

UPOV

## SEMINAR ON PLANT VARIETY PROTECTION AND TECHNOLOGY TRANSFER: THE BENEFITS OF PUBLIC-PRIVATE PARTNERSHIP

April 11 and 12, 2011  
Geneva, Switzerland



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The views expressed in the papers and discussion summaries of the Symposium are those of the speakers and/or participants and are not necessarily those of the International Union for the Protection of New Varieties of Plants (UPOV).

# Program

## Monday, April 11, 2011

- 08.30 Registration
- 09.30 Welcome address by Mr. Francis Gurry, Secretary-General, UPOV
- 09.40 Opening by Mr. Keun-Jin Choi, President, Council of UPOV
- 09.50 Benefits of the UPOV system for technology transfer  
Mr. Peter Button, Vice Secretary-General, UPOV

### **SESSION 1: Use of Plant Variety Protection by National Research Centers**

Chair: Ms. Enriqueta Molina Macías

- 10.10 National Agriculture and Food Research Organization (NARO), Japan  
Mr. Ryudai Oshima, Deputy Director, Intellectual Property Division, Ministry of Agriculture, Forestry and Fisheries (MAFF)
- 10.35 Grasslanz Technology, New Zealand  
Ms. Jenn James, IP Manager
- 11.00 Coffee
- 11.30 Agricultural Research Council, South Africa  
Mr. Shadrack R. Moephuli, Chief Executive Officer  
(presented by Mr. Raimundo Lavignolle, Office of the Union)
- 11.55 Brazilian Agricultural Research Corporation (EMBRAPA), Brazil  
Mr. Filipe de Moraes Teixeira, Head, Technical Innovation Office
- 12.20 National Institute of Agricultural Research (INRA), France  
Mr. Yves Lespinasse, INRA Research Director
- 12.45 Lunch

### **SESSION 2: Technology Transfer by the Private Sector**

Chair: Ms. Kitisri Sukhapinda

- 14.30 DSP SA, Switzerland  
Mr. Willi Wicki, Responsible for Varieties Administration
- 14.55 Masstock Arable UK Ltd, United Kingdom  
Mr. Barry Barker, National Arable Seed Product Manager
- 15.20 Uruguayan Breeders Association (URUPOV)  
Mr. Diego Risso, Executive Director
- 15.45 Role of the private sector in Kenya  
Mr. Evans Sikinyi, Kenya
- 16.10 Coffee
- 16.40 Discussion (with panel of speakers)
- 17.30 End of session

**Tuesday, April 12, 2011****SESSION 3: International Research Centers**

Chair: Mr. David Boreham

- 09.30 Perspective of the Consultative Group on International Agricultural Research (CGIAR) Consortium  
Mr. Lloyd Le Page, Chief Executive Officer, CGIAR Consortium
- 09.55 Experience of a CGIAR center: International Rice Research Institute (IRRI)  
Mr. Ruairadh Sackville Hamilton, Head, Genetic Resources Center, IRRI
- 10.20 Possible approaches for Technology Transfer by International Research Centers  
Mr. Ian Barker, Head of Agricultural Partnerships, Syngenta Foundation
- 10.45 Discussion
- 11.15 Coffee
  
- 11.45 Closing remarks by the Chairs
- 12.15 Close

# Benefits of the Upov System for Technology Transfer

Mr. Peter Button,  
Vice Secretary-General, UPOV

**Technology transfer: encouraging the development of new varieties of plants for the benefit of society**

The purpose of this presentation is to highlight the key role that the UPOV system of plant variety protection plays in encouraging plant breeding in the public and private sectors and in delivering high quality varieties to farmers and growers.

The declaration from the Second World Seed Conference<sup>1</sup> highlighted the critical role of new plant varieties and high quality seed in providing a dynamic and sustainable agriculture that can meet the challenge of food security in the context of population growth and climate change. The Conference further emphasized the important role of both the public and the private sectors to meet the challenges ahead and the benefits when the two work together.

The mission of UPOV is: “To provide and promote an effective system of plant variety protection with the aim of encouraging the development of new varieties of plants for the benefit of society”. New varieties are a crucial means of delivering new technologies to farmers and growers and, ultimately, of course, delivering benefits through to consumers. However, these new varieties will not exist without the work of breeders.

## Benefits for farmers and growers

It is virtually impossible to list all the benefits that new plant varieties offer to farmers, but they can include: higher yield; resistance to pests and diseases; tolerance to stresses (e.g. drought, heat); greater efficiency in the use of inputs; improved harvest ability and crop quality. New plant varieties also offer diversity of choice to farmers that can improve their access to national and international markets (see Figure 1).

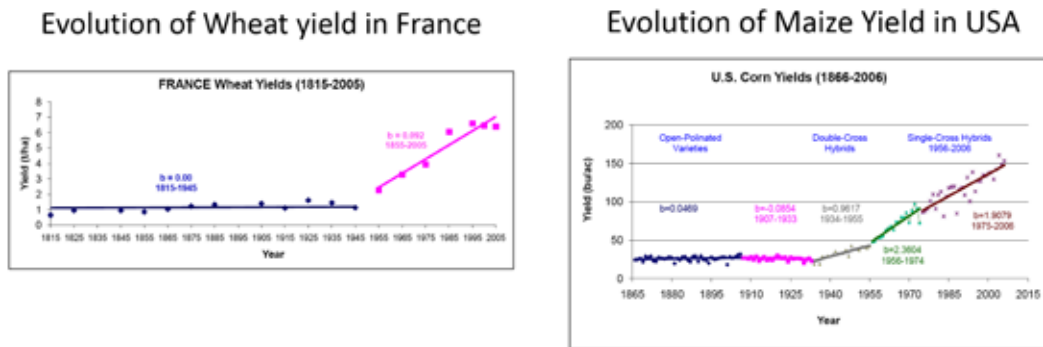
Figure 1: Benefits of New Plant Varieties for Farmers and Growers



1 The Second World Seed Conference “Responding to the Challenges of a Changing World: The Role of New Plant Varieties and High Quality Seed in Agriculture” had the objective to identify the key elements that are necessary to ensure a suitable environment for the development of new varieties, the production of high quality seeds and their delivery to farmers. The Conference, held in Rome on September 8-10, 2009, was jointly organized by the Food and Agriculture Organization of the United Nations (FAO), the International Union for the Protection of New Varieties of Plants (UPOV), the Organisation for the Economic Cooperation and Development (OECD), the International Seed Testing Association (ISTA) and the International Seed Federation (ISF).

Figure 2 illustrates, for example, the evolution of yields in wheat (France) and maize (United States of America) since the advent of modern plant breeding, at least 50% of which has been attributed to new varieties.

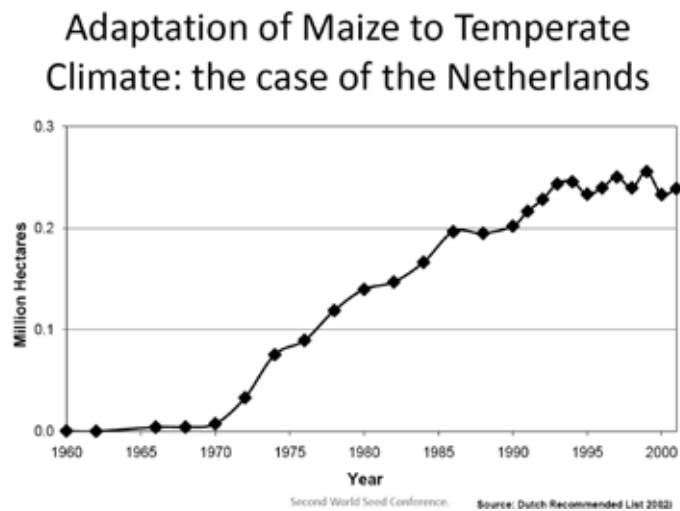
Figure 2



Bernard Le Buanec, Second World Seed Conference (Rome, September 2009)  
(see [www.worldseedconference.org/en/worldseedconference/home.html](http://www.worldseedconference.org/en/worldseedconference/home.html))

It is also important to look at the broader benefits of new varieties. With regard to climate change, there are already impressive examples to indicate how breeding is able to respond to differing environments. The maize crop, for example, up until 1970 was not adapted to cultivation in the Netherlands (see Figure 3). It was only by the efforts of breeders that farmers are able to have new maize varieties that grow well in the Netherlands, having been adapted to their specific climatic conditions.

Figure 3: Climate adaptation in Maize

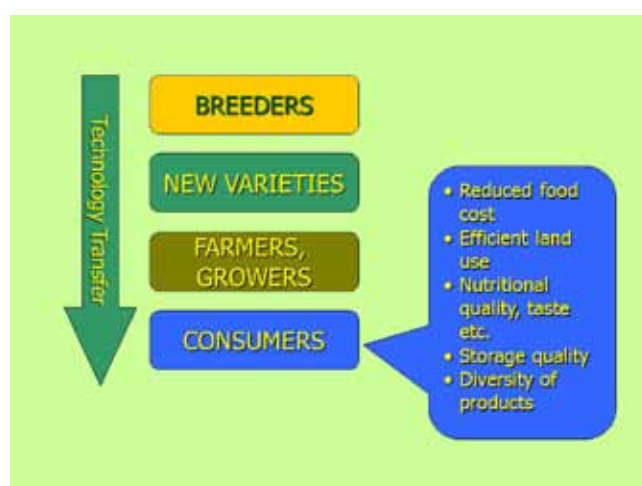


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## Benefits for society

The effects of breeding mentioned above are quite broad in their scope, but it is also important to be aware of the diversity of breeding objectives. Many people will be aware of breeding objectives such as improved yield, disease and pest resistance etc.. However, there are many other advantages that new varieties can bring to consumers and society as a whole. We can see examples of those benefits in terms of reduced cost of high quality food, efficient land use, diversity of plant derived products etc.. In short, breeders are delivering benefits and adding value through the agricultural chain of production (see Figure 4).

Figure 4: Benefits of New Plant Varieties for Society



Providing an effective system of protection for all types of breeders

Plant breeding is a long and expensive process. However, at the end of that process, new plant varieties can often be very easily and quickly reproduced. Therefore, a system of protection is needed in order to allow breeders to recover their investment. One of the important aspects of the UPOV Report on the Impact of Plant Variety Protection (Impact Study) (see [www.upov.int](http://www.upov.int)) was to look at how plant variety protection encourages breeders and breeding. The Impact Study illustrated the role of plant variety protection in increasing diversity of breeders, particularly in the private sector, but also with regard to the public sector, where researchers were encouraged to focus their research towards more adapted varieties. In general, the Impact Study observed an overall increase in breeding activity as a result of the introduction of the UPOV system of plant variety protection. Figure 5 provides examples from China and the Republic of Korea of how the UPOV system and membership of UPOV encourages breeding and the availability of new varieties from the public and private sector. There is information that government breeding is incentivized, with additional income being made available through plant variety protection: there is growth not just in the private sector but also in the public sector breeding.

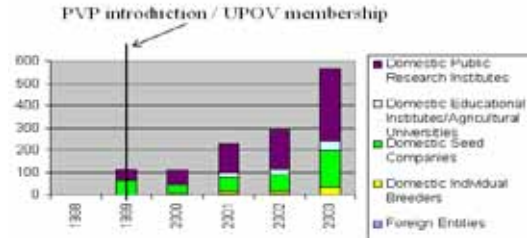
In Kenya, the Impact Study demonstrated that public and private breeders started to jointly develop new varieties for some agricultural crops, such as wheat and maize (see Figure 6). It was reported that plant variety protection played an important role in promoting this kind of public-private cooperation. It was also observed that some university scientists, previously conducting academic work, started to breed commercial varieties, thereby increasing the number of commercial breeders.

Figure 5 (Source: Impact Study)

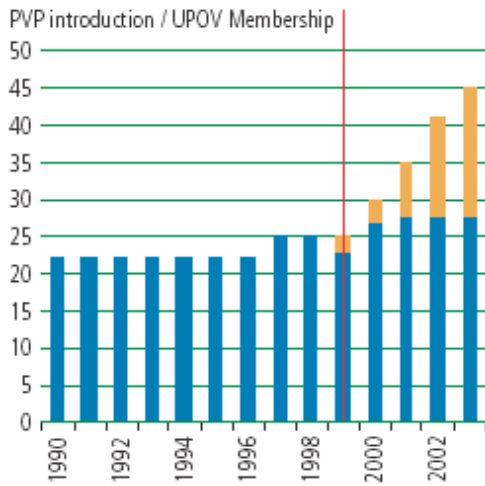
Republic of Korea: breeding investment in Chinese Cabbage



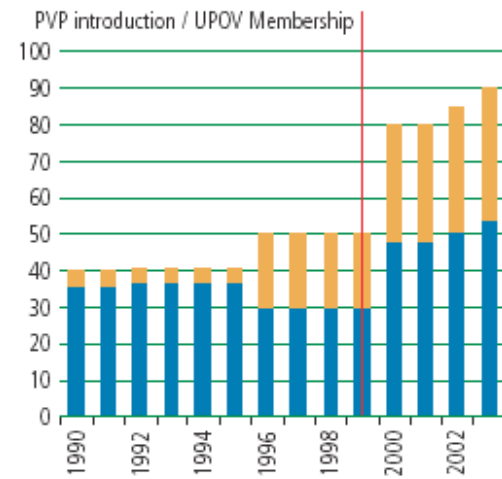
China: Number of Applications by Categories of Applications (Agriculture)



China: Number of Breeders in Henan Province (Wheat)

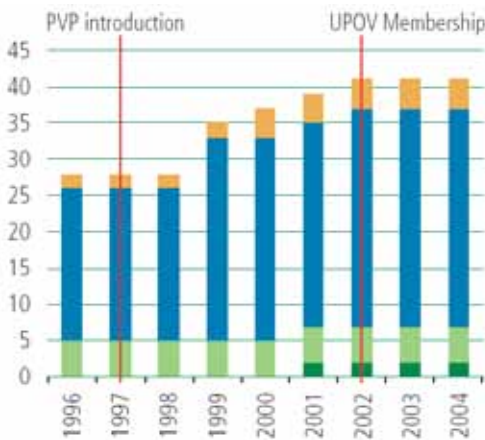


China: Number of Breeders in Henan Province (Maize)

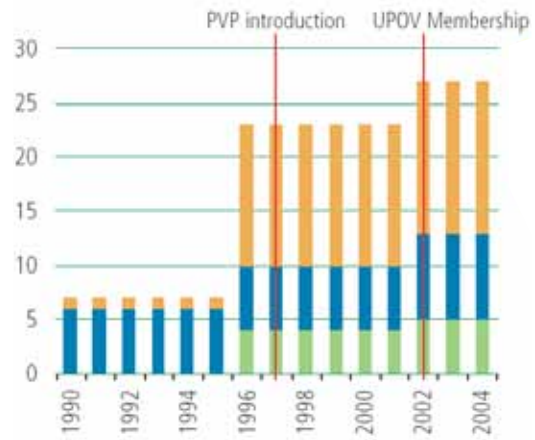


- Number of other breeders
- Number of breeders at the Provincial Research Institute

Republic of Korea: Number of Rose Breeders



Republic of Korea: Number of Rice Breeders



- Companies
- Government Research Stations
- Individuals
- University Researchers

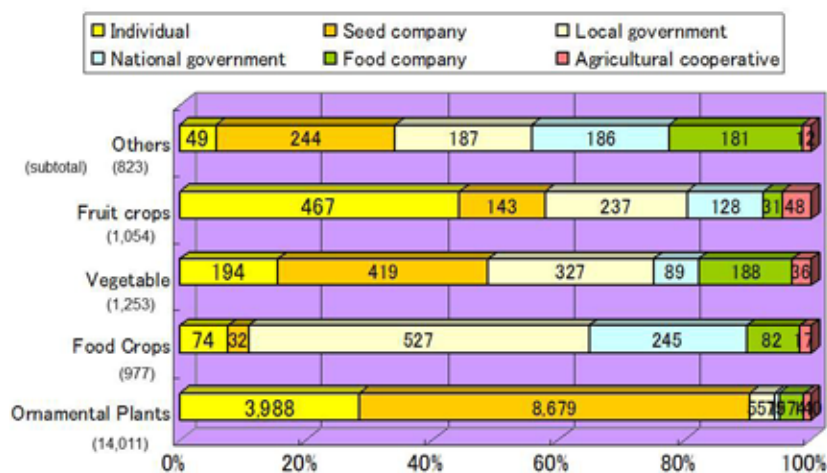


Figure 6: Kenya: applications for agricultural crops (1997-2003)

