To: 'biotech-room1@mailserv.fao.org'
Subject: In the last week of FAO e-conference on partnerships and agricultural biotechnologies

Dear Colleagues,

We have now begun the last week of this FAO e-mail conference on "Strengthening partnerships in agricultural biotechnologies for the benefit of smallholders in developing countries: Discussing North-South, South-South, Public-Private cooperation and more". Very many thanks to all of you who have dedicated your time so far to sharing your viewpoints and experiences on this subject and we strongly encourage those who have not already done so to participate in the discussions. As usual, to contribute just send a message to biotech-room1@mailserv.fao.org. All of the messages posted so far are available from the Forum webpage (http://www.fao.org/biotech/biotech-forum/en/). If anyone is missing any specific message(s) and wants to receive them by e-mail, just contact me.

On another related issue, as I wrote in an earlier message, FAO hosted the Global South-South Development Expo last week, which focused on food security and agricultural development. More details about this major event can be got from the FAO press releases published on the occasion of the Expo opening (http://www.fao.org/news/story/en/item/116237/icode/) and its closing (http://www.fao.org/news/story/en/item/116470/icode/). New South-South agreements fostered by FAO among some of its member countries were also highlighted in another FAO press release last week (http://www.fao.org/news/story/en/item/115538/icode/). Four events from the Expo were webcast and are available on the FAO website, at http://www.fao.org/webcast/. Details on the events webcasted are provided at the end of this message.

Regards

John

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FAO Biotechnology website http://www.fao.org/biotech/ (in Arabic, Chinese, English, French, Russian and Spanish)
4 EXPO events that were webcast

1. Opening Ceremony (2.5 hours)

Participants include
Nassir Abdulaziz Al-Nasser, President of UN General Assembly's 66th Session;
Macharia Kamau of Kenya, President of the High-level Committee on South-South Cooperation;
Marcelo Suárez Salvia, Presidency of the Group of 77;
Jacques Diouf, FAO Director-General;
Rebeca Grynspan, Associate Administrator of UNDP;
Kanayo Nwanze, President of IFAD;
Josette Sheeran, Executive Director of WFP;
Getachew Engida, Deputy Director-General of UNESCO;
J. Brian Atwood, Chair of the OECD/DAC.

2. Opening day press conference (1 hr)

Speakers include
Macharia Kamau, Permanent Representative of Kenya to the UN and President of the General Assembly High-level Committee on South-South Cooperation; Marcelo Suárez Salvia, Presidency of the Group of 77;
Manoj Juneja, FAO Deputy Director-General for Operations;
Yiping Zhou, Director, Special Unit for South-South Cooperation (SU/SSC);

J. Brian Atwood, Chair of the OECD/DAC.

3. Leadership Round Table on Food Security (2 hours, 15 mins)

A dialogue on global human development issues with renowned leaders in South-South and triangular cooperation, moderated by BBC correspondent and presenter Zeinab Badawi. With panelists:
Prof. Fuming Liao, Assistant Director-General, China National Hybrid Rice Research and Development Centre;
Dr Rajendra S. Paroda, Former Director General, Indian Council of Agricultural Research and Secretary, Government of India, founder President of the GFAR and Executive Secretary of the APAARI;
Mr Bukar Tijani: Honourable Minister of State of the Ministry of Agriculture and Rural Development of Nigeria;
Mrs Esther Penunia: Secretary General of the Asian Farmers Association; and
Mr Onaur Ruano, Executive Secretary, Inter-ministerial Chamber for Food and Nutrition Security, Brazil.

4. Closing ceremony, including awards highlighting successful Southern-led solutions to global development challenges (3 hours)

Statements by:
FAO Director-General elect, José Graziano da Silva;
Tariq Ali Al-Alsani, on behalf of Nassir Abdulaziz Al-Nasser, President of the Sixty-Sixth Session of the United Nations General Assembly;
Macharia Kamau, President of the UN General Assembly High-level Committee on South-South Cooperation;
Babatunde Osotimehin, the Executive Director of UNFPA;
Amita Misra, Director, Bureau for Regional Programmes, UNIDO
Amir Abdulla, WFP Deputy Executive Director.

-----Original Message-----
From: Biotech-Mod1
Sent: 14 December 2011 11:23
To: 'biotech-room1@mailserv.fao.org'
Subject: 56: AGRINATURA-EEIG and Biotechnology and Biosafety in Sub-Saharan Africa

From Rob Black, Natural Resources Institute (NRI), University of Greenwich at Medway, United Kingdom.

From December 2009 until September 2010, the Consortium of European agricultural research organisations formerly known as ECART (now AGRINATURA-EEIG) conducted a study on Biotechnology and Biosafety in Sub-Saharan Africa funded by the European Commission (EC). This study has now been reported in Black et al. (2011) Journal of Biotechnology 156, 370-381 (Case studies on the use of biotechnologies and on biosafety provisions in four African countries). The study involved staff or associate consultants of three members of the consortium - NRI (UK), Institut de Recherche pour le Développement (IRD, France) and Istituto Agronomico per l'Oltremare (IAO, Italy). (I was team leader and Legal/Regulatory Expert for this study.)

Following the success of this project, AGRINATURA-EEIG now wishes to propose a new project for International Fund for Agricultural Development (IFAD) funding and has had some dialogue with IFAD already. Consequently, NRI is leading the development of the proposal that is likely to involve on the European side NRI, IRD and IAO again along with the Instituto de Investigação Científica Tropical (IICT, Portugal) and other member organisations of AGRINATURA-EEIG. The provisional title of the project is Approaches to realising the practical application of biotechnology in Sub-Saharan Africa as a contribution to food security and sustainable agricultural production. It is envisaged that the project will concentrate on agricultural biotechnology and industrial/environmental biotechnology but with links to biotechnology for aquatic systems.

The EC-funded study looked at biotechnology and biosafety in Ghana, Senegal, Mali, Burkina Faso and Kenya (the latter not reported on in the paper mentioned above). However, at this stage we have no particular restriction on the Sub-Saharan countries that might be included in the project.

We are currently identifying Partners (institutions or individuals) who will share responsibility of leading the various work packages of the project. If you wish to have further details of the proposed project and especially if you are interested in participating as a Partner, please contact me as soon as possible.

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[Thanks to Robert for the information about this international project. If anyone is interested in participating in the new project, please contact him directly. The paper he refers to above was published in the December 2011 edition of the Journal of Biotechnology, which was dedicated to selected contributions from sessions of the 14th International Biotechnology Symposium (http://www.ibs2010.org/), that took place in Rimini, Italy from 14-18 September 2010. Apart from Robert's paper, it also includes papers by A. Fahmi on "Benefits of new tools in biotechnology to developing countries in south Asia: A perspective from UNESCO"; D. Cichocka, J. Claxton, I. Economidis, J. Högel, P. Venturi and A. Aguilaret on "European Union research and innovation perspectives on biotechnology"; and J. Ruane and A. Sonnino on "Agricultural biotechnologies in developing countries and their possible contribution to food security". This last paper, from FAO, is available on the web, at http://www.fao.org/docrep/015/an111e/an111e00.pdf or you can request a copy from biotech-admin@fao.org...Moderator].

-----Original Message-----
From: Biotech-Mod1
Sent: 14 December 2011 11:30
To: 'biotech-room1@mailserv.fao.org'
Subject: 57: Re: Making partnerships work

This is from Dr. Bakari Aliyu, Cowpea Breeder and Senior Lecturer in the Department of Crop Production and Horticulture, Federal University of Technology, Yola, Nigeria.

I want to share some few things about the subject under discussion in Nigeria.

The term Biotechnology is still alien to most Nigerians especially small holders. To the few others, it is an elite language known only to those "at the top." The contribution of Abubakar Abubakar (Message 45) in reaction to Message 33 by Obidimma Ezezika seems too simplistic. That is not to say that the International Institute of Tropical Agriculture (IITA) is not contributing. But think about the size of the country of 150 million people especially in the educationally backward northern states.

My suggestion is that the most appropriate level for the establishment of biotechnology-related partnerships is between institutions and also between research laboratories. This is in addition to massive individual and institutional capacity building across the country. The most beneficial partnership is that of Triangular and an enhanced public-private partnership that involves the Government, development agencies, input suppliers and processors, small holders, NGOs, funding agencies and the general public as observed by Laurens Klerkx (Message 18).

Resource-poor farmers and other small holders are always faced by poor infrastructure and poor or non-existent extension services. As a policy initiative, the Government and the partners should engage in massive public enlightenment campaign using the available institutions at the Federal, state and local Government levels. The level of public ignorance in science especially in Biotechnology coupled with poverty and weak Government institutions is a major hindrance.

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-----Original Message-----
From: Biotech-Mod1
Sent: 14 December 2011 11:55
To: 'biotech-room1@mailserv.fao.org'
Subject: 58: Some issues to be considered in this debate

This is Datta Rangnekar from Ahmedabad, India, again.

I was glad to find some interesting contributions, particularly messages 46 by Laurens Klerkx and 53 by Tassawar Malik, as these brought out issues related to developing countries and crucial issues like transfer of technology, sustainability etc. I wish to draw the attention of the FAO and the participants to some related and additional issues that need consideration and have policy implications from the perspective of livelihood development of the resource-poor/underprivileged families (numerically the largest group amongst the farming community in the developing countries).

The issues suggested to be considered are:

1. Biodiversity and Equity issues (discussed together in view of their interrelationship and to bring to the notice of participants as to how, besides the high cost of seed material and inputs, there is another aspect that precludes equitable distribution of benefits of biotechnology).

The pressure of market demand results in typical response of promoting 'Public - Private - Partnerships' for developing high yielding varieties of crops/livestock/poultry chosen on the basis of market potential. These crop/livestock varieties are vigorously promoted while the resource poor farmers mostly cultivate tubers and minor millets (referred to as wild foods - a derogatory term) and keep native breeds of livestock and poultry and these are neglected. The phenomenon is appropriately described as "Pressure - Response - Relationship". It is bound to result in loss of biodiversity. We keep on discussing in seminars and workshops the dangers of loss of biodiversity but ignore it while planning for fast growth in production. It is unlikely that private entrepreneurs will be interested in research on these crops and livestock and neither would the scientists since there is no incentive. How to balance these aspects? Maybe Public-NGO-Farmer partnerships, if supported by conscientious funding organizations, provide an alternative. (FAO is well aware of this dilemma)

2. Vulnerability and dependency issues.

One of the sequels of the entry of private enterprise in use of agric-biotechnology for producing seed material with high production potential (hybrid or GM or Bt) is that "Dependency Syndrome" is promoted. It is a chain reaction - it starts with dependency for seed material and then for inputs needed to get desired

production followed by post-production activities. From the livestock sector, poultry production is a good example where a handful of commercial organizations control the entire cycle making the producer and particularly resource poor 'dependant as well as vulnerable'. It may be worth trying 'Public - Farmer' or 'Public - Farmer - NGO' partnerships, maybe they provide a better alternative. Let me mention that 'Private enterprises' may be useful/appropriate under certain situations - not everywhere.

3. The issue of Mindset of technical people (the breeding bias).

I cannot help mentioning that in this conference I find discussions veering round use of agro-biotechnology mainly for breeding purposes. I faced a similar situation in last few decades in development programmes where the main intervention considered for development was 'breeding intervention'. Let us look at average yields and ask ourselves: if the small farmers of developing countries have not utilized production potential of local varieties or the improved ones produced through selection in crops and livestock are we justified in pushing seed material produced through high tech ? For livelihood development, the need is to improve 'whole farm output' and that can be done in three ways - checking losses, improving management and then consider the third step of introducing superior germplasm. For resource poor farmers, checking of losses (control of pests and diseases) is invariably high priority. Why not look for appropriate biotechnological tools that do not need high external inputs and would enable control - it brings immediate results. And this could be followed by the other steps.

4. Pro-poor approach issue

I strongly feel there is need for facilitating Policy recommendations to provide good incentives for scientists to get involved in 'Pro-Poor' research as it is not likely to result in quick publications or patents - the main criteria for evaluation and recognition of scientists and research organizations. I am tempted to ask - why can't the FAO push 'Pro-poor research' as it is pushing 'Pro-poor development' (maybe I am not aware and if so pardon me).

5. Transfer of Technology issue

I am glad some participants drew attention to this widely adopted approach (of Transfer of Technology, TOT) on agriculture development - in fact it is presented as the main activity in many cases. In most development projects I was associated with, I tried to keep TOT out since I studied and observed TOT for years and found that:
- it functions like 'Postal Delivery of Letters' where the postman has to hand over the letters without looking at the contents and sometimes even the details of address (letters are bundled area-wise) and
- It also works like 'making a horseshoe and looking for a horse with the appropriate hoof size to fit it'.
Is it not high time we change the approach??

Thanks for extending the E-conference period.

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-----Original Message-----
From: Biotech-Mod1
Sent: 14 December 2011 13:57
To: 'biotech-room1@mailserv.fao.org'
Subject: 59: Addressing the 9 specific questions from the Background Document - AARINENA

This message is from Ahmad Abdul kader, Head of Biosafety Unit in the General Commission for Agricultural Scientific Research (GCSAR), Syria and Ibrahim Hamdan, Executive Secretary of the

Association of Agricultural Research Institutions in the Near East and North Africa (AARINENA). It is the contribution from AARINENA (http://www.aarinena.org/).

It addresses all of the specific 9 questions, some of which had sub-questions, listed in Section 5 of the Background Document:

1a). "What can we learn from specific past experiences of partnerships in biotechnologies (in crops, forestry, livestock, fisheries or agro-industry) for smallholders in developing countries?"

In the West Asia and North Africa (WANA) region, unfortunately, applications of agricultural biotechnologies have not been widely used, and have not sufficiently benefited smallholder farmers. However, some experience of partnership in biotechnology which benefited the smallholders can be recognized in just a few examples which are reflected by the fact that the recent advances in biotechnology applications provided good opportunities for immediate benefits to the WANA region. The applications made in the region included the development of micropropagation systems for many plant species. However, the main application for the benefit of smallholders is the production of virus-free potato, date palm, banana and other crops. This in addition to the development of doubled haploids in cereals. The benefits of these applications are observed by the increasing yield stability of these crops.

1b). "What were the key lessons learned?"

- Existing biotechnology tools provide huge opportunities to sustainability of production and consequently address food security issues. Several of these are simple, cost-effective and easily adaptable by farmers (such as micropropagation and producing virus-free material). Such applications should be broadly widened.
- The skills can be enhanced in a relatively short time for direct application.
- Applied biotechnology must be given a high priority in funding projects in biotechnology and research must be oriented to matters which have an investment possibilities.
- Identifying promising niches for future R&D investments.
- Providing support for capacity building in agricultural biotechnology for the final end of benefiting of farmers.
- Technology transfer, cooperation and partnership between research institutions in different countries should be given a priority to widen these applied technologies.

1c). "What were the problems and what were the features of the partnerships that worked?"

- Establishing appropriate infrastructure to support applied biotechnology research.
- Limited technology transfer, cooperation and partnership between research institutions in different countries.
- Private-public partnership is a feature of some successful examples

2). "A number of specific kinds of partnerships (North-South cooperation, South-South cooperation, triangular cooperation and Public-Private partnerships) were described in Section 4 of the Background Document (http://www.fao.org/fileadmin/user_upload/biotech/docs/conf17bd.pdf). Which of these (or, indeed, other kinds of partnerships) in the area of agricultural biotechnologies are most likely to be beneficial for smallholders in developing countries?"