Crop	Category	Source of Application				Total
		Foreign	Local			
			Public	Private	Joint public & private	
Oat	Cereal	-	1	-	-	1
Finger millet	Cereal	-	-	-	2	2
Barley	Cereal	-	-	7	-	7
Proso millet	Cereal	-	-	-	1	1
Pearl millet	Cereal	-	3	-	-	3
Sorghum	Cereal	-	3	-	4	7
Wheat	Cereal	-	4	2	24	30
Maize	Cereal	-	27	14	14	55
Tea	Industrial	-	12	21	-	33
Pyrethrum	Industrial	-	23	-	-	23
Coffee	Industrial	-	4	-	-	4
Cotton	Industrial	-	1	1	-	2
Macadamia nut	Industrial	-	4	7	-	11
Sugarcane	Industrial	-	6	-	-	6
Safflower	Oil	-	1	-	-	1
Sunflower	Oil	-	5	5	-	10
Castor oil	Oil	-	2	-	-	2
Soybean	Oil	-	7	-	-	7
Bracharia	Pasture	-	1	-	-	1
Rhodes grass	Pasture	-	5	-	-	5
Guinea grass	Pasture	-	1	-	-	1
Setaria	Pasture	-	2	-	-	2
Clover	Pasture	-	-	1	-	1
Pigeon pea	Pulse	-	4	-	-	4
Dolichos bean	Pulse	-	2	-	-	2
Runner bean	Pulse	-	-	1	-	1
Dry beans	Pulse	-	6	1	6	13
Peas	Pulse	7	-	-	-	7
Cow pea	Pulse	-	3	1	-	4
Mung bean	Pulse	-	2	1	-	3
Cassava	Root crop	-	2	-	-	2
<b>Total</b>			<b>131</b>	<b>61</b>	<b>51</b>	<b>251</b>

An analysis in Japan (Figure 7) demonstrates the diversity in types of breeders that develop new varieties where the UPOV system of plant variety protection is in place. This indicates the relevance of PVP for different types of breeders in the private sector, the public sector and also for public-private partnerships.

Figure 7: Japan: number of varieties protected



## Facilitating breeding progress

It may be useful to recall some of the key aspects of the UPOV Convention and to explain how they are applicable to different types of breeders, particularly with regard to the breeder's right and exceptions. The breeder's right in the 1991 Act of the UPOV Convention (see Figure 8) sets out the rights which a breeder has on propagating material of a protected variety. It is the choice of the breeder to decide who is authorized to grow the variety and on what terms. This is an important aspect to be considered by public sector or private sector breeders.

Figure 8:

**1991 Act of the UPOV Convention**

**Article 14**

**Scope of the Breeder's Right**

(1) [Acts in respect of the propagating material] (a) Subject to Articles 15 and 16, the following acts in respect of the propagating material of the protected variety shall require the authorization of the breeder:

- (i) production or reproduction (multiplication),
- (ii) conditioning for the purpose of propagation,
- (iii) offering for sale,
- (iv) selling or other marketing,
- (v) exporting,
- (vi) importing,
- (vii) stocking for any of the purposes mentioned in (i) to (vi), above.

**(b) The breeder may make his authorization subject to conditions and limitations.**

It is also relevant to recall that there are exceptions to the breeder's right in the UPOV Convention. Certain exceptions are compulsory, and there is also an optional exception (see Figure 9).

Figure 9: Summary of exceptions to the Breeder's Right under the 1991 Act of the UPOV Convention

**Exceptions to the Breeder's Right**

Compulsory

Acts done:

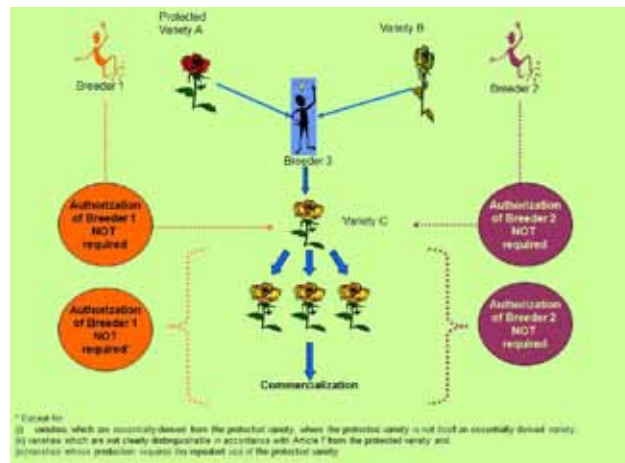
- privately and for non-commercial purposes
- for experimental purposes
- breeding other varieties (breeder's exemption)

Optional

Farm-saved seed

Firstly, with regard to the exceptions, a key feature of the UPOV system is the “breeders’ exemption”, which is a compulsory exception. The exception under Article 15(1)(iii) of the 1991 Act states that the breeder’s right shall not extend to “acts done for the purpose of breeding other varieties, and, except where the provisions of Article 14(5) apply, acts referred to in Article 14(1) to (4) in respect of such other varieties”. This is a fundamental element of the UPOV system of plant variety protection known as the “breeder’s exemption”, whereby there are no restrictions on the use of protected varieties for the purpose of breeding new plant varieties. The second part of Article 15(1)(iii) “and, except where the provisions of Article 14(5) apply, acts referred to in Article 14(1) to (4) in respect of such other varieties,” clarifies that, except for the varieties included in Article 14(5) (i.e., essentially derived varieties; varieties which are not clearly distinguishable from the protected variety and varieties whose production requires the repeated use of the protected variety), the commercialization of the new varieties obtained does not require the authorization of the title holder of any protected variety used in the breeding of those new varieties (see Figure 10)

Figure 10: Illustration of the Breeder’s Exemption



The summary chart in Figure 11 symbolizes how new varieties are a means of transferring technology down the chain of production and how the breeder’s exemption provides technology transfer back up the chain, by allowing new varieties to be used by other breeders.

Figure 11: Breeder’s exemption facilitates technology transfer to breeders



### Exceptions for farmers and growers

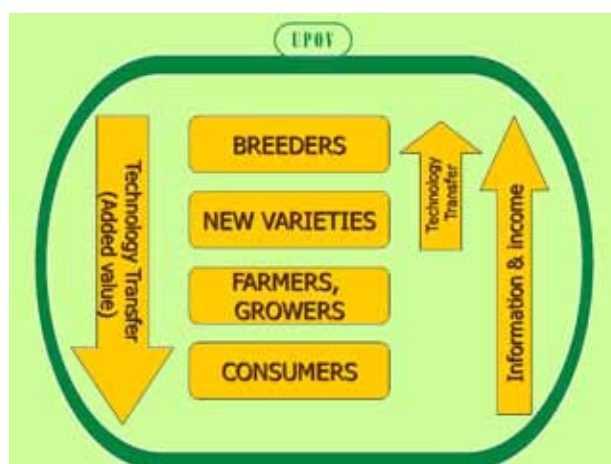
The aim of the UPOV system is to encourage the development of new varieties of plants, of which farmers and growers are the primary beneficiaries. The UPOV Convention also provides certain exceptions for farmers and growers. Under the 1991 Act of the UPOV Convention, acts done privately and for non-commercial purposes fall outside the scope of the breeder's right. Thus, where "subsistence farming" refers to the propagation of a variety by a farmer exclusively for the production of a food crop to be consumed entirely by that farmer and the dependents of the farmer living on that holding, such farming may be considered by a UPOV member to be excluded from the scope of the breeder's right.

With regard to the optional exception in relation to farm-saved seed, the 1991 Act of the UPOV Convention provides that UPOV members may permit farmers to use for propagating purposes on their own holdings the product of the harvest obtained on their own holdings from the protected variety, within reasonable limits and subject to safeguarding legitimate interests of the breeder. The inclusion of the optional exception in the 1991 Act of the UPOV Convention recognizes that, for some crops, there has been a common practice of farmers saving the product of the harvest for propagating purposes, and this provision allows each member of the Union to take account of this practice and the issues involved on a crop-by-crop basis, when providing plant variety protection. The use of the words "within reasonable limits and subject to the safeguarding of the legitimate interests of the breeder" is consistent with an approach whereby, if the optional exception is implemented, it is done in a way which does not undermine the incentives provided by the UPOV Convention for breeders to develop new varieties, because that would also undermine the benefit to farmers, growers and society as a whole.

### Summary

We have seen how the features of the UPOV system facilitate technology transfer to farmers and growers in the form of new varieties and how certain of the exceptions to the breeder's right are designed to allow farmers and growers to obtain additional benefits. We have also seen how the breeder's exemption enables breeders to utilize protected varieties for further breeding, in order to maximize breeding progress. To complete the scenario that maximizes benefit to society, it is important to view this technology transfer as a virtuous cycle (see Figure 12). In that regard, it is necessary to recognize that the legal framework of protection offered by the UPOV system provides incentives for investment in delivering the most suitable varieties to farmers and growers. It is also that framework which enables the needs of farmers and growers to be understood and for the investment to be directed towards meeting those needs. I am sure that this Seminar will provide examples of this virtuous cycle in action and illustrate the importance of plant variety protection in providing a dynamic and sustainable agriculture that can meet the challenge of food security in the context of population growth and climate change.

Figure 12: Summary



# SESSION 1: Use of Plant Variety Protection by National Research Centers

## National Agriculture and Food Research Organization (NARO), Japan

Mr. Ryudai Oshima,  
Deputy Director, New Business and Intellectual Property Division,  
Ministry of Agriculture, Forestry and Fisheries (MAFF)

### 1. About the National Agriculture and Food Research Organization (NARO)

The National Agriculture and Food Research Organization (NARO) is the largest public agricultural research institute in Japan. With headquarters in Tsukuba, NARO has 14 national institutes and research centers nationwide. For the objective of contributing to sustainable growth of agriculture and food industry, its area of research covers technology in agricultural production, food processing, nutrition, food safety and farming infrastructure.

In 2001, the legal form of NARO was transformed from an institute within the national government into an incorporated administrative agency (IAA). An IAA is a form of organization which;

- is independent from national government
- performs duties that are clearly defined by national law
- is usually provided with funds from the national budget
- is obliged to set a 5-year plan to achieve the targets established by the Minister concerned
- is subject to evaluation of its performance by a committee appointed by the Minister concerned

Crop improvement is at the center of the duty of NARO, and its research centers are engaged in breeding of new varieties of food crops, including rice, wheat and soybeans, and horticultural crops, including fruits and vegetables. In its role as a national public research institute, NARO gives its priority to the development of basic varieties, which may be of use across the nation, and leading varieties, which involve application of advanced or experimental technologies that may be then followed by prefectural research institutes or private companies. For more information about NARO, please refer to its website at [www.naro.affrc.go.jp/index\\_en.html](http://www.naro.affrc.go.jp/index_en.html).

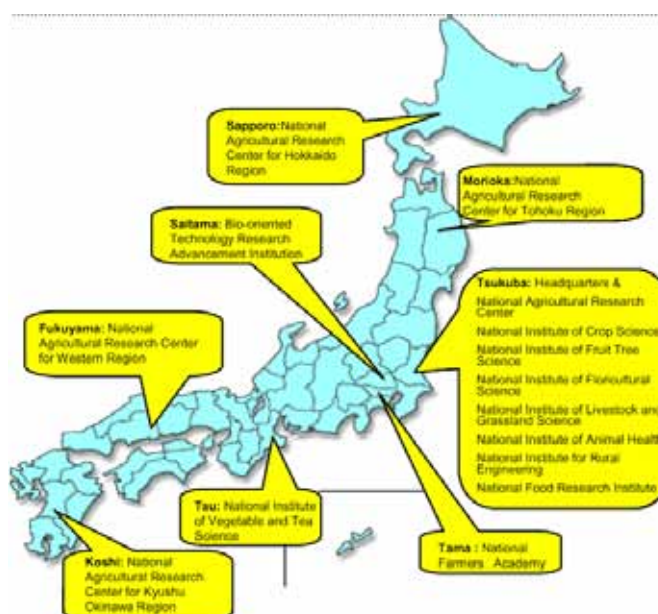


Fig1: Organization of NARO

## 2. NARO's Intellectual Property Policy

In accordance with its status as an institute operated mainly under public funds, NARO's most important mission is the transfer and dissemination of its research outcome for public uses, not merely the conduct of research and development. On that basis, NARO has established its "Intellectual Property Policy" and has established the Intellectual Property Center as its internal office for centralizing intellectual property (IP) issues of NARO in 2006.

NARO's Intellectual Property Policy features two main strategies for transferring and disseminating its research outcome:

### 1. IPR Acquisition

This approach is taken when the invention or new variety is expected to be commercialized. Dissemination is achieved by commercialization through licensees. IP rights (IPR) generate royalty revenue to NARO, and NARO utilizes the revenue for further invention and breeding activities (IP cycle (innovation-protection-utilization (royalty))).

### 2. Publication (no IPRs)

IPR acquisition may not be appropriate for research outcomes which should be shared among the widest possible range of users, i.e. improved farming practices and detection of laws behind already-utilized technologies. Such types of research outcome are published by NARO, and disseminated through prefectural extension service centers across the nation or prefectural research institutes.

## 3. Status of PBR Acquisition and Utilization

In its 5-year plan approved by the Minister of Agriculture, Forestry and Fisheries, NARO set a target of applying for plant breeders' rights (PBR) for more than 140 new varieties during the financial period (FY) 2006-2010. In the first four years of the period, NARO filed 156 applications, and the cumulative number of PBRs in force owned by NARO increased by 32 to 458 in FY2009. Fruit crops, rice, forage crops and vegetables account for a large proportion of the 458 varieties with PBR. For varieties intended for commercial use in foreign countries, NARO also files applications for PBR with foreign authorities. Until the end of FY2009, NARO obtained 32 PBRs for fruit crops, sweet potatoes and soybeans in the European Union, the United States of America, New Zealand, Israel, Australia and China.

NARO's PBR and patent licenses are, in general, non-exclusive, and the amount of royalty is determined through negotiation on a case-by-case basis. PBR royalty is determined by the units of seeds and seedlings sold by the licensee, multiplied by the royalty rate. The royalty rate is from 1-5%, depending on crop types. For food crops of importance to national food security, the rate is set at lower levels. The rate was raised from 0.16% or 0.32% in 2001, when NARO became an IAA. A part of the revenue from licensing is paid to the breeder as an incentive payment and the remainder to NARO's intellectual property budget.

NARO has established the Infringement Countermeasures Committee, consisting of executive officials of NARO. In the event of suspected infringement, the Committee calls external experts and takes actions, including warnings and appeals to the court for injunction.

## 4. Conclusion

NARO has strengthened its IPR policies. Active utilization of the plant variety protection system has contributed to the development of elite plant varieties through the IP Cycle (innovation-protection-utilization (royalty)) in the public research institutes. IPRs are at the core of promoting the dissemination of elite varieties for public use, which is the mission of NARO as a public research institute

## Use Of Plant Variety Protection By National Research Centers

**Ms. Jenn James, IP Manager<sup>2</sup>**  
**Grasslanz Technology Limited, New Zealand**

### **Role of government owned research and development organizations in New Zealand**

Prior to the establishment of Crown Research Institutes (CRI's) in 1992, all Government Departments in New Zealand, including those with a scientific research capability (e.g. Department of Scientific Research (DSIR), Ministry of Agriculture and Fisheries/Forestry) (MAF)) were largely publicly (tax payer) funded to perform and deliver outputs for public good. In the case of plant breeding and development, this meant new plant varieties were released into the public domain for any party to use – essentially they were commodity products.

In this situation, plant breeders would often develop new varieties which proved of little commercial interest or value due to their unrecognized potential by end users, or due to unproven performance in specific or general environments that were the focus at that time. The Government Act, which created CRIs in 1992, states that the purpose of a CRI is to carry out research for the benefit of New Zealand, pursuing excellence in all that it does, abiding by ethical standards and recognizing social responsibility and to operate as a good employer. A CRI must do these things whilst remaining financially viable.

CRIs must transfer and disseminate their research, science and technology. They have the role of “making a difference” with the research they produce. This is achieved through strategic, long-term relationships with sectors and industry. This provides the mandate for companies such as Grasslanz Technology to be established and to function.

### **Grasslanz Technology Ltd**

Grasslanz Technology Ltd. (Grasslanz) is a plant technology provider. Its products are primarily proprietary plant varieties and other technologies delivered through seed to the end user - farmers. Grasslanz invests in applied research and development (R&D), the outputs from which are licensed to production and marketing companies for sale. It employs neither science nor marketing capability. It establishes alliances with seed companies to co-invest and then, most often, exclusively licenses the resulting products for production and sale.

Grasslanz is a wholly owned subsidiary of AgResearch Ltd, one of 8 government-owned CRI's. Grasslanz is arguably one of New Zealand's most influential pastoral companies, resulting from its ability to bridge between science innovation and commercialization.

Grasslanz specialises in developing proprietary forage varieties and other forage technologies, such as novel fungal endophytes. It is the owner of more than 80% of the proprietary endophyte technologies and white clover varieties, and a large proportion of ryegrasses and other forage varieties sold in New Zealand. Grasslanz's product portfolio is based around traditional, temperate plant species; namely, perennial, Italian and hybrid ryegrasses, tall fescues and white and red clovers, but also bents, bromes, herbs and many others.

<sup>2</sup> Authors: Jenn James and John Caradus, Grasslanz Technology Ltd, PB 11008, Palmerston North, New Zealand

Grasslanz, while owned by AgResearch Ltd., has the freedom to invest in both public and private research. Investment can be made wherever it expects to obtain the best return in terms of an innovative technology or product that is fit for purpose. The majority of Grasslanz plant varieties have been bred out of AgResearch Ltd. – a valuable and reputable resource. AgResearch is the preferred R&D provider and receives more than 70% of total R&D investment made by Grasslanz Technology. Grasslanz develops strong commercial alliances to maintain a channel to market for its plant technologies. Delivery to the ultimate customer, the farmer, is achieved through sale of seed by head licensee companies. These companies are based primarily in New Zealand but also include businesses in Australia, the United States of America and Europe. Ironically, some companies that are the greatest competitive threat to Grasslanz in some technologies are its valued customers in other innovations. Grasslanz also manages funding in joint R&D investment programs on behalf of other R&D investment agencies and commercial companies.

The Grasslanz business model is a six step process, starting from the identification of a product concept, through to the product's commercial launch by a seed company partner:

1. Identify market opportunities, through either market 'pull' or research 'push'
2. Determine the market entry strategy and engage investors/alliances
3. Contract and manage R&D
4. Protect intellectual property and brand
5. Deliver technology through nucleus seed to commercial partner
6. Administer license and steward product in the marketplace

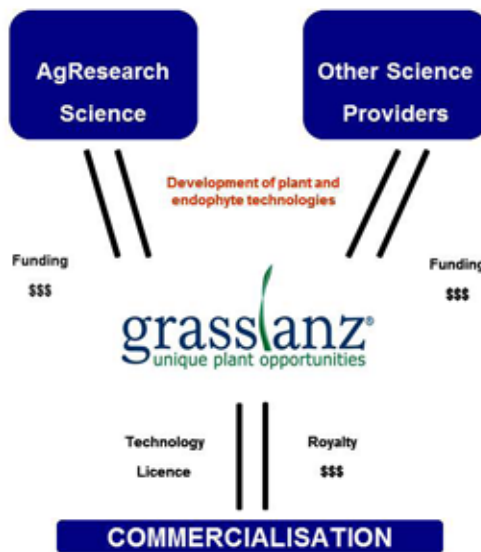


Figure1.0 Grasslanz Technology Ltd. business model

Grasslanz also has a significant 30:70 joint venture with PGG Wrightson Seeds Ltd. – Grasslands Innovation Ltd. Established in the 2006/07 season, the objective of this long term strategic joint venture is to discover, develop and market forage innovations nationally and internationally exclusively for PGG-Wrightson Seeds Limited.



### Impact of Plant Variety Rights

Prior to New Zealand becoming a member of UPOV in 1981, government departments that bred plant varieties held no intellectual property (IP) rights over their new varieties or innovations. Consequently, commercial traders in these new plants and seeds were reluctant to spend money promoting them without some exclusivity. The breeding effort and costs associated with these government-funded researchers were also of benefit to potential commercial competitors and other plant breeders overseas.

The introduction of Plant Variety Rights (PVR) in New Zealand in 1987 gave confidence and security to both government and commercial breeders, providing a renewed impetus to breed new, improved varieties. PVR also enhanced the confidence of providers of overseas germplasm for use in New Zealand for seed production and marketing, in the knowledge that the IP could be controlled and managed effectively. In New Zealand, fungal endophytes are considered to be species eligible for protection by PVR. Fungal endophytes are naturally-occurring fungi, whose complete life cycle occurs within grasses, such as perennial ryegrass and tall fescue, in a symbiotic relationship. Most New Zealand ryegrass pastures are infected with endophyte. The endophyte fungus grows between the cells of the host plant, drawing nutrients from it but, in return, conferring resistance to insect pests, drought tolerance and protection from overgrazing.

Grasslanz is a world leader in the use of PVR to protect fungal endophytes. Along with its licensee companies, Grasslanz is committed to effective information transfer and promotion of novel endophytes. It participates in technical workshops to improve the understanding of these endophyte technologies and works closely with the New Zealand Plant Variety Office in developing effective methods for IP protection.

### Change in drivers of publicly funded research

CRI's are Government-owned businesses with a scientific purpose. They receive some public money, but are increasingly expected to make profits and, if required, to pay dividends to their shareholder, the New Zealand government. A portion of funding is available for 'blue sky' research (no immediate commercial value) where private investment is unlikely. To achieve the targets expected of these research institutes, it is essential that partnerships and collaborations are formed with relevant private companies and other research groups. These collaborations not only share the costs but also the benefits of commercialization and give investing stakeholders some exclusivity over the resulting products. License agreements between the parties detail the conditions and any restrictions of use, ownership of product and IP, marketing, increases through seed production, quality standards to be met and conditions of use for any licensed trademark.

The transition of these government research departments into CRI's saw a more efficient and targeted research environment and, with PVR available, an increased confidence and security of its intellectual property. Partnerships and collaborations with various plant based industries had a solid foundation, which proved the importance of IP Rights in maintaining the research momentum.

Several decades ago, it was accepted that a part of the Government's role was to support New Zealand's primary industries in agriculture and horticulture and during those times it was successful in doing so. It is now no longer seen as appropriate that tax payers alone fund research for the benefit of national, or multi-national, privately-owned companies.

It became essential, therefore, that partnerships and collaborations were formed to obtain funding from those who would receive the immediate resulting benefit. Not only does this encourage investment, due to the exclusivity provided (through IP and license agreements), but it focuses research into products the market wants and expects. The expertise of commercial knowledge to establish markets and promote products in New Zealand and, perhaps even more importantly, overseas, was something government researchers generally lacked and were in no position to undertake.

PVR and other forms of IP protection, together with these exclusive arrangements, allow for product control in the marketplace and deter infringement. This enables the owner/breeder to recoup costs in the development of the variety, which can then be used for further R&D investment.

Royalties received from proprietary seed sales assist in the funding contributions to further research projects supported by Grasslanz. This creates a funding cycle which bridges research and marketing pathways, as opposed to the chasm into which many other research projects fall because of a lack of commercial linkages, experience or knowledge. The failure to progress a product of research through lack of a commercial pathway is, unfortunately, known to many scientists. Grasslanz, on the other hand, acts as an agent to ensure that science discoveries are disseminated by companies able to produce and market the resulting technology.

It might be thought that a disadvantage of this approach could be a lack of research and experimentation with germplasm of 'marginal' material, perceived to be of insignificant commercial importance. For example, material that could have use in small or unique environments, or potentially useful new plant genera or species being overlooked. However, Grasslanz has the resources, access to expertise and financial freedom to explore such niche opportunities. The success of mainstream products can help fund these 'smaller' more speculative projects.

### **The importance of plant variety protection to Grasslanz as the commercializing agent of a National Research Centre**

IP protection is at the core of the Grasslanz' business success , A full time IP manager is employed to ensure that appropriate protection of its commercially important IP occurs through PVR and, where appropriate, supported by patents and trademarks. This is managed through:

- Key liaisons between legal advisors and breeders/inventors in the development of new applications;
- review of new IP of interest from potential competitors and collaborators; and
- Interaction with PVR offices, particularly in New Zealand, Australia, the European Union and the United States of America.

Grasslanz IP strategy is to:

- Establish an Intellectual Property (IP) estate that can be used to leverage alliances with other companies
- Encourage broad claims to IP rights that maximize utility in offering field-of-use licenses outside the primary field of interest and that help to attract alliances to share R&D costs and allows for cross licensing any improvements
- Identify IP that can be commercialized and obtain access through ownership or license
- Have a defensive IP strategy to enable Grasslanz to block others but avoid others blocking Grasslanz

To achieve this strategy Grasslanz follows 4 steps:

- 1. Assess** the opportunity, potential benefits and value of the IP. Is it novel, can it be protected, will there be freedom to operate and is there an obvious path to market?
- 2. Capture** the IP to prevent it unknowingly entering the public domain.
- 3. Protect** the IP in a way that maximizes its commercial potential. Most common types of protection include:
  - Patent
  - Trademark
  - Plant Variety Right
  - Trade Secret

**4. Exploit** the IP as quickly as possible to ensure a return on investment within the term of the protection period (e.g. 20 years for PVR for agricultural crops Determine based on market data):

- the countries where protection needs to be obtained
- whether licensing or selling the technology to another party is a sensible option
- risks associated with sales into territories of technologies where there is no IP protection

AgResearch Ltd. has a long and proud history of high quality plant variety research and development. Its PVR portfolio, which is now managed by Grasslanz, dates back to the first PVR application, filed in 1985 with the New Zealand Plant Variety Rights Office. Since that first application, Grasslanz has applied and has been granted hundreds of PVRs, many which have been exploited for their full 20 year protection period. This security of IP protection has enabled Grasslanz to demand an appropriate royalty on proprietary seed sold, to ensure 'adequate' returns on investment and into future R & D.

AgResearch Ltd./Grasslanz' successful proprietary varieties enable higher monetary return to be invested in other projects – ones which serve farmers directly and which generate an effective cycle of providing funding to develop highly innovative products for the agricultural industry, which in turn help fund further projects.

If PVR did not exist, Grasslanz would not be able to command premium prices for its products and, consequently, would have less money to invest in R & D. That would result in less output and less innovation for New Zealand agriculture. If their rights were not protected, there would be little incentive for breeders to spend time and resources developing new varieties.

## Use of Plant Variety Protection by National Research Centers

**Mr. Shadrack R. Moephuli, Chief Executive Officer<sup>3</sup>**  
**Agricultural Research Council, South Africa**

### Introduction

South Africa is a member of the International Union for the Protection of New Varieties of Plants and is bound by the 1978 Act of the UPOV Convention. It adopted the Plant Breeders' Rights Act 15 of 1976 to incorporate provisions of the UPOV Convention-. The Act was amended in 1996 to introduce UPOV 1991 Act provisions, but South Africa has not yet acceded to the 1991 Act. In South Africa plant variety protection is afforded through this Act (15 of 1976) as amended and is administered by the Department of Agriculture Fisheries and Forestry. The Act provides for a system through which plant breeders' rights (PBRs) may be granted for varieties of plant genera or species.

### Process

Any person may apply for a plant breeders' right for a new variety in South Africa, provided that the plant genera or species to which the variety belongs has been prescribed in terms of the Plant Breeders' Rights Act. Applications can be made if:

1. the person is a resident of South Africa or any other UPOV member; and
2. if the person is not a resident of South Africa, they must appoint an agent in South Africa to whom all correspondence can be forwarded.

All applications for Plant Breeders' Rights must be submitted to the Department of Agriculture, Forestry and Fisheries (Directorate Genetic Resources) in Pretoria and the application must be accompanied by the following before any examination will commence:

1. a fully completed application form;
2. a fully completed technical questionnaire;
3. power of attorney (proxy) from the owner or breeder of the variety to apply for variety listing (this is only necessary in cases where the applicant is not the owner or breeder of the variety);
4. the quantity of propagating material (seed or vegetative propagating material) as prescribed in the Act. In the case of seed, enough seed is requested for approximately 10 years of use. Propagating material and all documents must be submitted to the Directorate within one year of the application, and if this cannot be done, written application for extension of the 1 year must be submitted to the Directorate; and
5. the fees as prescribed in the Act.

### Evaluation

South Africa has a dual testing system. For seed crops and most ornamentals, the trials are established at one of the three National Evaluation Centres and all DUS tests are performed at these centres.

The national authority (the Department of Agriculture Fisheries and Forestry) maintains the seed reference collections. For fruits and some ornamentals, the breeder or their agent, establishes the trials for distinctness, uniformity and stability ("DUS") on their premises according to the prescripts provided by the national authority. The official DUS examiners visit these sites during the growing cycle to perform the DUS tests.

The breeder of a new variety must maintain the variety and guarantee that propagating material, which still conforms to the original description, is always available. If he fails to do so, the Registrar may cancel his right.

<sup>3</sup> Authors: Shadrack R. Moephuli, Mollane A. Moselakgomo and Vuyisile Phehane, Agricultural Research Council

An applicant for a plant breeder's right may apply to the Registrar of Plant Breeders' Rights for provisional protection of a variety.

#### **Granted Rights/Effect of Granted Rights**

As soon as the evaluations are completed, the applicant is advised of the findings and whether the Right is granted. A certificate is issued to the owner of the variety and when the Plant Breeders' Right expires, the certificate must be returned to the Directorate by the holder of the Right. This is to stop anyone from misusing the certificate and claim royalties for a variety which no longer has a Plant Breeders' Right. Plant Breeders' Rights are granted for a period of 25 years for trees and vines and a period of 20 years for all other crops. During the first 5 years, which is the sole right period, the holder of the right may refuse to issue a licence to anyone and utilize the variety for his own purposes only. During the remaining 15 years, it is possible to apply to the Registrar for a compulsory licence.

For the whole validity period of the Right, the holder must pay an annual fee to the Registrar. The holder of the Right may renounce to the Plant Breeders' Right at any time.

As soon as the periods of 20 or 25 years have expired, the Plant Breeders' Right automatically expires, the variety becomes public property and may then be utilized by anybody without paying royalties. The period of the Right is determined by the Act and cannot be extended once it has expired.

The use of a protected variety for private, non-commercial and experimental purposes does not constitute an infringement of the rights of the holder. In South Africa, farmers are also allowed to replant seed of protected varieties, on their own holdings for own use, without paying royalties to the holder of the right.

#### **Register**

All the information concerning applications, rejections, approvals, deletions granting of Rights, expiry of Rights, etc. is published quarterly in the South African Plant Variety Journal.

This Journal is circulated to all offices of the Directorate, as well as all UPOV members and other interested parties.

For the year ending at 31 December 2009, the total number of registered plant breeders' rights on the registry was 2,255.

The species with the highest number on the register was roses, at 412, followed by grain maize at 174.

ARC had 332 plant breeders' rights for various crops, fruits and vegetables.