Joint research projects are probably the most beneficial, since the outcome is efficiency gains in technology development and adaptation, as well as in know-how and knowledge transfer. The partnership between the agricultural research institutes in the WANA region is a good example, where the activities of the ARRINENA are contributing to the enhancement of agricultural and rural development in the WANA region through fostering agricultural research and technology development. It is also promoting the exchange of scientific and technical experience and information. Further, it strengthens collaboration within and outside the region to achieve greater degree of self-reliance in food and agriculture. All of these activities are beneficial to the smallholders in our developing countries. These research institutes are non-profit governmental bodies for the benefit of the smallholder farmers. Some examples are reflected by the

fact that the recent advances in biotechnology applications provided good opportunities for immediate benefits to the WANA region, as described in the response to question 1a) above.

Further, in order to strengthen research partnership in the WANA Region, AARINENA established 7 regional research networks for date palm, cotton, plive , medicinal and aromatic plants, water use efficiency, agricultural biotechnology and, finally, plant genetic resources. These networks are contributing to the generation of information, training, extension and inter-regional research and development programs in the WANA region and with other Regional Networks such as the Asia-Pacific Association of Agricultural Research Institutions (APAARI) Asia-Pacific Consortium on Agricultural Biotechnology (APCoAB) and the Inter-regional Network on Cotton in Asia and North Africa (INCANA). Within this framework, some regional training courses were held, e.g. on bioinformatics at the Agricultural Genetic Engineering Research Institute (AGERI) in Cairo, Egypt in 2008.

Two more partnership examples within the WANA region are:
- FAO project TCP/RAB/3202 (D) entitled: "Strengthening capacities towards the establishment of a regional platform for the detection of genetically modified organisms". This project involved partnership between 6 countries, i.e. Jordan, Lebanon, Sudan, Syria, United Arab Emirates and Yemen. The outcome of this partnership is the establishment of a regional platform for sharing experiences, expertise and know-how to harmonise laboratory procedures, standards, and techniques of GMO detection. It also involved holding a few workshops on GMO detection and its implications. It also involved organizing a training course on "GMO Detection and Biosafety" which was held at the International Center for Agricultural Research in the Dry Areas (ICARDA), Aleppo, Syria, 19-24 June 2010. *[This was a two-year Technical Cooperation Programme (TCP) project approved by FAO in 2008. Within the project, one of the tasks is to prepare a comparative analysis of the current practices in the six participating countries and identify options for standardization. A 203-page document by M. Madkour, entitled "Status and options for regional GMOs detection platform: A benchmark for the region", was therefore published to present the status of GMO detection in these six countries, identify the gaps, needs and options for strengthening the regional approach towards establishing a GMO detection platform. It is available at http://www.fao.org/docrep/012/al310e/al310e00.htm ...Moderator]*.

- Joint research project of international cooperation involved UK, Italy, Spain, Morocco, Tunis and Syria as well as ICARDA in a project approved and funded by the European Union which ended in August 2009. The project code and title was: TRITIMED: EUFVI-INCO-CT-2004-509136. "Exploiting the wheat genome to optimize water use in Mediterranean ecosystems" - http://www.rothamsted.bbsrc.ac.uk/cpi/tritimed/indexcontent1.html. The outcome of the project were the development of improved wheat inbred lines which give high production under drought conditions. The final outcome will benefit farmers also.

3). "Are there particular biotechnology-related areas of education/training or research that are more suitable for South-South or North-South cooperation?"

Yes, the priorities imply:
- the practical applications of biotechnology
- facilitate access to improved germplasm and technology transfer from the developed countries
- Promote investments and enterprises across borders with considering highly public-private partnerships
- Close co-ordination and cooperation with regional and international projects and institutions (UNEP-GEF (United Nations Environment Programme-Global Environment Facility) projects, FAO, ICARDA,...)

4). "When wishing to engage in biotechnology-related Public-Private partnerships to benefit their smallholders, which kind of guidelines or best practices should developing country governments or organizations follow?"

- Focus on applied biotechnology (plant tissue culture, DNA molecular markers, gene cloning and characterization, GM crops for biotic and abiotic stresses) which could be one strategy to be adopted in order to obtain suitable varieties with traits of interest that will face the problems encountered in the field

and to satisfy the needs of the consumers. This will ensure increasing production per unit area which is the most realistic solution to contribute in shrinking of the gap in the WANA food security.
- GM crops and other biotechnologies should be promoted to be adopted by the commercial type of agriculture in the WANA region, but with considerable caution and case-by-case, taking biosafety considerations into account. However, through partnership between public and private sectors (like Egypt) and through technology transfer, such technologies can be transferred to small farmers. But, the safe application of these technologies requires functioning biosafety systems in place.
- Undertaking an active biotech R&D programme and securing funding, national commitment, and political will.
- Considering the intellectual property rights.
- A broad public debate is to be engaged actively in order to raise understanding and gain the support of consumers and society for this exciting technology.
- Need to change the mind set and bring about corporate culture in public sector institutions.
- Emphasis on capacity building in scientific policy and legal matters.
- Emphasize that private and public sector partnerships have to be developed for any significant progress to be made.
- Regional/International collaboration and capacity building is crucial so that progress is made, and all benefit.
- Partnership of public-private in biotechnology research should meet the needs of poor farmers.
- Need to restore higher public research funding: Public institutions focus on problems of the poor and small holder farmers, help prepare future scientists, and help assure that the public interest is protected.
- Applications should be demand-driven
- Applied Biotechnology must be given a high priority in funding projects in biotechnology and research must be oriented to matters which have an investment possibilities.
- Business models must be taken in consideration as a step forward for feasibility studies.

5a). "A number of biotechnology-related partnership activities were described in Section 2 of the Background Document (individual and institutional capacity development; joint research projects; sharing of biotechnologies, protocols and materials; and knowledge sharing). Which of these (or others not mentioned here) are likely to be most beneficial for smallholders in developing countries?"

Joint Research Projects
Regional projects
Private-public partnership
Individual and institutional capacity development

5b). "Which kind of partnership (Section 4 of the Background Document) is recommended for the different partnership activities?"

Regional public-public partnership is more beneficial, but public-private partnership is more effective

6a). "For each of the different sectors (crops, livestock, forestry, fisheries and agro-industry), in the context of agricultural biotechnologies,
are there certain kinds of partnerships which are likely to be more beneficial for smallholders in developing countries?"

Concerning crops: Cotton, maize, wheat, sugar beet, potato,...

6b). "are there certain technical areas which can benefit most from partnerships?"

Genetic engineering, GM crops tolerant to biotic and abiotic stresses. Micropropagation of virus-free material (potato, date palm, banana,)

7). "What kind of policy initiatives should developing countries undertake if they wish to strengthen partnerships for the development and use of agricultural biotechnologies to benefit their smallholders?"

- Ensuring sufficient attractive investment laws for involvement of private sectors
- Understanding the societies expectations
- Policies encouraging the partnership of public-private in biotechnology research which should meet the needs of poor farmers.
- A national strategy for biotechnology is needed to set up the areas of interest and the future prospects of agriculture biotechnology to be adopted.
- Include biotechnology in school syllabi and providing factual information about its usefulness and safety aspects.
- Collaborate in regional and inter-regional capacity building through support of national agricultural research systems (NARS), CGIAR centers, other international institutions and regional like APAARI, Forum for Agricultural Research in Africa (FARA) and AARINENA.

8a). "Which institutional arrangements can be established to provide robust support to biotechnology-related partnerships to ensure their success and sustainability?"