**Table 1: ARC Cultivars with Plant Breeders' Rights on the national register in 2009**

Agricultural Crops	ARC No.	Total No. on Register
Arachis L. (Groundnut/Grondboon)	3	3
Avena L. (Oats/Hawer)	2	11
Digitaria eriantha Steud. (Smuts Finger Grass/Smutsvingergras)	1	2
Eragrostis tef (Zucc.) Trotter (Teff/Tefgras)	6	10
Festuca arundinacea Schreber (Tall Fescue/Langswenkgras)	4	6
Glycine max (L.) Merrill (Soya Bean/Sojaboon)	7	47
Helianthus annuus L. (Sunflower/Sonneblom)	8	21
Hordeum L. (Barley/Gars)	1	7
Lolium x boucheanum Hausk. (Lolium multiflorum Lam. x perenne L.) (Hybrid Ryegrass/Basterraigras)	4	6
Lolium multiflorum Lam. (Italian & Westerwolds Rye Grass/Italiaanse & Westerwoldse Raaigras)	21	34
Lolium perenne L. (Perennial Ryegrass/Meerjarige Raaigras)	1	10
Lupinus albus (White lupin/ Witlupien)	3	4
Nicotiana tabacum L. Tobacco/Tabak	8	11
Phaseolus coccineus L. (kidney Bea/Nierboon)	1	1
Phaseolus vulgaris L. (Dry Beans/Droë Bone)	12	40
Raphanus sativus L. var oleiformis Pers. (Fodder Radish/Voerradys)	6	6
Secale cereale L. (Rye/Rog)	10	12
Solanum tuberosum L. (Potato/Aartappel)	18	68
Sorghum bicolor (L.) Moench (Grain sorghum/Graansorghum)	2	7
X Triticosecale Witt. (Triticum x Secale) (Triticale/Korog)	4	9
Triticum L. (Wheat/Koring)	16	67
Vigna unguiculata (L.) Walp. [including/insluitend V. sinensis (L.) Savi ex Hausk., Dolichos biflorus L.] (Cowpea/Akkerboon)	1	1
Fruit Crops	ARC No.	Total No. on Register
Actinidia chinensis Planch. (Kiwifruit/Kiwivrug)	1	1
Citrus L. (Sweet Orange, Lemon, Grapefruit, Loose Skin Citrus types, other Citrus (Bitter Seville, Lime Kumquat/ Suurlemoen, Pomelo, Losskil Sitrussoorte, ander Sitrus (Bitter Seville, Lemmetjie, Kumkwat)	12	36
Malus Mill. (Apple/Appel)	5	51
Mangifera indica L. (Mango)	5	17
Musa acuminata Colla (Banana/Piesang)	1	1
Olea L. Olive/Olyf)	1	4
Prunus armeniaca L. (Apricot/Appelkoos)	1	7
Prunus persica (L.) Batsch var nucipersica Schneid. (Necatrine/Nektarien)	25	62
Prunus persica (L.) Batsch (Peach/Perske)	36	52
Prunus persica (L.) Batsch (Peach ROOTSTOCK/Perske ONDERSTAM)	1	4
Prunus salicina Lindl. (Japanese Plum/Japanse Pruim)	19	36
Psidium guajava L. Guava/Koejawel)	1	1
Pyrus L. (Pear/Peer)	13	24
Vitis L. (Grape/Druif)	22	49
Ornamental Crops	ARC No.	Total No. on Register
Erica L. (Hearh/Heide)	1	3
Leucadendron R. Br. Conebush, Yellowbush/Tolbos, Geelbos)	8	11
Leucospermum R. Br. Pincushion/Speldekussing)	7	8
Ornithogalum L. Chinchinchee/Tjienkerientjie)	8	8
Protea (Protea, Sugarbush/Protea, Suikerbos)	7	13
Vegetable Crops	ARC No.	Total No. on Register
Allium cepa L. (Onion/Ui)	4	30
Ipomoea batatas (L.) Lam. (Sweet Potato/Patat)	15	15

### Ownership as per the PBR Register

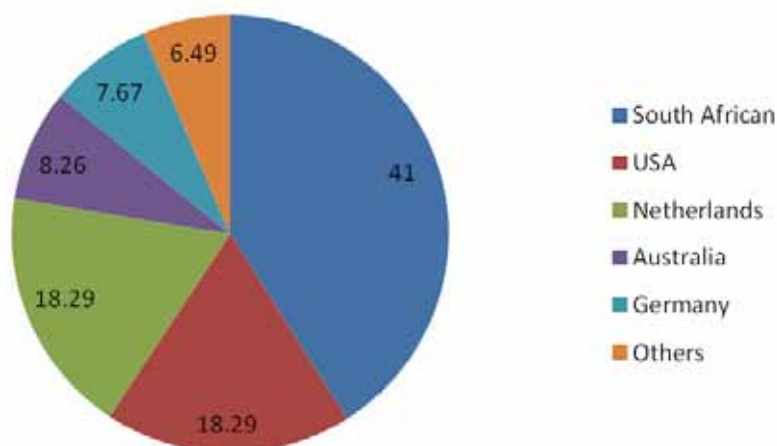


Figure 1: Plant Breeders' Rights ownership (percent) as per South African register 2009

A significant portion of plant breeders' rights registered in South Africa originate from other countries. South African residents registered 41 % of the plant breeders' rights in 2009. Of the South African owned plant breeders' rights, approximately 36 % are registered by the ARC. These are important achievements for food security, agricultural development and benefit sharing. In addition, the ARC's contribution towards the agricultural sector is significant as it provides a basis upon which benefit-sharing could be realized from further breeding and development of genetic resources.

The implementation of plant breeders' rights in South Africa and the consequent accession to the UPOV Convention have been a major stimulus for the agriculture sector, particularly those in plant breeding. The result has been a general increase in the number of varieties developed and in foreign varieties introduced into South Africa. Evidence for this can be found in the increased numbers of foreign applications, with greater proportions of foreigners being holders of plant breeders' rights. This system appears to provide financial benefits, but also enables local plant breeders and producers access to high quality, new varieties from other countries.

#### New Developments

In South Africa, a process is currently underway to develop and put in place a Plant Breeders' Right Policy aimed at developing economic growth through:

1. Providing an internationally recognized system for plant variety protection
2. Ensuring the availability of plant varieties for South African agriculture.
3. Encouraging the participation of those previously excluded from economic activity by recognizing their informal systems of innovation and creativity.
4. Encouraging the sustainable use and conservation of plant genetic resources for food and agriculture.

#### Management of Intellectual Assets by the ARC

The highest proportion of Intellectual Assets owned by the ARC is in the form of Plant Breeders' Rights. In order to ensure that its Intellectual Assets are effectively protected, the ARC has developed and implemented an Intellectual Property Management Policy. This policy provides for timely filing of applications for Plant Breeders' Rights and requires employees to disclose all information regarding new varieties as soon as possible. The policy is also used to evaluate all research and development activities in order to make decisions regarding the utility of some products for the agriculture sector. Further, this policy envisages financial benefits to accrue directly to the ARC, with some indirect benefits to the public; which could be through a variety of instruments that could be utilized to ensure a financial outcome.

The ARC Intellectual Property Rights Policy is crafted to be in accordance with specific legislation; the South African Intellectual Property Rights from Publicly Financed Research and Development Act 51 of 2008. The object of this Act is to make provision that intellectual property emanating from publicly financed research and development is identified, protected, utilized and commercialized for the benefit of the people of South Africa, whether it be for a social, economic, military or any other benefit. This Act further seeks to ensure that:

1. a recipient of funding from a funding agency assesses, record and reports on the benefit for society of publicly financed research and development;
2. a recipient protects intellectual property emanating from publicly financed research and development from appropriation and ensures that it is available to the people of South Africa;
3. a recipient identifies commercialization opportunities for intellectual property emanating from publicly financed research and development;
4. human ingenuity and creativity are acknowledged and rewarded;
5. the people of South Africa, particularly small enterprises and designated group entities, have preferential access to opportunities arising from the production of knowledge from publicly financed research and development and the attendant intellectual property;
6. following the evaluation of a disclosure, researchers may publish their research findings for the public good; and
7. where necessary, the government may use the results of publicly financed research and development and the attendant intellectual property in the interest of the people of South Africa.

The Act further provides that an intellectual property creator at an institution and their heirs are granted a specific right to a portion of the revenues that accrue to the institution from their intellectual property until such right expires.

In terms of the Act, intellectual property creators at an institution and their heirs are entitled to the following benefit-sharing:

1. at least 20 per cent of the revenues accruing to the institution from such intellectual property for the first one million rand of revenues, or such higher amount as the Minister may prescribe; and
2. thereafter, at least 30 per cent of the net revenues accruing to the institution from such intellectual property.

These benefits must be shared in equal proportions between the qualifying intellectual property creators or their heirs unless otherwise agreed between those creators and the recipient or determined in accordance with institutional policies. The benefits to intellectual property creators and their heirs must be a first call on the applicable revenue ahead of any institutional distribution. The recipient may distribute the balance of the revenues generated by intellectual property as it deems fit, but must apportion part of it for funding, among other things:

1. more research and development;
2. the operations of the office of technology transfer; and
3. statutory protection of intellectual property.

Stemming from the Act (51 of 2008), the ARC Intellectual Property Management Policy established an Office of Technology Transfer, headed by the Executive Director: Technology Transfer and has the Senior Manager: Commercialization, Intellectual Property Manager and the Corporate Legal advisor as standing members. The main tasks of this Technology Transfer Office are to improve awareness about Intellectual Property within the organization, ensure effective disclosure, conduct relevant assessments and file the appropriate application. Further, any unregistered Intellectual Property is recorded and tracked in a manner that ensures ARC research and development results are effectively commercialized. To achieve this, the Office must ensure the ARC has all the appropriate and relevant systems to manage Intellectual Property.

To date, ARC has developed and implemented an Intellectual Property Management Protocol that contains decision processes and workflows. These workflows graphically illustrate the steps to be taken and at what point to whom and by whom. Responsibilities are assigned for filing applications for plant breeders' rights.



In order to ensure that personnel within the organization are aware of the value of developing and protecting the organizations intellectual property (IP). IP awareness workshops are conducted, which give personnel a platform to interrogate the systems and propose efficient ways of managing the IP.

As a public entity in South Africa, ARC is obliged to ensure that the outcomes of its research and development initiatives are effectively disseminated. This includes developing mechanisms for commercializing its Intellectual Assets. To this end, ARC has adopted an approach for the transfer of technology, including new varieties with plant breeders' rights to both the commercial and resource-poor agricultural sector. An Intellectual Property Licensing Policy is used to enter into specific arrangements for the transfer of ARC varieties to commercial producers. The policy includes principles for entering into benefit sharing arrangements with other parties. For commercial producers, the licensing of ARC varieties is often designed to ensure maximum benefit to the organization, while also enabling the agriculture sector a competitive advantage. Whereas, licensing in the transfer of varieties to resource poor producers is done in a manner aimed at ensuring maximum benefit to the recipients, mainly through training interventions and the establishment of small medium and micro – enterprise incubators.

Licenses issued for agricultural development to resource poor farmer can be drafted in a variety of innovative ways. For example, the license may be royalty-free for a period where payments are deferred, with payment of royalties linked to the performance of the recipient's business. This royalty-free period would be carefully managed, ensuring the recipient understands their contractual obligations (e.g. protection from unauthorized propagation, performance milestones and periodic reporting on commercial activity). In addition, the recipients would be made aware of the powers of the rights-holder (ARC) to revoke the license where contractual arrangements are not being fulfilled. The aim of such a specific approach is to prepare the budding entrepreneur for a competitive commercial environment through successful performance.

Where ARC seeks to disseminate its Intellectual Assets for exploitation by commercial agriculture, a different approach is applied. Commercialization vehicles are often utilized, which would in turn become responsible for the management of the Intellectual Assets and effective payment of royalties to the ARC. Prior to appointing a commercialization partner, the ARC utilizes a transparent, but competitive, bidding process. Prospective bidders are expected to provide detailed information, demonstrating how they would commercialize ARC Intellectual Assets and how this would meet the ARC developmental, social, economic growth and sustainability objectives. The successful bidder would be assigned a specific licensing agreement with specific benefit sharing arrangements for the ARC, mostly in the form of royalties, but also market information.

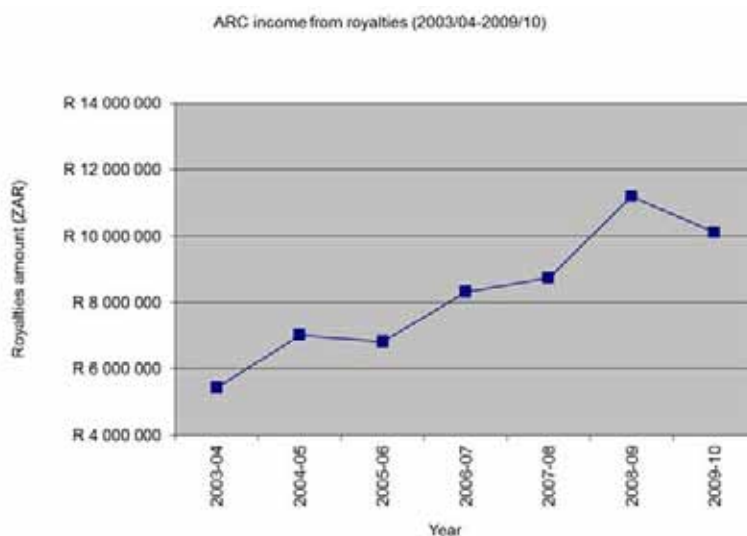


Figure 2: Income generated from royalties (2003/4 – 2009/10)

As shown in Figure 2, the income generated from licensing, mainly plant breeders’ rights, steadily increased over time, with a slight decline in the financial year 2009/10. Reasons for the decline have not been fully understood. However, it’s possible that the decline could be due to the following:

- a. competitiveness of ARC varieties;
- b. sub – optimal collection of royalties;
- c. changes in the production patterns as a result of the recession and climate change; and,
- d. entry into the market of superior varieties from other breeding programs.

Comparative analyses suggest that the ARC income from licensing its technologies is favorable. The ARC compares favorably when its license income, as a percentage of research and development expenditure, is compared to the averages for different countries and regions, benchmarked in different studies as shown in Figure 3:

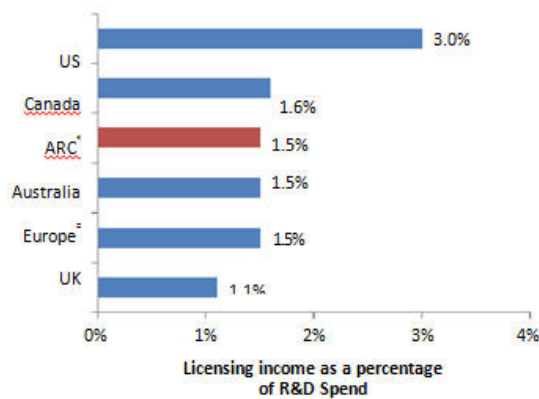


Figure 3: Licensing income as a percentage of R & D Spend

Analyses of performance of similar institutions’ income generated from licenses as a proportion of expenditure on research and development suggests that the ARC continues to perform favorably. It emerged that the ARC ranked third in income generated as a proportion of expenditure on research and development. This suggests that the ARC has an effective mechanism for generating income from investments into research and development. Factors for this success may vary and would require detailed understanding of the objectives and operations at the different institutions.