- Funding projects in biotechnology and research which must be oriented to matters which have investment possibilities.
- Increase funding support to R&D in biotechnology.
- Identifying promising niches for future R&D investments.
- Providing support for capacity building in agricultural biotechnology.
- Establishing appropriate infrastructure to support applied biotechnology research.
- Ensuring adequately equipped labs and supporting facilities
- A broad public debate is to be engaged actively in order to raise understanding and gain the support of consumers and society for this exciting technology.
- Initiate and maintain networks with the regional countries of the project that would ensure continued public awareness, collaboration and strengthening of capacities in the different issues relating to biotechnology and biosafety.
- Identifying and operationalzing the responsibilities of different public and private institutions in all terms of partnership.
- Priority-setting should involve all stakeholders and consider national development policies and market opportunities.
- Identification of needs
- Promoting the application of biotechnology as a tool in the sustainable development.
- Ensuring the judicious and wise use of modern biotechnology in order not to jeopardize the environment and human health.
- Extend policy support by recognizing biotechnology as an integral component of strategy to meet the challenges of food insecurity and climate change

8b). "What are the hurdles that can prevent effective international collaboration and how can they best be overcome?"

- Limited funding support
- Lack of highly professional human resources in most developing countries.
- Lack of good infrastructure
- Lack of incentives for researchers in developing countries.
- Therefore, governments and international agencies that are involved in agricultural development should extend need-based funding support.

9a). "What is the most appropriate level for the establishment of biotechnology-related partnerships (for example, between countries, between institutions, between research laboratories/units or between individuals)?"

There is a need to create strong regional linkages between research laboratories to benefit from their expertise and experiences. Strengthening of partnerships between countries as well as within countries should be encouraged as an approach to facilitate the development and use of biotechnologies and maximize synergies as well as to share and optimize use of limited resources.

9b). "What incentives can be provided to foster collaboration at each of these levels?"

Develop benefit sharing policies that balance the needs to facilitate transfer of technologies to users while providing fair share of benefit to technology developers.

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-----Original Message-----
From: Biotech-Mod1
Sent: 15 December 2011 09:18
To: 'biotech-room1@mailserv.fao.org'
Subject: 60: Re: Addressing the 9 specific questions from the Background Document - AARINENA

This is Osama Momtaz, Deputy Director for Research, Agricutural Genetic Engineering Research Institute, Egypt and current coordinator for the AARINENA Agriculture biotechnology network.

First of all, I would like to thank all colleagues who participated in this FAO e-conference and special then John Ruane, forum administrator and all forum team. Also, I would like to point out that I did follow up the e-conference emails where all different aspects for developing agriculture biotechnology enforcement were discussed. All that happened during a very critical period in Egyptian history where restating leadership and policy reorientation are taking place. I was thrilled today to go for the first time to participate in Egyptian election, also, considering that there have been four ministers of Agricuture till now this year only and the fifth will come maybe after the presidentential election next July. So, policy reform for small stakeholders will have a new meaning.

I participated in March 2010 in the West Asia and North Africa (WANA) region parallel session of the FAO international technical conference on Agricultural biotechnologies in developing countries (ABDC-10) as AARINENA Agriculture biotechnology network coordinator, and participated in the preparation for the final session report with my colleague from Syria Dr. Ahmed abd El Kader, Biosafety group leader in the network. I wished when I submitted that report to my superior in Cairo to have a response or even to negotiate the contents. I think also the same is happening in other countries in the region, after the people revolutions in the Arab region, specially the Near East and North Africa (NENA) region, every word in that report and the earlier message (number 59) from Dr. Ahmed that was developed will have a meaning. I am looking forward for the outcome for this e-conference to deal with all previous concerns in developing countries specially Egypt and WANA region to reform policies, admit the important of agriculture

biotechnology and apply it to benefit these countries' economies and also benefit small stakeholders, or in another meaningful word, poor farmers.

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[At ABDC-10, a total of 27 parallel sessions were held over the first three days, the majority of which were organized by different inter-governmental and non-governmental organizations. Five of these were region-specific and, for these, FAO invited relevant regional organizations to organize parallel sessions for their region. The scope of each regional session was to address the potential role of biotechnologies for agricultural development in the region and to cover the entire range of biotechnologies across all the food and agricultural sectors. The session on Latin America and the Caribbean was organised by the Inter-American Institute for Cooperation on Agriculture (IICA), the International REDBIO Foundation and the Technical Cooperation Network on Plant Biotechnology in Latin America and the Caribbean (REDBIO). The session on West Asia and North Africa was organized by the Association of Agricultural Research Institutions in the Near East and North Africa (AARINENA). The session on Sub-Saharan Africa was organized by the Forum for Agricultural Research in Africa (FARA). The session on Asia and the Pacific was organized by the Asia-Pacific Association of Agricultural Research Institutions (APAARI). The session on Europe and Central Asia was organized by the FAO Regional Office for Europe and Central Asia, Budapest, Hungary. The summary reports of these sessions, plus all the presentations made, are available at http://www.fao.org/biotech/abdc/parallel/en/ (Sessions D.1 to D.5)...Moderator].

-----Original Message-----
From: Biotech-Mod1
Sent: 15 December 2011 09:29
To: 'biotech-room1@mailserv.fao.org'
Subject: 61: Pre-breeding of wheat genetic resources: North-South cooperation

This is Harjit-Singh Rekhi, Former Professor, School of Agricultural Biotechnology (formerly Biotechnology Centre), Punjab Agricultural University, India, and presently working for a Canadian federal regulatory agency in Food and Agriculture.

For some reason, I am late in participating. However, I am writing this to share with the group a significant progress made in pre-breeding of wheat genetic resources at the Punjab Agricultural University, India, under three consecutive research projects funded by the United States Department of Agriculture (USDA), under US-India Fund. These projects were carried out in collaboration with the Wheat Genetic and Genomic Research Centre, Kansas State University, USA as well as National agricultural research centres. *[For more information on pre-breeding, see also Message 24 by Jorge Mayer...Moderator]*.

Under the first project, more than 14,000 accessions of 20 cultivated and 116 related species were procured from different sources and a conservation method was designed for long term storage of this germplasm at an altitude of 4,200 meters above sea level in the Himalayas in India without creating any expensive artificial conservation facility - 'almost no cost' conservation method. Evaluation and cataloguing of this germplasm identified a number of sources of resistance to diseases and abiotic stresses as well as other useful agronomic and quality (processing and nutritional quality) traits (Gill et al., 1995; Harjit-Singh et al., 1998).

In the second and third project, these genetic resources, particularly those from wild Triticum and Aegilops species, were utilized in wheat genetic enhancement using a combination of molecular and conventional tools. This resulted in transfer of more than a dozen novel genes for disease resistance, including leaf rust,

stripe rust, powdery mildew, loose smut, Karnal bunt, and cereal cyst nematode resistance genes, into good agronomic background of cultivated wheat species (Harjit-Singh et al., 2000a, Harjit-Singh et al., 2000b; Dhaliwal et al., 2002). Identification and transfer of novel high molecular weight glutenin sub-units from four wild Triticum progenitor species into durum wheat lead to significant improvement in protein content and gluten strength, a trait associated with processing quality (Harjit-Singh et al., 2000a).

The by-product of these projects was the development of more than a dozen populations for molecular mapping/tagging in wheat. Most of the published work in the last 13 years on molecular tagging/mapping of genes governing traits of economic importance in wheat carried out under collaborative research in India, and also some collaborative work with institutions in USA (Kansas State University); CIMMYT, Mexico; Switzerland and Iran is the result of planning and development of these populations at the Punjab Agricultural University, Ludhiana, under the above mentioned projects.

Enhanced germplasm and populations of wheat have been provided to wheat breeders and network partners in India and international collaborators in USA, Canada, Mexico, Switzerland, U.K. and Iran.