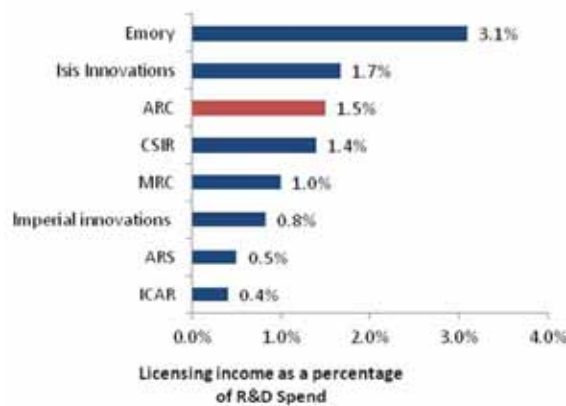


Figure 4: Institution licensing income as a percentage of R & D spend

In 2009, ARC's income from royalties could be attributed to 3 main areas as per Table 2:

R&D Division	Income from royalties (ZAR)
Horticulture	R 27 397 712
Animal production	R 3 219 607
NRE	R 0
Grains	R 27 032 407
<b>Total</b>	<b>R 57 649 725</b>

**Table 2: Income from royalties by the ARC from 2003/4 to 2009/10.**

Analysis of South Africa's agricultural performance suggests that crop improvements could be attributed to significant investments in research and development. Sustained investments in research and development, particularly in plant breeding have enabled the ARC to develop new varieties that continue to be released into the agricultural production system. The impact has been increased agricultural yields, arising from improved farmer productivity and competitiveness of the sector. In many respects a significant proportion of South African farmers utilize both ARC-developed varieties and those originating from other countries, in order to ensure sustainable and competitive agricultural production. This interplay of varieties from different parts of the world is also important for mitigation of agricultural risks, particularly for developing resistance against specific pests and diseases; therefore ensuring a good yield and harvest for the producers, which in turn ensures food security.

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## USE OF PLANT VARIETY PROTECTION BY NATIONAL RESEARCH CENTERS

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Brazilian Agricultural Research Corporation (EMBRAPA), Brazil**

### Abstract

The management of questions of intellectual property (IP) involved in the processes of research, development and innovation by research institutions constitutes a strategic management tool that is increasingly important, being prioritized to make viable the formation of partnerships that can guarantee success in the process of agricultural innovation. This paper presents the principal aspects and results of the process of managing intellectual property by Embrapa, the main Brazilian agricultural research center, whose results contribute to guaranteeing the competitiveness of this organization on the global agricultural research scene. The existence of a strong and well-structured system of IP protection of varieties in Brazil, with well-established legal norms, allied with the capacity of the institution to utilize this system in its favor, represents Embrapa's principal competitive difference in making viable the formation of both private and public partnerships in the generation of innovations, which benefit Brazilian agro-business.

### 1. Introduction

Innovations in the agricultural sector can make a difference in those countries that take advantage of new development opportunities arising in the context of global socio-economic change, where issues such as demographic growth, the greater power of consumption of emerging nations and increased demand for alternative sources of energy are part of the combined consolidated trends which anticipate an increased demand for agricultural products.

The public sector has a strategic role within this scenario through the adoption of public policies and the formulation of well-defined and efficient IP legislation which guarantees security and stability as necessary safeguards for investment in this sector.

In this sense, Brazil relies on IP legislation, which in turn stems from quite specific laws for the protection of patents and trademarks (Industrial Property Law, 1996), and varieties (Plant Variety Protection Law, 1997), as well as various published public policies to make viable the technical-scientific development of the country. Above all, for the innovation process to be complete, it is necessary that the companies which act within the agricultural market adopt the correct strategies to work with such institutional advantages.

It is necessary for these companies to adopt a more integrated and systematic view of all the factors that affect the technical and economic development of agriculture, which in the area of Research Development and Innovation (RD&I)<sup>5</sup> does not occur in isolation but as part of a greater, more interactive process involving diverse agents and institutions with different interests.

Within this context, the process of IP management may be seen as fundamental to guaranteeing the competitiveness and sustainability of companies assisting in the execution of the innovation process, be it through the protection and defense of property rights connected to innovation or in creating structures and situations capable of dealing with different categories of activities and arrangements used in developing an innovation, such as complex negotiations involving protected knowledge, studies of technological monitoring and prospection, as well as studies on making technologies available (Freedom to Operate (FTO)).

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5 The concepts related to RD&I may be better understood by the study of two documents published by the Organisation for Economic Cooperation and Development (OECD): Manual Frascati, 1994 (Chapter 2) and Manual of Oslo, 2005 (Chapters 1 and 2).

This article approaches the way the Brazilian Agricultural Research Corporation “Embrapa”, the largest tropical agricultural research institution in the world, utilizes the system for the protection of varieties in making viable the success of its innovation strategies, mainly in its activity in the formation of partnerships with the Corporation for the development of agricultural innovation.

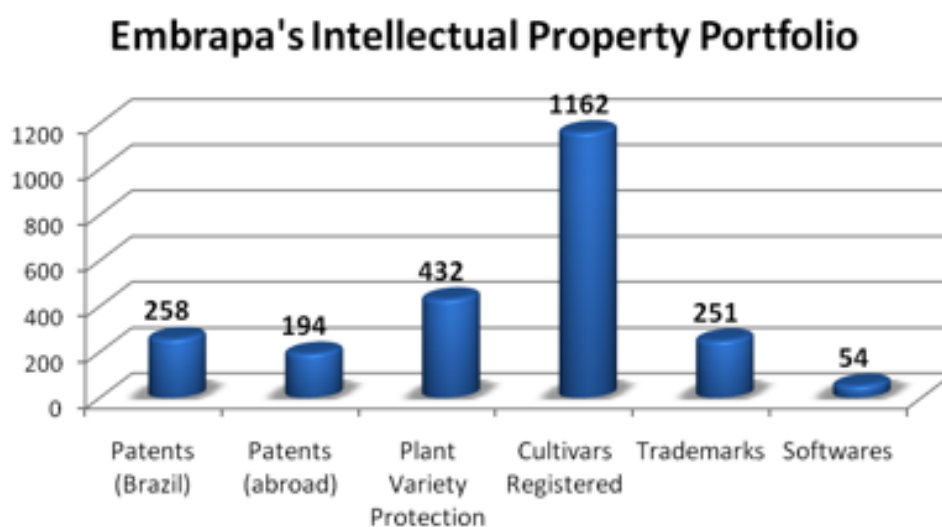
## 2. Management of Intellectual Property (IP) at Embrapa

Founded in 1973, Embrapa is the principal supplier of new technologies for Brazilian agro-business. Today, the corporation has 9,342 employees, of whom 2,282 are researchers – 35 per cent with masters’ degrees, 65 per cent with doctorates and 7 per cent with post-doctorate credentials. Its budget in 2011 was \$1.141 Billion. Its researchers work in 47 decentralized units spread across the country (there being 43 research units and four service units). Also increasingly featured are the international activities of the Corporation through the functions of its three virtual laboratories abroad: Labex America do Norte, Labex Europa and Labex Asia; and six projects active in the transference of technologies developed for tropical agriculture: four in Africa and two in the Americas. Besides this, Embrapa includes 14 business offices (ENs) and two production units (Ups) distributed throughout the country, to produce, commercialize and distribute the seeds and variety grafts it has developed.

With its mission of making viable research solutions for the development and innovation of sustainable agriculture to benefit Brazilian society, Embrapa works in the most diverse areas of agricultural research, generating knowledge, so that, since its creation, the Corporation has concerned itself with strengthening its intangible production assets and technological resources

It was at the start of 1996, with the publication of new rules relative to the protection of intellectual property in Brazil, that Embrapa adopted management criteria for these resources and activities conforming to the new legal prerogatives, with a view toward optimizing the “stimulus function” embedded in rights relative to intellectual property, and neutralizing possible threats to the social mission of Embrapa as a public-sector company.

From 1996 to 2010<sup>6</sup>, Embrapa filed for protection, in Brazil as well as abroad, 452 technologies by means of patents (there being 258 in Brazil and 194 abroad) and registered 251 trademarks and 54 software programs. In addition to this, Embrapa applied for protection of 432 varieties in its own name or in partnership with various other institutions, besides having registered 1162 varieties for commercial use thus making a total of 2351 processes managed, as shown in Figure 1.



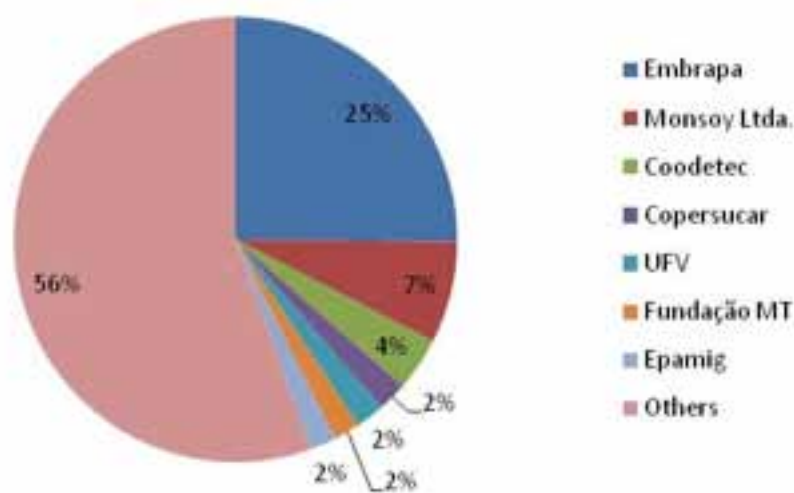
Source: Embrapa data base. December, 2010

<sup>6</sup> Data consolidated up to 2010.

One of the principal protection mechanisms used by Embrapa is the protection of varieties, which represents the only legal form of protection of plants in Brazil. For the Corporation, the seed or variety grafts represent not only a form of technology, but an entire package of technology inserted in a vector of technology transfer. It is an efficient way of transferring the result of diverse research initiatives covering different themes, beginning with the initial vector of any agricultural production.

Embrapa is the absolute leader in the number of varieties protected in Brazil (Figure 2), being the owner or co-owner of 25.1 per cent of all varieties protected by the official Brazilian Office of Protection (of the 1343 varieties protected in Brazil, 338 belong to Embrapa)<sup>7</sup>.

**Percentage of Varieties Protected in Brazil per Owner**



Source: SNPC.

The research and development (R&D) portfolio of the Corporation involves the development of projects with different varieties, which, in accordance with their commercial potential and social impact, can be classified as: (i) varieties of commercial interest (high commercial impact and a large number of users, i.e. commodities); (ii) varieties of social interest (low commercial impact and a large number of users, i.e., beans and manioc); (iii) niche research varieties (low commercial impact and low number of users, i.e. Amazon fruits) and (iv) niche market varieties (low number of users, high commercial impact, i.e., ornamentals).

For each type of varietal classification Embrapa has adopted specific IP protection with differing objectives. In the case of varieties of social interest, the protection of varieties is oriented toward recognition of the Corporation's achievements versus financial return. In the case of varieties of commercial and/or niche market interest, IP protection may function as a basic business model in the procurement of financial resources for the institution, as well as accessing protected technologies and the formation of partnerships in a cooperative environment, as with agricultural research.

<sup>7</sup> Data obtained together with Serviço Nacional de proteção de Cultivares / Ministério da Agricultura, Pecuária e Abastecimento (SNPC/MAPA).

### 3. Partnerships for Innovation at Embrapa

The conduct of cooperative research has always been characteristic of the agricultural sector. However, with the advance of the so-called “knowledge economy” and the diffusion of the IP protection system, knowledge is becoming more and more fragmented; there always being more to do in establishing a cooperative environment among the different actors possessing rights in the area of research and development, accomplished through negotiations oriented towards the establishment of partnerships for the generation of products and/or the licensing of the technologies generated. In addition, intellectual property is instrumental in financially recompensing the investments in research and development made by the company (Teece, 1986).

In this sense, Embrapa manages intellectual property in its intangible assets to make viable its business models in three forms: (i) formation of partnerships; (ii) accessing other third-party technologies; (iii) financial return on investments made by the Corporation in R&D.

In its partnership business model, Embrapa adheres to the legal prerogatives established under Brazil’s innovation legislation. These partnership agreements structure the performance of joint activities in technological and scientific research and the development of technology, products or processes; be they with public or private institutions.

One of the best examples of Embrapa’s success in the formation of these partnerships is its program of variety development and licensing: Through public/private partnerships in this area of research, substantial resources are brought in by diverse private partners in every phase of Embrapa’s innovation of varieties, from research to the sale of seeds.

The varieties developed within the framework of these partnerships are protected exclusively in the name of Embrapa, but the private partners who contribute to the generation of these varieties acquire exclusive licensing rights for a determined period of time, paying royalties for their commercialization.

To give an example of the volume of money involved in this process, in 2009, more than six million US dollars were invested by the private sector in Embrapa’s research; close to 10 million US dollars were collected in royalties and close to six million US dollars were collected from the sale of seeds by Embrapa. Transfer of technology totalled nearly 22 million US dollars among the partnerships in the generation of varieties in 2009 alone.

Moreover, these partnerships permit Embrapa to test its varieties at more than 200 test sites spread across Brazil and in at least five other countries, guaranteeing an immense variability for the adaptation of our varieties. Another strategic benefit for the Corporation is that with this business model the process of defining varieties that are to be generated by Embrapa is done by its researchers in conjunction with the technical and marketing teams of its private partners, guaranteeing that Embrapa delivers what the market really needs and wants, avoiding the risk of wasted investment.

Another of Embrapa’s business modalities made viable by the management of intellectual property has been access to third-party technologies, the best example being its partnerships in the area of biotechnology.

In the case of the biotechnology industry, the products that are generated are the result of an accumulation of inventions, where the final product is developed through the use of a series of products or processes already patented. There is a high degree of proprietary fragmentation in relation to the components necessary in bringing a product to market (Graff, 2003), such as negotiating with other companies necessary for the innovation to occur because of the difficulty in having just one company holding all the necessary knowledge.

The first successful case for the Corporation in this area was the contract for technical cooperation signed with the multinational Monsanto in 1997, giving access to technology patented by that company related to genes that confer tolerance to herbicides based on glyphosate. Following these negotiations, Embrapa gained access to technology of great interest to the Brazilian market, leading to the introduction of this patented gene in its varieties. As this partnership obtained great success, being the starting point of Embrapa's experience in this area, it went on to negotiate with other multinational companies in possession of genes of interest to the Corporation.

One of these companies was BASF. This company acquired the patent rights of a gene conferring tolerance to herbicides of the imidazolinone family from a US university and negotiated a partnership with Embrapa to introduce it in its soy varieties, using a process of transforming Leguminosae, patented by Embrapa. The result of this partnership was the generation of a new soy variety, which was introduced in a program of soy bean breeding by Embrapa with its private partners, and was also licensed to other Brazilian breeding programs. The new varieties generated within this system will be multiplied by seed producers finally reaching the market as seeds and completing the cycle of innovation projected to occur in 2012.

A third category of business modality is the use of intellectual property to obtain a return on financial investments made in the process of Embrapa's research and development. As has previously been stated, Embrapa is the leader in the number of varieties protected with the official Brazilian variety protection office, thereby being the possessor of 338 varieties, mainly cotton, corn, soy, beans, wheat, rice and sorghum.

It has succeeded in licensing these varieties to seed producers through the payment of royalties. Over time, the annual rate of royalties generated by Embrapa's protected varieties has increased from approximately 3 million Brazilian reais in 2001 to 17 million Brazilian reais to date.

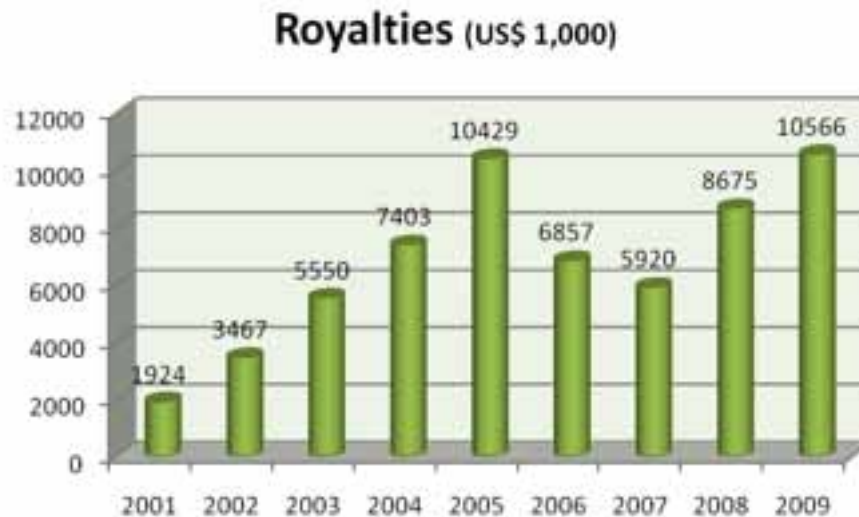


Figure 3: Volume of royalties paid to Embrapa 2001-2009

According to the report of information referencing The Policy of Intellectual Property furnished by the Brazilian Institute of Science and Technology to the Federal Government in 2010, Embrapa alone accounted for 80 per cent of the total royalties earned by these institutions during the period 2006 to 2009 (Figure 4).



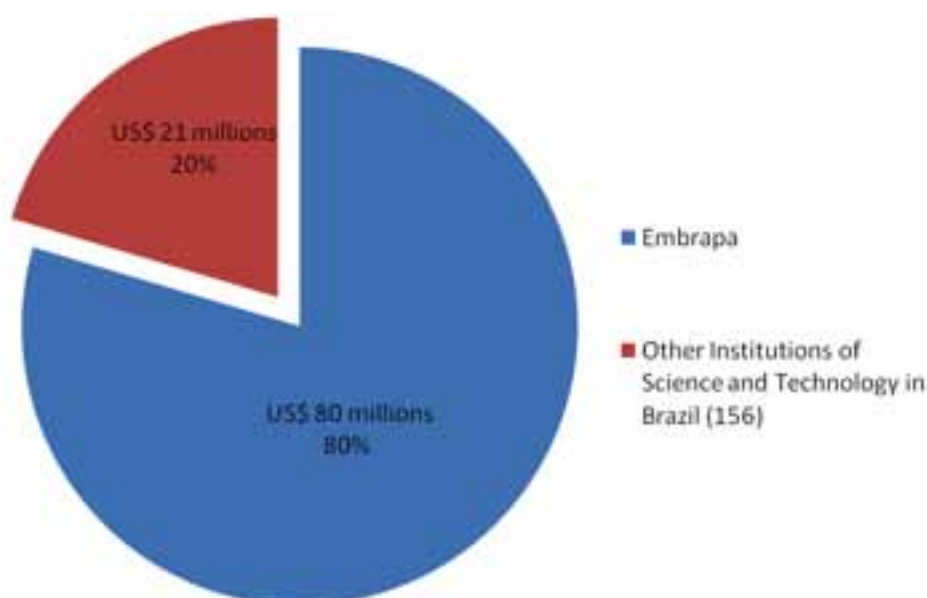


Figure 4: Volume of royalties received by Brazilian R&D public institutions such Universities and R&D centers  
Source: Pimentel, 2010

The results achieved by Embrapa are also quite significant when compared with other research centers located in developed countries. According to data from an Association of University Technology Managers (AUTM) U.S. licensing survey, the average earnings from the transfer of technology by US public research institutions is equivalent to 0.9 per cent of their budgets (Merril & Mazza, 2010). Embrapa's earnings are equivalent to 2 per cent of its budget.

#### 4. Final Considerations

The management of intellectual property within a company requires knowledge and multi-disciplinary skills, related to themes covering competitive dynamics, the structure of partnership agreements and national and international licensing; the use of technical information, analysis of freedom to operate, IP protection, technological prospecting and information security.

Embrapa is an example of a Brazilian research center that understood quite early the importance of this issue, developing a series of institutional initiatives with a view toward guaranteeing empowerment of the corporation in the use of this strategic asset. The formulation of a clear policy for the management of intellectual property with established norms, the setting-up of a coordinating structure within these policies, directly connected to the changing situation of the Corporation and the ongoing training of its employees in relation to guaranteeing the success it has achieved over the years with the results being beneficial not only to the Corporation, but also to its private partners and for Brazilian society in general has been very important.

Through public/private partnerships in Embrapa's plant breeding research, substantial resources have come from various private partners in every phase of the innovation process, from research to the purchase of seeds, and the royalties earned by this system are the result of this Brazilian public/private innovation model.

All of this has been possible thanks to the existence of the legal system for the protection of varieties in Brazil. The possibility of IP protection of breeding results obtained by Embrapa's research projects has been fundamental to the establishment of the Corporation's partnerships and to the results, as otherwise it would have been impossible to guarantee any commercial advantage for private partners and, consequently, impossible to attract investment in the R&D process of the Corporation. It would also have been impossible to obtain direct returns on investment through the charging of royalties for licensing technologies, much less negotiating commercial advantages to obtain access to third-party technologies.

Therefore, the existence of a strengthened system for the protection of varieties is strategic for Brazil, because it guarantees not only investment in research, but also because it is achieving specified objectives of national interest within a policy of socio-economic development. It was following the implementation of the system to protect varieties that our breeding programs were able to become strong and competitive, guaranteeing technological security which we provide to a globally competitive agriculture sector.

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## Use Of Plant Variety Protection By National Research Centers

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INRA has a charter on Intellectual Property (IP), which places issues concerning patents in the life sciences sector and collaboration with industries and various partners in the agronomical sector.

INRA has to adopt a policy which combines the primacy of public service and support for innovation in a constantly evolving international and bio-industrial context. As collaborative partnerships are increasing between public and private researchers in life sciences and new relationships have to be built with extension services, INRA is developing an appropriate policy on IP. By developing such a policy on IP protection, INRA expects more than just a financial gain to provide support for its efforts in favor of innovation; INRA wants to maintain its strategic ability to choose its industrial partners and to control conditions under which innovations achieved using public funds can be exploited.

INRA encourages and strongly supports the protection of new plant varieties through the use of certificates of Plant Variety Protection (PVP). The PVP certificate offers an excellent compromise between the property rights of inventors and the free use of improved materials to enable the invention of new varieties intended for commercial exploitation. It provides free access to plant material as a genetic resource for the breeding of new varieties, while at the same time ensuring a financial return for the creator of a new variety which complies with the DUS criteria of Distinctness, Uniformity and Stability. INRA will continue to support this system of protection at a European level and worldwide.

INRA strongly encourages its researchers to consider patents as a satisfactory compromise to ensure both dissemination and protection of knowledge. INRA will only apply for patents to cover gene sequences for which a definite biological function has been demonstrated experimentally.

INRA's mission is to ensure that the international scientific community benefits from genetic resources and biological material as tissue and cell cultures, while taking into account the increasing risks of inappropriate use if such materials are disseminated without sufficient care. INRA therefore strongly recommends the systematic use of a Material Transfer Agreement (MTA). In addition to ensuring satisfactory traceability of exchanges, these agreements must provide guarantees to INRA on the confidential nature of the transfer, the preservation of its ownership of the material and its ability to control the exploitation of results obtained using transferred biological material as well as being freed from any liability in the event of inappropriate use.

In the case of research projects conducted with external partners, the different parties will all contribute in terms of biological, technological, financial, human and intellectual resources. For INRA, questions concerning the ownership, dissemination and commercial exploitation of results, which must be covered by a contract, are not dealt with in the same way with public and private partners.

In the case of public partners, ownership may be predefined by framework agreements or conventions governing the creation of Joint Research Units (JRU). Joint ownership of results will be offered to the partner, if it is established that the results were obtained jointly.

In the case of industrial partners, INRA will claim full ownership of its own results, i.e. those obtained during work executed on its premises, carried out and managed by its researchers. Thus, INRA must remain the owner of results obtained, even when private-sector partners participate in the funding of its research. The latter may then benefit either from a prerogative of access to information or options for a license concerning the results as compensation for its participation.

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These principles will be illustrated through examples of collaborative projects involving private partners in practical plant breeding and involving two examples in annual crops (winter rapeseed and bread wheat) - and one in perennials (fruit trees).

Concerning winter rapeseed, since the 1960s, INRA has been directly involved in: i) increasing academic/pioneer research in the genetics of key agronomic traits (fatty acid composition, oil content, meal quality, disease resistance, cytoplasmic male sterility, dwarf genes, etc.) and ii) breeding commercial varieties protected through PVP with the aim of being the first breeder to promote new traits on the seed market: single low (zero-erucic 'Primor' in 1973) and then double low (low glucosinolate content 'Samourai' in 1989), quality, blackleg resistance ('Darmor' in 1983), hybridization system ('Synergy' in 1994), resistance to lodging (dwarf types such as 'Lutin' in 1999) and low linolenic acid content ('Basillic' in 2010). INRA rapeseed breeding was developed in collaboration with one private breeder (Serasem) from 1974 to 2005 and then with five private companies. As a second step, these INRA varieties were successfully exploited by other private European breeders to integrate the innovative traits into their commercial varieties.

Throughout this period, INRA has been very successful in developing competitive research on rapeseed genetics. This research was mainly supported by Promosol (an association grouping more than 15 companies, small and medium-sized enterprises (SMEs) and international companies like Pioneer, Monsanto, etc.). To guarantee freedom to operate for our partners, important results have been protected through patents: ogu-INRA CMS system, Bzh dwarf gene, DNA sequence of mutants for high oleic acid content, Clg1 cleistogamous gene, etc.

Of the 15 experts recognized at the international level on rapeseed, three scientists are involved in this INRA Brassica group. This demonstrates the possibility of combining competitive research activity with a breeding project, even when protecting the innovative material through PVP. The main challenge for INRA is to guarantee freedom to operate and to use results and material from our research.

Concerning bread wheat, INRA has also been involved in: i) increasing academic/pioneer research on the genetics of key agronomic traits (meal quality, disease resistance, dwarfing genes, etc.) and ii) breeding commercial varieties protected through PVP with the aim of being the first breeder to promote new traits on the seed market: the first double dwarf variety with resistance to lodging (Rht1 and Rht2 alleles in 'Courtot', registered in 1973), first stem-base disease resistance (e.g. eyespot caused by *Oculimacula yallundae* and *Oculimacula acuformis*) with Pch1, yellow rust (Yr17), brown rust (Lr37), black rust (Sr38), and cereal cyst nematode (Cre2), resistance introduced from *Aegilops ventricosa* and *Triticum carthlicum* ('Roazon' in 1977), multi-resistance and bread quality to reduce the dependence of agriculture on fungicide use ('Renan' in 1999), high-yielding hardy varieties in low input systems ('Virtuose' in 1998, 'Farandole' in 1999, 'Koreli' in 2005, 'Barok' in 2008, 'Flamenko' and 'Folklor' in 2010). These INRA varieties have been successfully exploited by other private European breeders through integration of the innovative traits in their commercial varieties. INRA bread wheat breeding was developed in collaboration with private breeders (associated in GIE Club5 and CETAC) from 1983 to 2010.

Throughout this period, INRA was very successful in developing research on wheat genetics with new opportunities in the Breed Wheat Integrated French project recently approved.

Concerning fruit trees, besides INRA, two partners are involved in releasing fruit varieties: Agri-Obtentions (AO), an INRA subsidiary, and the SARL (Ltd.) CEP-Innovation, grouping most of the French fruit tree nurserymen. A new 10-year agreement was signed in April 2008 between INRA, AO and CEP-Innovation. For different groups of countries – the European Union and Switzerland, Mediterranean countries, the rest of the world – this agreement stipulates the role of CEP-Innovation in screening, propagating and developing the new INRA fruit varieties, even in the case of a variety bred jointly with a partner other than CEP-Innovation. CEP-Innovation is now in partnership with INRA to breed new varieties of apricot (15-year contract signed in 2007) and new varieties of pear (20-year contract signed in 2008).

NOVADI was founded by CEP-Innovation in 1997, by 17 French nurserymen with the aim of developing a series of apple varieties of good eating quality, naturally resistant to the most common diseases. NOVADI is also partnering INRA in breeding new apple varieties (contract renewed in 2007 for five years). This consolidated group of nurserymen, together with certain producers and marketing organizations, formed a new company, S.A.S. POMALIA, whose main aim is to select and promote the best apple varieties from the list proposed by NOVADI. The INRA apple variety 'Ariane' was selected as the best and the first variety of a series distributed under the generic trademark 'Les Naturianes®'. The variety 'Ariane', selected during the 1990s is a 100 per cent INRA variety (DUS in 2003); the new breeding projects stipulate that the varieties which will be released will be shared equally between INRA and CEP-Innovation.

The collaboration with nurserymen for breeding and releasing new varieties led to participation of their SME, NOVADI, in European Integrated Projects devoted to disease resistance and fruit quality. These pre-competitive research projects implement the applied breeding works to meet the new challenges, such as pesticide restrictions, climate change, improvement of fruit quality for increasing consumption, etc. Recently a new European Integrated Project was approved: FruitBreedomics – an integrated approach for increasing breeding efficiency in fruit tree crops – which is particularly aimed at providing the European fruit sector with cutting-edge breeding tools to improve selection efficiency as well as superior pre-breeding material to meet grower and consumer demands. The findings will directly benefit breeders – both public and private.

In summary, such an organization involving the INRA charter on IP, including the certificates of Plant Variety Protection, is a guarantee for mutual benefits for the partners:

- the public institute INRA, has the opportunity to develop its own varieties (100 per cent owned) or co-bred varieties (50 per cent owned) in better conditions, thanks to the professional expertise of its private partner. INRA also has financial support for current fruit breeding programs within applied research contracts which stipulate the "rights and duties" of each partner. INRA could also involve a private partner (NOVADI) when answering European calls for pre-competitive research.
- the private partner has access to the pre-competitive knowledge and pre-breeding material within a framework (the applied research contract with INRA), but also within the European Integrated Projects when it is a partner. It can screen, propagate, develop and benefit from innovative new fruit varieties, particularly for bio-aggressor resistance, regularity of production and quality of the fruit. It would gain international consideration and could participate in professional debates for promoting its view on training and developing new innovative varieties.

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## SESSION 2: technology transfer by the private sector

### DSP SA, Switzerland

Mr. Wilhem Wicki,  
Responsible for Varieties Administration

#### The position of Delley Seeds and Plants Ltd in the Swiss seed branch

Delley Seeds and Plants Ltd (DSP) is a small and medium enterprise (SME) active in breeding and development within the Swiss seed branch (Fig. 1). It is owned by the Swiss seed growers, which are members of the Swiss seed growers association, Swisssem.



Fig. 1: The position of DSP within the Swiss Seed branch

The most important basic principles to comply with the duties of DSP:

- Contract with the Federal Office of Agriculture (FOAG) concerning the right of co-ownership and holding of plant breeders' rights (PBR) for varieties from the federal research stations, hereinafter called ACW/DSP varieties
- Partnership with the federal research stations Agroscope Changins-Wädenswil (ACW) and Reckenholz-Tänikon (ART)
- Co-operation with breeders and variety representatives abroad as well as close contacts and collaboration with branch organizations and private companies in the seed market

Swisssem, the Swiss seed growers association, holds 40% of the shares of DSP and the 4 major seed multipliers organizations: ASS; SEMAG; SGD; and OSP/NFW, hold the remaining 60%. The producers affiliated to the latter organizations are also members of Swisssem with about 1,500 specialized farmers.

The seed multiplier organizations obtain a license from DSP for producing and further marketing the ACW/DSP varieties. The legal framework for this lies in the Swiss law on plant variety protection, which is in accordance with the UPOV 1991 act.

#### What is DSP working on?

##### Forage crops

Switzerland, having a typical grassland agriculture, has a long tradition in breeding of fodder crops. The research station Agroscope Reckenholz-Tänikon (ART) works on a broad range of species. The breeding program is based on the genetic diversity in natural local populations. Some of the main characteristics of these varieties are valuable agronomic traits, such as high yield, resistance against pathogens, quality and persistence. DSP, as co-owner of the varieties, is responsible for their registration and marketing in Switzerland and abroad as well as for the production of basic seed.

##### Soybean

The soybean crop was introduced in Switzerland at the end of the 1980's. The research station Agroscope ACW is breeding soybean with the aim of developing varieties adapted to the climatic conditions of Switzerland and to the requirements of the market. It implies, for example, the use of the harvested products for human consumption. An example is the selection of varieties with large, uncolored grains, which result in a better flavoring profile.