The materials generated in these projects have been largely used by the School of Agricultural Biotechnology, Punjab Agricultural University (PAU) and other research institutions in India and abroad (developed and developing countries) for further genetic improvement. For example, at Kansas State University, the interspecific derivatives from the crosses of Indian bread wheat cultivar WL711 with Aegilops triuncialis and Aegilops geniculata (developed at the PAU) have been utilized for precise transfer of new leaf rust (Lr 57, Lr58) and stripe rust resistance (Yr40) genes. The materials carrying leaf rust (Lr 57) and stripe rust resistance (Yr 40) genes from Aegilops geniculata are being used further for molecular genetic analysis using wheat expressed sequence tags (ESTs) and synteny with rice. Materials provided to the Crop Development Centre, University of Saskatchewan from the crosses of Triticum durum with T. dicoccoides, were used for loose smut of wheat.

In India itself, collaboration among two federal Government organizations (Wheat Project Directorate and Department of Biotechnology), and four leading national research institutes, including PAU, led to successful implementation of a network project on molecular breeding of wheat quality traits. This project utilized the populations developed in the US-funded projects on pre-breeding. This led to significant achievement in molecular marker analysis of grain protein content (Harjit-Singh et al., 2001) and other important grain characteristics (Varshney et al., 2000). Molecular markers have been identified to initiate molecular breeding for yellow berry (Ammiraju et al., 2002) tolerance and sprouting tolerance (Roy et al., 1999).

At the PAU, interspecific populations from the pre-breeding projects have been used to develop an integrated molecular linkage map of diploid wheat (Indo Swiss Collaboration in Biotechnology) and a number of molecular markers linked to novel useful alien genes have been identified for precise alien gene transfer into good agronomic backgrounds of cultivated wheat. Interspecific derivatives from these projects have potential to be utilized for overcoming new challenges like that of evolution of a highly virulent race of stem rust (Ug99) which has become a threat to world wheat production (Harjit-Singh and Zewdu, 2010).

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-----Original Message-----
From: Biotech-Mod1
Sent: 15 December 2011 09:33
To: 'biotech-room1@mailserv.fao.org'
Subject: 62: Re: AGRINATURA-EEIG and Biotechnology and Biosafety in Sub-Saharan Africa

This is Sylvia Uzochukwu, Department of Food Science and Technology, University of Agriculture, Abeokuta, Nigeria.

Thank you Rob for your interesting message (number 56). Getting biotechnologies, especially agricultural biotechnologies, applied in sub-Saharan Africa, is really an urgent matter.

John our able moderator, I enjoyed reading the article "Agricultural biotechnologies in developing countries and their possible contribution to food security" which you referred us to. It was very well written. Just to let you know there are many of us who are participating in the conference by just reading and assimilating contributions. Please keep up the good work.

Prof. Sylvia Uzochukwu
Professor of Food Microbiology and Biotechnology
Biosafety Specialist

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-----Original Message-----
From: Biotech-Mod1
Sent: 15 December 2011 11:26
To: 'biotech-room1@mailserv.fao.org'
Subject: 63: For partnership we need to enable the easy exchange of breeding or planting materials

From Adrian Dubock, also author of message 51.

How great to read of the continuation of seed exchange for successful trait breeding in message 61 from Harjit-Singh Rekhi. I say continuation as this was exactly the type of international cooperation which was so successful when used by Norman Borlaug and Gurdev Khush for wheat and rice in the 1960's and which allowed the power of international seed breeders and seed breeding to use the world's genetic resources to combat the biotic stresses limiting food production.

How sad it is, that in the supposed name of protecting biodiversity, the same international sharing of new forms of seeds, created through genetic engineering, cannot occur between breeders internationally without a plethora of complex documentation. It is this bureaucratic system - spawned from the interpretation of the Convention on Biodiversity Diversity (CBD), and especially its Cartagena Protocol - not the patent system, which is the enemy of the spread of sustainable innovation, with the often related Material Transfer Agreement the most innocent sounding but potentially deadly of the lot.

Seed breeders need diversity of trait expression to breed from. Traditionally crops have been selected for yield, usually expressed as carbohydrate. We now know that micronutrients are also important in diet, and in many cases, given the long tradition of yield only selection, there is no micronutrient diversity to select from and improve in a staple, unless it is introduced. Many of the poor only have access to the staple crop where they live, and micronutrient deficiencies of their staples reduce the quality and longevity of their lives, their ability to take advantage of the opportunities available to them, and therefore their contribution to their societies. In this way the CBD is anti-poor.

North-South, South-South, Public-private and all other types of partnerships and governments need to work hard at enabling the easy exchange of breeding or planting materials, whatever their source.

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-----Original Message-----
From: Biotech-Mod1
Sent: 15 December 2011 14:05
To: 'biotech-room1@mailserv.fao.org'
Subject: 64: Re: Pre-breeding of wheat genetic resources: North-South cooperation

This is Rachel Predeepa once again from India.

This is with regard to message 61 sent by Mr Harjit-Singh Rekhi. This is really a great pleasure to know that so much of work has been contributed by India in molecular plant breeding sector. However, this is where I would like to stress upon my point that there is a lack of gap in linkages, memorandums of understanding (MoUs) and collaborations of the public sector with the private sector. Linking private-public sectors is of great importance for this is the only way that potentials in terms of human resources and material resources could be tapped efficiently. This will also give a professional blend of both the approaches, the professional private sector and the service-oriented public sector.

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-----Original Message-----
From: Biotech-Mod1
Sent: 15 December 2011 16:47
To: 'biotech-room1@mailserv.fao.org'
Subject: Last few days of the e-mail conference // FAO-BiotechNews

Dear Colleagues,

There are just a few days left, so I really encourage those who haven't yet done so to share your views and experiences on partnerships in agricultural biotechnologies - on topics raised by other participants in the conference, on your main conclusions or lessons learned from this conference etc.

Messages can be posted to the conference any day up until Sunday 18 December 2011. These final messages will be posted on Monday 19 December and the conference will then be closed. As usual, send your messages to biotech-room1@mailserv.fao.org

As an aside, since 2002 FAO has been publishing an e-mail newsletter called FAO-BiotechNews which contains short news and events items (including on e-mail conferences of this FAO Biotechnology Forum). The newsletter is published in six different versions, one per language i.e. Arabic, Chinese, English, French, Russian or Spanish. If you or any of your colleagues wish to subscribe, send a message to FAO-Biotech-News@fao.org indicating which e-mail addresses are to be subscribed and in which language they wish to receive the newsletter.

The items in FAO-BiotechNews focus on the activities of FAO, of other UN agencies/bodies and of the 15 CGIAR research centres, plus the activities from a small number of other major-intergovernmental organisations (e.g. OECD, OIE, UPOV). The newsletter covers all food and agricultural sectors (crops, forestry, fisheries/aquaculture, livestock, agro-industry) and a wide range of biotechnology tools (e.g. use of molecular markers, artificial insemination, triploidisation, biofertilisers, micropropagation, genomics, genetic modification etc.). Documents are included as news items in the newsletter if they are freely available on the web, and an e-mail contact is always provided for each news/event item.

All the over 800 news items posted in the 92 Updates posted since 2002 are available at http://www.fao.org/biotech/biotech-news/en/. All the event items posted are available at http://www.fao.org/biotech/biotech-events/en/

Best regards

John

-----Original Message-----

From: Biotech-Mod1
Sent: 15 December 2011 17:22
To: 'biotech-room1@mailserv.fao.org'
Subject: 65: Experiences from Cameroon

This is Norbert Tchouaffe, Cameroon, again.

In referring to the past experiences of biotechnologies in Cameroon:

1) What were the key lessons learned?

Biotechnology, defined as all branches of work that use living organisms to create goods and services, offers unique opportunities to tackle some of the challenges that threaten our well being and environment. As one of the major revolutions of the 20th century, biotechnology has already yielded a wide range of effective pharmaceuticals, diagnostic reagents, vaccines, transgenic crops with high yields and pest resistance, as well as highly-profitable service industries. The vast forestry resources of Cameroon with more than 10,000 different plant species offer an opportunity to develop an indigenous pharmaceutical industry based on bioactive ingredients from our medicinal plants and drawing inspiration from indigenous herbal medicine. Researchers at the National Universities of Cameroon employ both modern and classical biotechnology, drug discovery, photochemistry and agro-forestry approaches to document and preserve Cameroon's biodiversity, develop new tools for the control of endemic disease, enhance agricultural output, protect the environment and spin off new companies.

But to be sustainable, Cameroonian biotechnologies need appropriate infrastructures and commitment with indigenous population's know-how.

2) What were the problems?

- Limited funding support as mentioned in message 59 (by Ahmad Abdul kader). For this reason we set up a pro-poor network to help poor farmers to improve their level of business and accountability - at http://mftot6.ning.com/
- Lack of appropriate infrastructures
- Limited technology transfer to the needed population (indigenous populations)

3) What were the features of the outreach channels and partnerships that worked?

In Cameroon, NGOs serve as a bridge between researchers, policy-makers and farmers (breeders).

The University of Dschang, Cameroon dedicated to research in agriculture, has linkages with many foreign universities and cooperation with some international organisations. The linkages usually aim at the exchange of staff and students whilst international organisations usually assist our University with capacity building of staff and funding for research. There is also increasing collaboration with national institutions and private companies. Whilst institutions provide support in teaching and research, private companies, for now, only provide facilities for practical training of students. There is therefore great potential for growth in the collaboration of private companies in the areas of research and development.

Another area of an outreach activity is the establishment of partnerships with private institutions of higher education.

I totally agree with Datta Rangnekar (Message 58), particularly for pro-poor approach and Transfer of Technology issues. There is a need for new partnerships ('Public - Farmer' or 'Public - Farmer - NGO' partnerships) to reach poor farmers. The aim of these partnerships is to help poor farmers to grow in stature to produce crops with skills corresponding to the needs of the market (in quality and quantity).

As many participants mentioned, there is also a need for fora, networks where poor farmers can voice their opinions

Norbert Tchouaffe
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-----Original Message-----
From: Biotech-Mod1
Sent: 15 December 2011 17:41
To: 'biotech-room1@mailserv.fao.org'
Subject: 66: Research and innovation value chains on biotechnology for agriculture, agro-industry and bio-industry

This is Myriam Sánchez M, Director of Corporacion Biotec, in Cali, Colombia, South America, a Science, Technology and Innovation Center, in the National STI System of Colombia. I am a Professor at the Universidad del Valle, Engineering School, and deal with management of Innovation related to Biotechnology research, for agriculture, agro-industry and bio-industry.

I have been reading the very interesting participations in the conference. Thanks John for the organization and motivation.

I would like to share Corporación Biotec's experiences working within "Research and innovation value chains", relating small producers, researchers, consumers and different actors and agencies in "Innovation systems". We are an inter-disciplinary group. We contribute to put knowledge in the production system without that rupture among researchers and producers generated by a linear way of research that does not value at the same level as "expert knowledge" the small producers' traditional knowledge.

Recently, Corporacion Biotec is dealing with a pilot case, to insert agricultural biotechnology in rural basic and medium schools curricula, with great promising results.

I invite those who read Spanish, to visit Corporacion Biotec's webpage: htpp://biotec.univalle.edu.co

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-----Original Message-----
From: Biotech-Mod1
Sent: 16 December 2011 09:01
To: 'biotech-room1@mailserv.fao.org'
Subject: 67: Re: Experiences from Cameroon

I am Tonjock Rosemary Kinge, Researcher and PhD student, Department of Plant and Animal Sciences, University of Buea, Cameroon.

I agree with Message 65 (by Norbert Tchouaffe) but with a different view. A lot more research work has been carried out with plants as regard biotechnologies than with fungi especially macrofungi (mushrooms) in Cameroon. Fungi are one of the most important groups of organisms in terrestrial ecosystems, having a biomass second only to plants, and species diversity second only to the invertebrates. Mushrooms serve as a source of food, beverages, they supply us with pharmaceuticals, traditional medicine, biochemicals and enzymes of enormous value to medicine and industry, help in nutrient cycling through mycorrhiza

associations, biocontrol agents and as agents for remediating sites polluted with intractable wastes. With their enormous uses, there is need to carry out extensive fungi biodiversity survey in Cameroon to document and preserve the actual number of species present and for conservation of edible and medicinal mushrooms. From our previous surveys on ethnomycology and diversity in the Mount Cameroon region, macrofungi (mushrooms) were found to have diverse uses as food, medicine and mythological. Our ethnomycological results have set a basis for pharmaceutical industry development based on bioactive ingredients from our medicinal mushrooms.

To be sustainable I agree with message 59 (by Ahmad Abdul Kader) on limited funding. Also, there is need for collaboration with other research institutions that have appropriate equipment to execute a particular research work. Funding and collaborations are actually the features of the outreach channels and partnerships that have been working for us and we hope to seek for more in the near feature.

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-----Original Message-----
From: Biotech-Mod1
Sent: 16 December 2011 11:04
To: 'biotech-room1@mailserv.fao.org'
Subject: 68: Re: Pre-breeding of wheat genetic resources: North-South cooperation

I am Professor PK Gupta, Emeritus Professor at CCS University, Meerut, India.

While at the Punjab Agricultural University, Ludhiana, Dr Harjeet Singh Rekhi worked with us on molecular breeding work in wheat and published a series of papers together. But this is not the only work in the area of molecular breeding done in India. Both the Indian Council of Agricultural Research (ICAR) and the Department of Biotechnology (DBT) funded a large number of projects in the area of molecular breeding involving development of molecular markers and their use in crop improvement. ICAR funded two 5-year mission mode projects (each for five years; 2003-2008), one involving molecular breeding and the other involving pyramiding of genes through molecular markers. In 2008, DBT also initiated an Accelerated Crop Improvement Program (ACIP), under which project proposals on molecular breeding were invited, and a number of projects, some of them multi-institutional (Network mode), were funded.

With ICAR support, a number of cultivars were produced through molecular breeding. For instance, in rice, Swarna-Sub1A (for submergence tolerance), Improved Pusa Basmati 1 and Improved Samba Mahsuri (both for resistance against bacterial leaf blight) and Birsa Vikas Dhan 111 (for drought resistance) were produced through molecular breeding and reached the farmers. Also in pearl-millet, hybrid variety HHB-67-2 (resistant to downy mildew) and in maize, hybrid variety Vivek QPM9 (with high lysine and high tryptophan) resulted due to improvement of their parents through molecular breeding. A number of other projects for resistance against biotic and abiotic stresses are currently in progress in different laboratories in India. Under Indo-Australian collaboration also, work is currently in progress for molecular breeding in wheat involving drought and heat tolerance. Some of the publications in the field of molecular breeding from our lab are provided below.

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2. Gupta, P.K, P. Langridge and R.R Mir (2010). Marker-assisted wheat breeding: present status and future possibilities. Molecular Breeding 26: 145-161.

3. Kumar, J., R.R. Mir, N. Kumar, A. Kumar, A. Mohan, K.V. Prabhu, H.S. Balyan and P. K. Gupta (2010). Marker-assisted selection for pre-harvest sprouting tolerance and leaf rust resistance in bread wheat. Plant Breeding, 129: 617-621

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-----Original Message-----
From: Biotech-Mod1
Sent: 18 December 2011 06:57
To: biotech-room1@mailserv.fao.org
Subject: 69: PPP in Forestry - an example from India

I am E.M. Muralidharan, working with the Kerala Forest Research Institute, Peechi, Kerala, India and involved in research on micropropagation of forestry species. I also use molecular markers for characterization, diversity assessment and DNA barcoding of forestry species.