DSP is co-owner of the varieties from the breeding program of Agroscope ACW and is in charge of the maintenance breeding as well as of the production of basic seed. In addition, DSP is engaged in the variety trials.

The adaptation to the climatic conditions of Switzerland was achieved by a strict selection for earliness. The early varieties are therefore also suitable for the cultivation in the nearby countries. DSP as co-owner represents the varieties from the breeding program of Agroscope ACW in Austria and France, amongst others. First trials have been carried out in the Russian Federation in 2010.

In order to broaden the genetic variability of the breeding material, crosses with later material are also carried out. Material with late maturity that arises from the crosses is not suitable for cultivation in Switzerland. However, there are regions in Europe, such as Italy and the south of France, for which this later material is climatically adapted. Therefore, Agroscope ACW, DSP and a partner in France started a project in order to evaluate this later material in those regions. A first variety from this project has already been registered in the official variety catalogue of Italy.

### Cereals

DSP is co-owner of the wheat & triticale varieties from the breeding program of the research station Agroscope Changins-Wädenswil (ACW). In this role, DSP conducts variety tests, is responsible for the maintenance breeding and is in charge of the production of basic seed. In addition, DSP accomplishes all duties in relation with the variety administration. This comprises registration in the National variety list, or the list of recommended varieties from Swissgranum, as well as the protection of intellectual property by means of plant breeders' rights.

For species for which there is no breeding activity in Switzerland, such as barley, rye and oat, DSP acts as representative in Switzerland for the majority of varieties. The same applies to wheat and triticale varieties from abroad as well as to spelt varieties from the former breeding program in Zurich, which completes the variety portfolio of the ACW varieties.

### The benefits of public-private partnership: A more detailed view on the cereal sector

Baking quality is a main goal in the wheat breeding program of the public research station Agroscope ACW, together with disease resistance and yield.

58% of the cereal area in Switzerland is planted with wheat and 78% of this area is planted with bread wheat varieties from the breeding program of ACW (Fig 2).

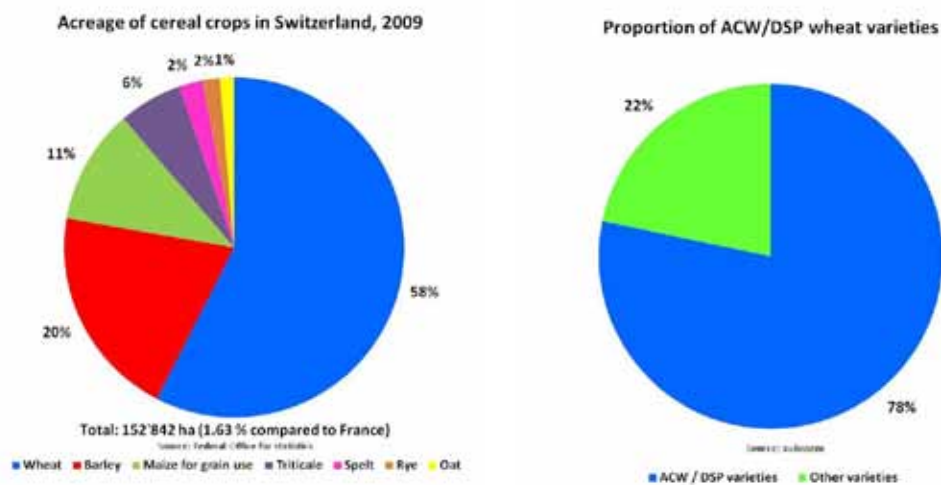


Fig 2: Acreage of cereals in Switzerland and proportion of ACW/DSP wheat varieties



The scheme of the wheat breeding program is as follows: ACW is responsible for the fundamental breeding work, i.e. crossing, selection for resistance in the early generations, first quality and yield analyses. From generation F7, the breeding material is screened at the site of ACW as well as at the site of DSP. Final selection for candidates to enter into tests for Value for Cultivation and Use (VCU) is carried out jointly with ACW and DSP at the site of Delley (Fig 3). From that point, until variety registration, further VCU tests are carried out jointly and DSP is responsible for the site in Delley. Here, in parallel to VCU, DSP starts maintenance breeding and production of pre-basic seed and also basic seed for more advanced material or varieties that are already registered. Moreover, DSP is responsible for the preparation of all seed lots for VCU testing, maintenance breeding and basic seed production.

Through this division of work, it is possible to maintain a wheat breeding program in Switzerland: neither ACW nor DSP could maintain a whole program on its own.

It is important to point out that DSP is neither producing nor marketing its varieties. The PBR system, according to the UPOV Convention, is the basis for licensing the ACW/DSP varieties and thus for collecting royalties, which is the main financial source to cover the costs of DSP relating to the services provided to the Swiss seed growers and hence for the Swiss farmers, which benefit from new, valuable varieties.

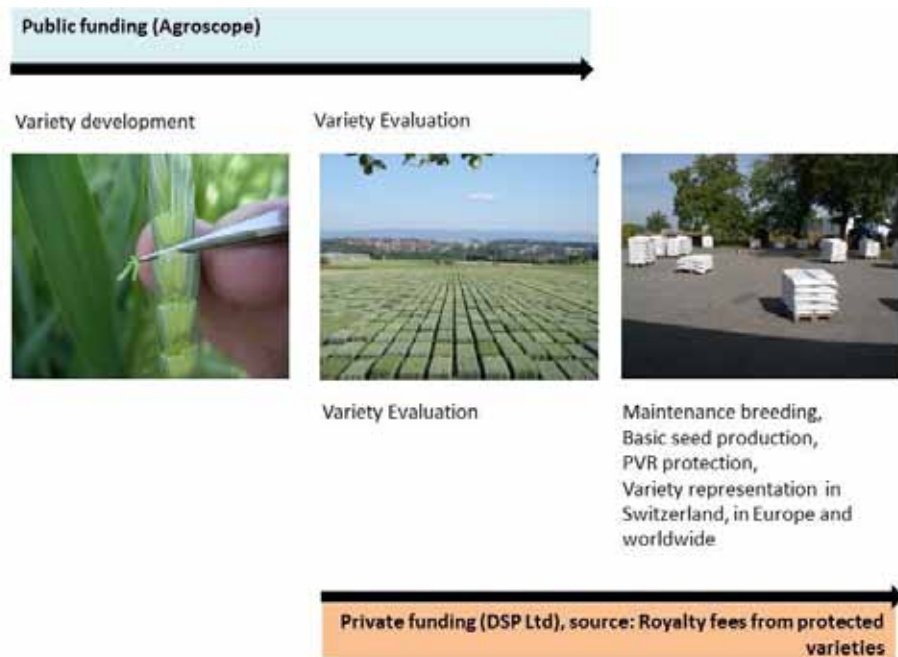


Fig 3: Scheme of the wheat breeding program in Switzerland

It is part of the duties as co-owner of the ACW-varieties to promote them abroad. For this purpose, DSP evaluates possible candidates in trial networks of breeders and representatives worldwide. After successful tests, the varieties are registered in the relevant variety lists and protected by means of plant breeders' rights. Currently, 40 varieties in 17 countries are registered (Fig. 4). Again, the considerable input is compensated by collected royalties, which are shared 50/50 between DSP and the respective partners. 15% of the royalties collected by DSP are transferred to a breeding fund. With these funds, Agroscope is entitled to carry out research projects that may support their breeding program.

### ACW/DSP wheat varieties in the world

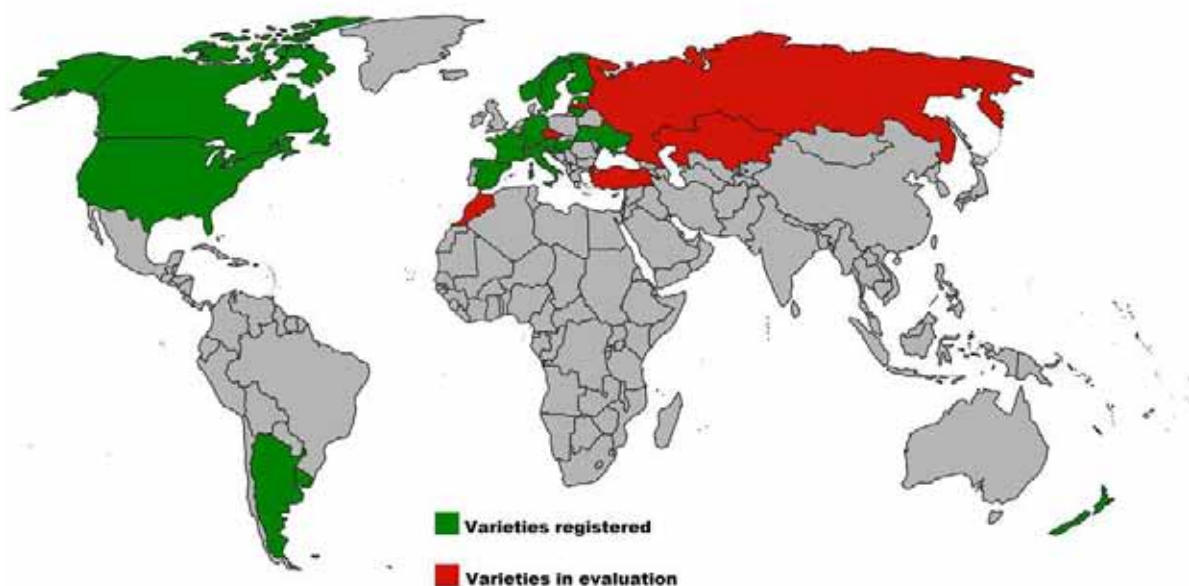


Fig 4: Dispersal of ACW/DSP wheat varieties

### Conclusion

This model of public-private partnership may be suitable to maintain, introduce or re-introduce small breeding programs for crops that are adapted to certain climatic conditions of a country, to consumer habits, to traditions or to the requirements of processors and distributors. Although the ACW/DSP wheat varieties, in terms of yield, cannot compete with high yielding wheat varieties of some major breeding companies, they comply with the market requirements of quality-conscious mills and bakeries. The share of almost 80% in the Swiss market demonstrates this point.

Such niche programs may also contribute to a sustainable agriculture. Because seed growers, i.e. farmers, participate in this model, it is a means of generating higher agricultural value.

The UPOV system is a very effective instrument to encourage such partnerships.

## Technology Transfer by the Private Sector

**Mr. Barry Barker,  
National Arable Seed Product Manager**

**Masstock Arable UK Ltd, United Kingdom**

When a new variety is brought to the market by either a public or private plant breeding organization it usually comes with a certain amount of knowledge as to its physical characteristics, its yield potential and maybe some information about its performance in different situations. It will probably have been measured against control varieties to prove that it has some benefit over varieties that a grower may know or have experience of. And that level of information may be enough to persuade the grower to plant that variety for the first time.

However, if you can provide that grower with more information about the way to manage the variety through the use of agrochemicals or fertilizers or how and where it should fit on the farm in order to provide a better financial return, then you have translated the potential of the improved genetics into a more tangible proposition for the grower. Once someone has experience of this approach then they are more likely to purchase new varieties from the same company in the future.

Masstock Arable is part of Origin Enterprises and is a supplier of advice and agricultural inputs predominantly based in the United Kingdom and Poland, but also with direct farm interests in the Ukraine and with its own research farm in the UK. The vast majority of its success is based around the service given by its 150 agronomists who regularly meet with their customers and advise them on what products to use and how to use them to get the best returns.

Masstock of course works with agrochemical manufacturers, fertilizer manufacturers and plant breeders who themselves provide the agronomists and product managers with technical information, but the vast majority of information about how best to use the products comes from our own research work. All the research work Masstock does is with protected varieties, many of which are made available to them prior to commercialization.

That work is based upon the need to look at crops as a whole, not just as individual products. So it is the interaction between the varieties/agrochemicals/fertilizers and farming practices which Masstock focuses on. As illustrated in Fig 1.



Figure 1

Varieties are the starting point and it is very important that we understand all we can about each variety in order to be able to make the most of its genetics. The information gained from the trials is used to help growers achieve better results from their crops.

For most breeders, the first objective is to create a variety that produces a yield that is an improvement on existing varieties. Very often that is verified by a limited number of trials with a common protocol. That common protocol will probably require the trials to be sown when the majority growers would sow that crop. We also know that varieties behave differently when drilled at different times, when drilled on different soil types or in different rotational positions. So whilst a variety may not be as good as the best when drilled in the main drilling window it may still represent an improvement for many growers who wish to drill part of the land either very early or very late on for one reason or another.

An example of this is where Masstock looked at winter wheat (*Triticum aestivum*) varieties coming through trials with the specific objective of identifying those that performed well from a very early sowing. This has been a practice that has been adopted by some farmers where they have large areas to plant and need to finish sowing within the optimum drilling window. Typically, varieties suited to very early drilling need to have stiff straw, good *Septoria tritici* resistance and be particularly slow to develop in the autumn. In a series of trials, Masstock identified a variety that when sown at the normal sowing time was no better than existing varieties, but in the very early drilling window it was an improvement on both well established and newer varieties. As a result of this work we have now agreed to screen varieties from this particular breeder at the very early stages of official trials in order to try and identify varieties with this characteristic, as otherwise it would be missed within the standard trialling system.

Fig 2 below shows the result of the trial and the variety

'Bantam' was shown to be the highest yielding variety when sown early. However, in United Kingdom official trials, which are mainly drilled in the main drilling window, it did not perform better than existing varieties.

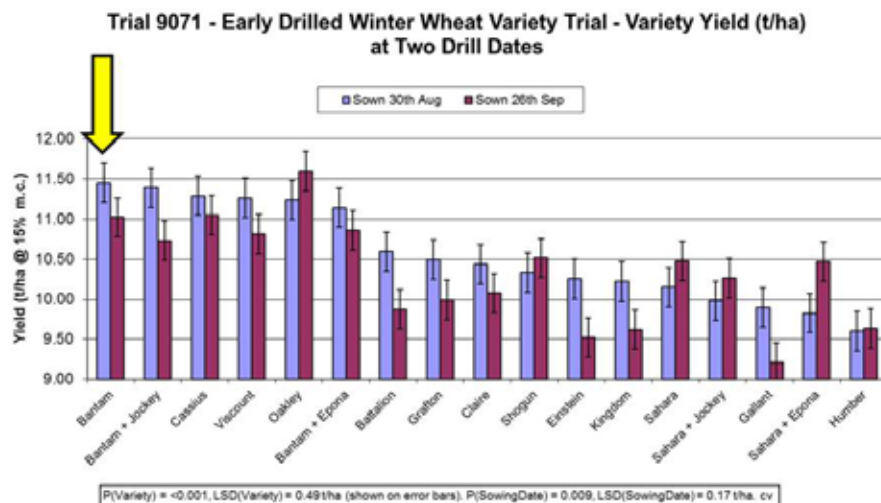


Figure 2

Another area of agronomic research which Masstock has developed is to use varieties as part of the strategy to manage resistant black-grass (*Alopecurus myosuroides*). This is a very important weed in certain parts of the United Kingdom. In Masstock trials, it was calculated that 100 ears of black-grass per m<sup>2</sup> could reduce yield by 1 tonne/ha. In the United Kingdom, the commercial product Atlantis (mesosulfuron + iodosulfuron) was introduced in 2003. By 2009, resistance had been identified in 23 regions of the United Kingdom and resistance quickly built up where there was repeated annual use of the product.

Trials were carried out to see how black-grass populations could be controlled by non-agrochemical methods. These included cultivation techniques, use of glyphosate prior to drilling, time of drilling, seed rate and variety.

From the graph below (Fig 3), it can be seen that on the farm where the black-grass trials are conducted, a typical population may be 1500 black-grass heads per m<sup>2</sup>. However, choosing the right cultivation technique, seed rate and variety etc can significantly reduce the population before applying the herbicide, which also reduces the chance of resistance occurring in the field. Varieties vary in the amount of leaf they produce in the early growth stages, and it is this that influences their ability to suppress weed growth. Fig 3 below.