Not surprisingly I find little discussion about forestry in this conference. With the growing concern about global warming and measures to contain it particularly REDD++, planted forests, agroforestry crops and regeneration of natural forests have assumed greater importance. Even otherwise, more farmers have taken

to growing tree crops in recent times to meet the increasing demand for industrial woody biomass. *[REDD refers to Reduced Emissions from Deforestation and forest Degradation, and the REDD++ approach proposes that it also accounts for emissions from agriculture and other land uses as part of a broader agriculture, forestry and other land use program...Moderator].*

I would like to give an example of a public-private partnership (PPP) model that looked good on paper but was fraught with problems in practice. The National Bamboo Mission (NBM) in India set up and ventured into a nationwide bamboo plantation programme to support the spawning bamboo-based industry that was being set up all over the country. To ensure quality and to maximize the productivity, micropropagated plantlets were proposed to be used as planting stock. Operational guidelines were issued for production of quality material, especially the criteria for selection of mother plants of bamboo and quality control for the plantlets.

The programme did help forge a partnership, with the NBM coordinating a link between several research organizations involved in research on bamboo, the large private micropropagation companies and the forest and horticultural departments of various states. Those companies that could meet the selection criteria were given the task of addressing the problem of shortage of planting material and they geared up to meet the huge demand for the quality planting material. Initially there was lack of technical knowledge on bamboo since, until then, this was hardly treated as a forestry species of importance and many of the important species were exotics. Secondly, while there were several published papers on tissue culture protocols, these required much more refinement to be able to qualify for a mass propagation programme. There was no time for this to be done since the programme was already launched and annual targets were to be met. Thirdly, even when the recommendation of the NBM (borrowing from the guidelines developed by the Department of Biotechnology, Government of India) required mother plants of proven quality to be cloned, it become apparent that there hardly was any selection being done in a scientific manner anywhere in the country.

This is a pointer to a problem that exists in many forestry crops where ambitious plans for use of biotechnology are drawn up without adequate understanding of the ground reality. Ideally, there should have been a partnership strategy drawn up well in advance, with a larger time frame and should have included institutions and experts in genetics and tree breeding besides forest managers and farmers themselves who could contributed from traditional knowledge to match the species with end use so that the mass production of planting material could be planned for on a regional basis. As it turned out, only a few species of bamboo actually made it to the plantations and much of it could be of doubtful quality. A few years from now there could be disillusionment in the minds of farmers about the technology itself. Here is an example, I think, where the role of PPP is well justified but was implemented prematurely and in too short a time frame.

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-----Original Message-----
From: Biotech-Mod1
Sent: 18 December 2011 07:07
To: biotech-room1@mailserv.fao.org
Subject: 70: biotechnology in animal feed for the poor farmers

I am Dr Suhubdy, a ruminant nutritionist at the Faculty of Animal Science, University of Mataram, Indonesia.

I have read all discussions in this e-conference and very advanced achievements in biotechnology in all aspects of plant and animal. My concern is about application in the real world, especially biotechnology in

animal feed for the poor farmers in the remote areas. Most research conducted is mostly in laboratory scale and limited in the field. For example, application of enzymes to improve the utilization of animal feed and the results are promising. But when they are started to be applied at the farm level, it is very difficult and hard because it is costly. My questions are:
1. Is there any way to make the application of biotechnology cheaper and easy as well as sustainable?
2. In addition, most farmers just use it when the projects are funded - after that all gone with the wind.
3. Can we include farmers when decisions are made?
I am sorry if these question are a bit late to be sent. But I do believe that biotech will have advantages later in assisting the poor farmers who live in remote areas.

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-----Original Message-----
From: Biotech-Mod1
Sent: 19 December 2011 15:15
To: 'biotech-room1@mailserv.fao.org'
Subject: 71: Cheaper and simpler biotechnologies through South-South collaboration

I am E.M. Muralidharan from India, again.

In response to Dr Suhubdy's question (Message 70) about how to make biotechnologies cheaper, simpler and sustainable, I think it requires special and focused attention and calls for more South-South collaboration. I am not sure of the animal feed sector which Dr. Suhubdy refers to, but if micropropagation could be an example, substantial achievements have been possible in a few plants like pineapple, banana, vetiver and ornamental plants through the development of low-cost tissue culture methods in India, Cuba and Vietnam. From my own experience too, I have learned that the possibilities are endless in adopting an array of cost reduction measures. Not only are these methods useful in making technology cheaper by cutting energy costs, but they are, by design, simpler and easier to implement in developing countries on a small-scale. It should be feasible to make such technologies applicable to a wider range of plants, if only there were some deliberate efforts in that direction instead of the typical research that is carried out to develop lab-scale protocols, in the well equipped laboratories. I feel this should also be possible with many other biotechnologies, if only some attention is given.

I request the Moderator of the FAO Biotechnology Forum to consider organizing an e-mail conference to bring focus on developing cheaper, simpler biotechnologies suited for decentralized small-scale ventures in developing countries.

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-----Original Message-----
From: Biotech-Mod1
Sent: 19 December 2011 15:16

To: 'biotech-room1@mailserv.fao.org'
Subject: 72: Re: biotechnology in animal feed for the poor farmers

This is from Haleem U. Hasnain, Livestock Foundation, Islamabad, Pakistan. My last full time job was with the FAO during which I mainly worked in Yemen as livestock specialist. At home in Pakistan, I have headed several livestock research and development agencies. Currently, I work as free lance livestock consultant.

The need for animal feed biotechnology for the poor farmers particularly in remote areas emphasized by Dr. Suhubdy (Message 70) is a real concern because none is really available. It is also a fact that the poor farmers in the remote areas are also mainly small farmers. All the scientific achievements of today in animal nutrition have not been helpful to these small and poor farmers. What is worse is that there seems to be nothing on the horizon yet. Is it because the focus has been on large farmers and that too in advanced economies?

Recent work in Pakistan on Total Mixed Rations has been encouraging. But it is yet to reach the small farmers due to several reasons. The problem is not confined to formulation of balanced economical rations. It is a lot more.

There is need for a totally new approach to solving this problem of an animal feed biotechnology and taking it to the small resource poor farmers, particularly in remote areas.

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-----Original Message-----
From: Biotech-Mod1
Sent: 19 December 2011 15:18
To: 'biotech-room1@mailserv.fao.org'
Subject: 73: Re: Making partnerships work

This is Sylvia Uzochukwu again from the University of Agriculture, Abeokuta, Nigeria.

What Dr. Bakari Aliyu states in Message 57 is true. Modern biotechnology is still something novel to the generality of the Nigerian populace and even among its scientists. The situation in Nigeria is also what is found in most sub-Saharan Africa (SSA) countries except South Africa. What is needed in the region is still massive individual and institutional capacity building and public enlightenment in modern agricultural biotechnologies. Previous capacity-building afforts have helped, but they have barely scratched the surface. The major reason for this is that governments in SSA are not sufficiently involved in this drive, having left most of it to be funded by donor agencies. Governments in SSA countries need to intensify funding of agricultural biotechnology research and development (R&D) if the food security emergency in the region is to improve. Most scientists agree that, though modern agricultural botechnology may not be the only answer to food security in developing countries, it is a very important answer. SSA countries are the worst hit by population explosions, crop pests, droughts, hunger and poverty. Our governments cannot afford to continue to pay only lip service to significant increases in agricultural biotechnology R&D funding. Increased political will to massively fund agricultural biotechnology R&D by governments of SSA countries, will address the capacity building needs of the region and quickly translate to increased food security.

One suggestion by some stakeholders in the region is for goverments in SSA to set up and fund regional Centres of Excellence for agricultural biotechnology R&D in order to help surmount the high capital outlay required for cutting edge R&D in the field. Present global economic trends may cause international donor

funds to be considerably pruned down, leaving the region somewhat high and dry. An urgent rearrangement of goverment budget priorities in SSA in favour of modern agricultural biotechnologies is called for.

I also agree, that partnerships between institutions and the Private sector, with a government overview works.

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-----Original Message-----
From: Biotech-Mod1
Sent: 19 December 2011 15:18
To: 'biotech-room1@mailserv.fao.org'
Subject: 74: Animal biotechnologies in the developing world

This is Muhammad Saif-ur-Rehman from the Department of Animal Breeding and Genetics, University of Agriculture, Faisalabad (Pakistan) and presently working as Assistant Professor in the University.

I tried here to briefly highlight the importance of indigenous animal genetic resources in the developing world in general and discuss the situation from Pakistan in particular regarding animal biotechnology. In Pakistan, like other developing countries, livestock is becoming increasingly important over the years in the growth of agriculture through significant contribution in GDP. The country is bestowed with rich animal genetic resources with fair number of breeds of buffaloes, cattle, sheep, goats, camels etc. These species are adapted to their regional environments over thousands of years and have provided an important source of sustenance for the population of the region. Due to the presence of unique genetic characteristics in indigenous animals, there is huge potential for their use in genetic improvement of livestock on a global scale which had already been practiced in the past. There are indigenous breeds which are particularly important on a global level, e.g., Nili Ravi buffaloes that produce milk with a high fat content, Sahiwal cattle with tick resistance, Teddy goats that have potential for for high prolificacy, Beetal goats that have potential for high growth rate, Kari sheep with short gestation length, camels that are highly tolerant to salt and many species that are resistant to heat stress or to particular diseases. However, the livestock keepers in the country are predominantly resource-poor smallholders having little or no land and few animals. This results in poor livestock productivity which is further deteriorating due to a number of factors including poor animal husbandry and veterinary services.

As we know, biotechnology is a promising tool in livestock development and it is hoped that it can improve the life of livestock keepers in the world, but the reality is that smallholders are not very much prepared to adopt these technologies. Their main concern is that how biotechnology can address the problems they are experiencing. The challenge is to focus this potential on their problems. The goal is to develop a technology, process or product that has clear commercial potential and can be commercialized after due testing and procedural regulation.

The country, like other parts of the developing world, still has to respond to the many gene-based technologies developed by advanced countries. At the moment, the main animal biotechnologies that are used to some extent in livestock production in the country include artificial insemination (AI), conserving animal genetic resources, multiple ovulation and embryo transfer (MOET), disease diagnosis and its control through vaccination and improvement and fortification of feeds and fodders.

In my view, there are several obstacles that limit the application of new molecular biotechnologies and breeding strategies to the animal breeds used in smallholder production systems in the country. At present,

there is a lack of infrastructure and insufficient manpower; absence of accurate animal records; absence of liaison between private industries, universities and livestock research institutions; and the high cost of biological inputs. Furthermore, there is a need to have sustained stakeholders participatory approach to get economic benefits of animal biotechnology. So that, with the advancement in biotechnology, the procedures required for its safe use can be constantly evaluated, upgraded and applied.

Coming to the end, I would like to conclude here with the words that it is a difficult task, but it can be achieved through firm commitment and partnerships. Its time to strengthen multi-institutional support through international donor consortium to develop cost effective and easily adaptable biotechnological products. The research grants by international agencies on animal biotechnology in developing countries, including Pakistan, is currently very low and constitutes only a small proportion of the total spending on agriculture. So, more grants in the form of collaborative research projects related to livestock are needed to benefit resource-limited farmers through biotechnology in the future.

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-----Original Message-----
From: Biotech-Mod1
Sent: 19 December 2011 15:19
To: 'biotech-room1@mailserv.fao.org'
Subject: 75: Thanking FAO

My name is Anupam Singh, Senior Research Fellow, Dr. K.V. Prabhu Division of Genetics, Indian Agricultural Research Institute, New Delhi and I work on "Molecular marker assisted selection for leaf rust resistance in wheat".

By this message, I would like to thank FAO in general for organising this wonderful conference. I have been benefited a lot by listening to the experiences and ideas of many participants. Without any doubt, the conference has witnessed the critical assessments of presently available tools for conservation of biodiversity and has provided many new ideas for further follow up and necessary actions.

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-----Original Message-----
From: Biotech-Mod1
Sent: 19 December 2011 15:20
To: 'biotech-room1@mailserv.fao.org'
Subject: 76: Re: For partnership we need to enable the easy exchange of breeding or planting materials

This is Prof. Harjit-Singh Rekhi again (Contributor of Message 61).

The comments made in Message 63 by Dr. Adrian C Dubock are highly appreciable, and need to be taken seriously if we have any interest in international development through crop genetic enhancement using both biotechnological and conventional techniques.

The comment "....continuation as this was exactly the type of international cooperation which was so successful when used by Norman Borlaug and Gurdev Khush for wheat and rice in the 1960's and which allowed the power of international seed breeders and seed breeding to use the world's genetic resources to combat the biotic stresses limiting food production" has a great significance in this regard.

It is a matter of satisfaction that the enhanced wheat genetic materials and inter- and intra-specific populations of wheat, conceptualized and developed by our team at the Punjab Agricultural University (Message 61), have been utilized and are being utilized by developed and developing nations across the world in addition to the institutions within India.

Harjit-Singh Rekhi, PhD
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-----Original Message-----
From: Biotech-Mod1
Sent: 19 December 2011 15:21
To: 'biotech-room1@mailserv.fao.org'
Subject: End of FAO e-conference on partnerships and agricultural biotechnologies

Dear Colleagues,

The last messages (numbers 71 to 76) have now been posted so Conference 17 of the FAO Biotechnology Forum, entitled "Strengthening partnerships in agricultural biotechnologies for the benefit of smallholders in developing countries: Discussing North-South, South-South, Public-Private cooperation and more", is now officially closed.

FAO established this Biotechnology Forum in order to provide quality balanced information on agricultural biotechnologies in developing countries and to make a neutral platform available for people to exchange views and experiences on this subject. We hope that you found this conference informative, interesting and that, like me, you have learned a lot from the many excellent messages sent by the participants.

The Background Document to the conference is available on the web (at http://www.fao.org/fileadmin/user_upload/biotech/docs/conf17bd.pdf) and all the messages posted will remain on the Forum website for people to read in the future, at http://www.fao.org/fileadmin/user_upload/biotech/docs/conf17msgs.pdf.

We strongly encourage you, as Forum Members, to widely disseminate information about the Foum and this conference. As is standard practice with conferences in this Forum, we will aim to prepare a Summary Document in the future that will provide a summary of the main issues discussed during the conference, based on the messages posted and circulate it widely.

For your interest, we can provide some figures about participation in the conference. It ran for 5 weeks, from 14 November to 18 December 2011. A total of 336 people subscribed themselves to the conference and, of these, 48 (i.e. 14%) submitted at least one message. Of the 76 messages that were posted, 30% came from people living in Asia; 22% from Africa; 20% from Europe; 14% from North America; 11% from Latin America and the Caribbean; and 3% from Oceania. The messages came from people living in 25

different countries, the greatest number coming from India (16 messages), followed by Canada (7), Nigeria and the Netherlands (6 each), Pakistan (5) and Brazil, Cameroon and the United States (4 each). A total of 48 messages (i.e. 63%) were posted by people living in developing countries. Roughly one third of the messages came from people working in universities and one third from people working in research centres, while 12% came from people working as independent consultants, 9% for the government and 4-5% each from people in the private sector, non-governmental organisations or inter-governmental organisations.

Finally, and most importantly, I wish again to personally thank all of you who participated actively in this conference, dedicating your time and effort to sharing your ideas, experiences and viewpoints with the conference.

As we are approaching the end of this year, I would also like to wish you all the very best for the coming year 2012.

With best wishes

John

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FAO Biotechnology website http://www.fao.org/biotech/ (in Arabic, Chinese, English, French, Russian and Spanish)