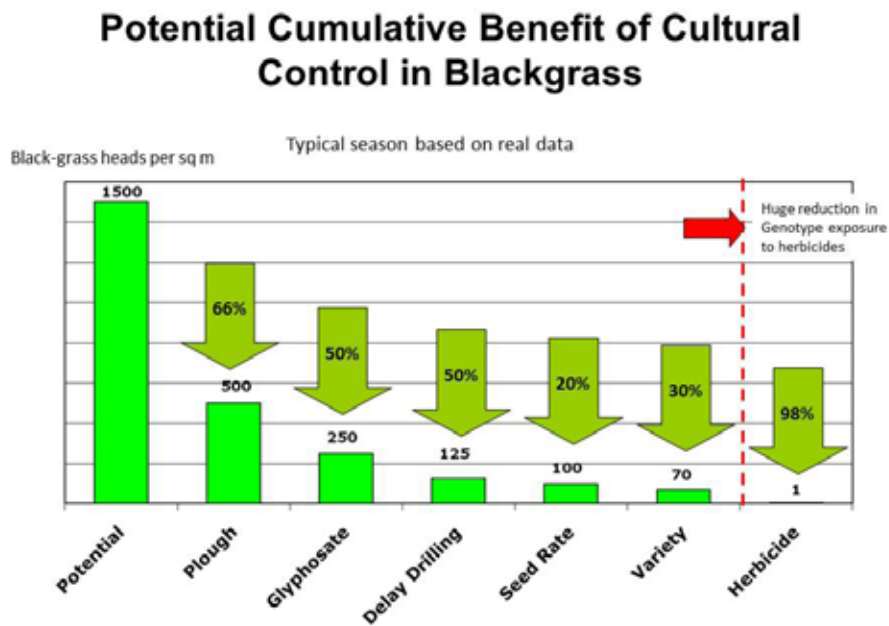


Figure 3

Masstock now screens all new varieties of winter wheat coming to the market and assesses their ability to provide early ground cover and reduce black-grass populations. Masstock agronomists then use this information when talking to growers about their cropping plan and which varieties they are considering growing in the future. The data is summarized in tables as illustrated in Fig 4 below.

### Variety Competitive Ranking vs Grassweeds - 2010 summary -

Variety	Competitive index (1 – 4 where 1=least competitive)			
Hereward, Sahara, <b>Kingdom</b> , <b>Panorama</b>				
Claire, <b>Grafton</b> , Solstice, <b>KWS Quartz</b> , <b>Gladiator</b> , <b>Cordiale</b> , <b>Duxford</b> , Ketchum, <b>Xi 19</b> , <b>Alchemy</b>				
Viscount, <b>Humber</b> , <b>Battalion</b> , <b>KWS Sterling</b> , <b>Conqueror</b> , Einstein, <b>KWS Santiago</b>				
Oakley, <b>Gallant</b> , Scout, <b>JB Diego</b> , <b>Invicta</b> , <b>Edmunds</b> , <b>Warrior</b> , <b>Robigus</b>				

Increasing competitiveness

*Italics* = New varieties so based on limited data  
**Red** = Not tolerant to CTU (Kula) or not yet tested

Figure 4

The way in which different varieties respond to Nitrogen levels has been an area of research in both winter wheat and oilseed rape for Masstock. It is well known that some winter wheat varieties produce higher protein levels than others and the work focused on how different varieties responded to different Nitrogen rates. In addition, work was carried out at two sites where the soil type was very different. One a very heavy clay soil and the other a much lighter soil type. The conclusion was that not only did wheat varieties differ in their ability to convert Nitrogen into grain protein, but in some varieties there was little point in continuing to apply Nitrogen beyond a certain level in order to achieve a higher grain protein level. However, this only applied to the light land site. At the heavy land site, protein levels continued to increase as Nitrogen levels were increased. This demonstrates the need to adopt a different approach according to both variety and soil type.

Oilseed rape (*Brassica napus*) varieties also vary in their response to Nitrogen. In this crop, Masstock focused on yield responses to different Nitrogen levels, but then looked at the yield increases in relation to the cost of the inputs. With the extremely volatile grain and fertilizer prices that have been experienced over the past few years, the price of the end crop and Nitrogen fertilizer can make a big difference as to whether a grower will get an improved financial return from increasing the rate of application of Nitrogen. Fig 5 shows three different winter oilseed rape varieties. 'DK Secure' which is a "semi dwarf" hybrid variety, characterized by its very short height. 'Castille' – a conventional (non hybrid) variety and 'Excel' – a very tall vigorous hybrid variety. The blue bars indicate the way in which the different varieties responded to the different Nitrogen rates in terms of yield. With the values for Nitrogen of £350 per tonne and £220 per tonne for the grain, it can be seen that the margin over the cost of the seed and Nitrogen does not significantly improve beyond 120kg per ha, except possibly in the case of 'DK Secure'.

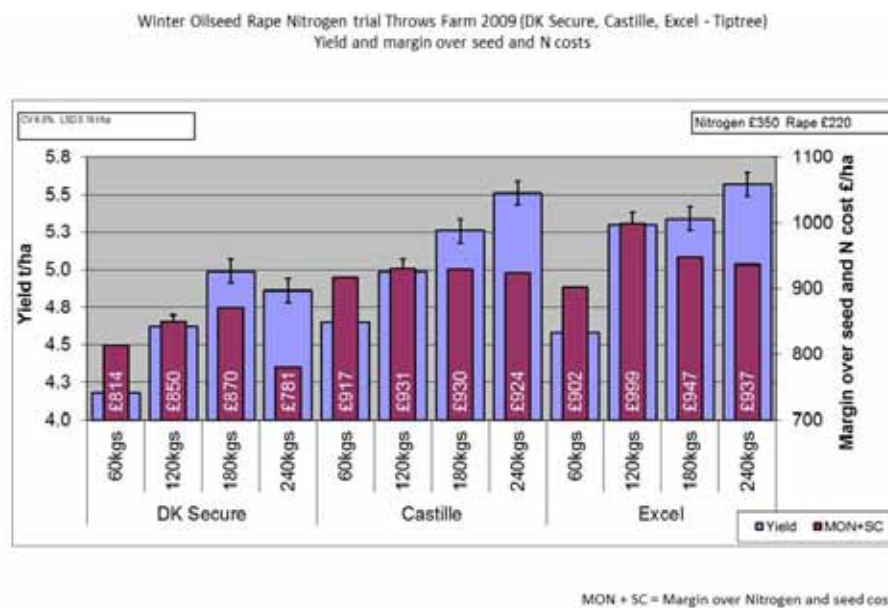


Figure 5

However, if values are changed to Nitrogen £300 per tonne and £400 per tonne for the grain (Fig 6) then the picture changes: with 'Castille', it pays to apply extra Nitrogen to the highest level, but not beyond 120kg for the hybrid 'Excel'.

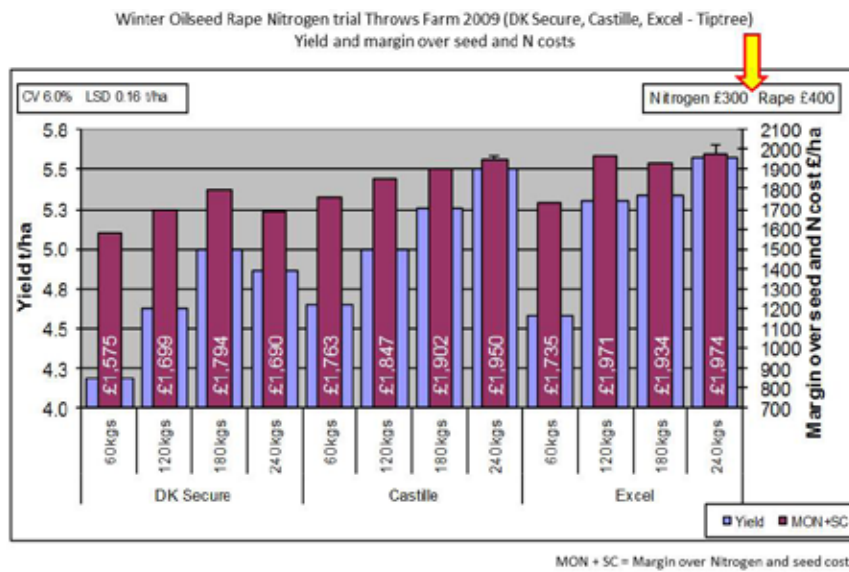


Figure 6

These research projects give an indication of how a commercial organization can add value to the genetic potential in a new variety. By looking at practical issues and considering individual varietal characteristics as one part of the whole crop management program, Masstock provides growers with advice that enables them to maximize the returns on their farms and encourages them to adopt new varieties as soon they become available.

To generate this information requires considerable investment. Masstock seeks to negotiate commercially attractive terms or preferential access to varieties from those breeders it works with. Therefore, it is essential that those varieties are protected by plant breeder's rights so that the breeder, or the agent, can control the distribution and the royalties and enable sufficient reward to attract companies such as Masstock to invest their time and money in developing the variety to its fullest potential.

Masstock has its own research and development team that are ORETO (Official Recognition of Efficacy Testing Organisations) certified. They carry out trials for official and commercial organizations and on their own behalf. Working on around 36,000 replicated plots each year and demonstrating some of the agronomic work to farmers via their SMARTfarm trial sites across the United Kingdom. It is an approach that has been very successful for both Masstock and the companies it works with.

## Technology Transfer by the Private Sector

**Mr. Diego Risso,  
Executive Director**

### Uruguayan Breeders Association (URUPOV)

Good evening, everyone. I would like to thank you for the invitation to take part in such a prestigious event and for giving me the opportunity to share Uruguay's vision in terms of plant breeding and technology transfer.

It is a great honor for me to be sitting here in this room speaking about issues related to plant breeders' rights and in particular the importance of the licensing of germplasm as a mechanism for the development and adoption of technology linked to and incorporated in the seeds of new plant varieties.

I should just like to point out Uruguay's geographical location in the world; in South America, between Argentina and Brazil.

Uruguay has a population of 3.3 million inhabitants and a total surface area of approximately 174,000 km<sup>2</sup>, almost 90 per cent of which is productive land. There are around 55,000 agricultural establishments and farms in all. As requested by UPOV, today's presentation will focus on species of forage crops, given that a large part of our gross domestic product (GDP) in Uruguay is generated by agribusiness and, in particular, activities linked to the production of meat, milk and wool.

Turning to the Uruguayan regulatory framework in terms of issues related to plant breeders' rights, Uruguay was the first South American country to accede to UPOV in accordance with the 1978 Act. You can see in red the numbers of the regulations and the Law on Seeds and what we want to highlight here is the year 2009 (slides 4+5). In that year, our law was revised and updated and, although we continue to adhere to the 1978 UPOV Convention, our revised law incorporated elements of the 1991 UPOV Act. The most important issue was the definition of the term "small farmer".

Uruguay has a solid institutional framework in terms of the issue of seeds. There is the National Seed Institute (INASE), created in 1997, which has its own establishing Act. INASE is the official body responsible for monitoring, inspecting and ensuring compliance with the regulations governing the trade in and production of seeds. The National Research Institute for Agriculture (INIA) is our main breeder at the national level, and then, at the private level, we have three seed associations which complement the actions of the aforementioned official institutes. At the international level, Uruguay is a member of UPOV, the Organisation for Economic Co-operation and Development (OECD), the International Seed Testing Association (ISTA) and the International Plant Protection Convention (IPPC). At the private level, Uruguay is a member of the following seed associations: the International Seed Federation (ISF) and the Seed Association of the Americas (SAA).

I am here today in my capacity as representative of the Plant Breeders' Association of Uruguay (URUPOV). URUPOV is a private, not-for-profit organization, with a membership made up of national and multinational companies, research institutes and individual breeders. Our main activities focus on the design and implementation of royalty-collection systems, the inspection and monitoring of the seed market, the provision of advice and support to members and communication with civil society in general and the agricultural sector in particular, with regard to issues related to plant breeders' rights.



As can be seen from the graph depicting the evolution of the number of protected varieties in Uruguay (slide 9), there has been sustained growth over the years. This is proof of a major advance in terms of the level of innovation through the incorporation of a high level of genetic varieties in Uruguay. Following Uruguay's accession to UPOV in 1994, the main quantitative leap forward (measured in the number of protected varieties) began in 1997 with the creation of the National Seed Institute (INASE). It should be pointed out here that the number of protected varieties originating from foreign breeders is on the increase (protected varieties of national origin are marked in blue on the graph, with those of foreign origin being marked in green).

Looking at a consolidated summary of the previous graph (slide 10), taking into account varieties of national and foreign origin, we can clearly see how important access to germplasm and genetic material created abroad is for Uruguay. The vital point here is the fact that this genetic material is represented by or licensed to Uruguayan companies in order to allow them to exploit licenses at the national level and even, in some cases, at the regional level (Argentina, Brazil and Paraguay). Thus, the image of Uruguay is one of a serious, reliable country in terms of respect for plant breeders' rights, owing as much to its legal framework and compliance on the part of the actors in the sector, as to respect for plant breeders' rights.

It is interesting to note that 26 per cent of protected varieties belong to the forage crop group of species, with another 26 per cent belonging to the oil crops group of species (headed by soybean).

Uruguay's main export is meat, which is a major contributor in terms of GDP of agricultural origin along with milk production and sheep (wool and meat).

Effective forage species breeding programs are essential for Uruguay, given that our main products contributing to national GDP depend on the reliable provision of feed based on such species.

As a result, the National Research Institute for Agriculture (INIA) views the strengthening of its forage species plant breeding programs as a priority. This situation has, however, also encouraged many companies to see Uruguay as a country where they can establish themselves in order to develop their genetic breeding programs, or to implement license-management programs, as a part of which varieties of foreign origin are evaluated and registered in Uruguay for production and marketing.

Finally, as a part of this introduction, the significance of the market for forage species should be highlighted in terms of its share in the total seed market, with forage crops being the most important group of species. Soybean deserves a chapter to itself, with this crop becoming one of the main contributors to GDP in Uruguay, while the dynamic way in which new genetic material has been incorporated should also be underlined.

This slide is a simple depiction of a system of which the management of plant breeders' rights and the various technology transfer mechanisms are a necessary part (slide 14). The diagram shows the process, beginning with germplasm, moving on to genetic breeding programs which transform the basic inputs (genes) into applied technology (varieties) and then on to delivery to producers.

It is at this point that each company needs to think about where it wants to participate (basic research, breeding, development, evaluation, production, marketing, etc). There are various models which combine one or more of these activities. Once this decision has been taken, companies can then define strategies linking them with third parties.

Over the last few years, research and development strategies designed to improve the plant variety market have been significantly modernized, leading to greater creativity on the part of institutions and companies when releasing varieties onto the market.

Once dominated by public varieties (commodities), the market is now sophisticated and modernized, focusing on protected varieties. These protected varieties have a high technological content, both inside the seed (germplasm and biotechnology) and around it (e.g. the treatment of seeds) and provide farmers with impressive yields in terms of quantity and quality of production. There is, however, a need for a legal intellectual property framework. A solid intellectual property framework is vital if we want to see a country develop and become competitive with regard to access to new technologies. Even though the main relevant legislation in South America is in line with the 1978 Act of the UPOV Convention, we feel that there is a need to update regulations in accordance with the 1991 Act of the UPOV Convention, in order further to promote the development of new plant varieties with greater agronomic value that will be more beneficial for farmers.

There are several distinct models operating in Uruguay with regard to genetic breeding and licensing of varieties. A number of international companies ensure the overall coordination of their breeding programs, as well as technology transfer strategies, while other companies act only at the national level through their plant breeding and variety licensing programs.

A number of international seed companies have chosen Uruguay as a base for their future expansion owing to the country's geographical location in South America and the opportunities it offers in terms of access to regional markets.

In the case of forage species, when companies seek to establish research and/or commercial links, one of the key factors to be taken into account is agro-climatic regions. On this map, the regions that are similar to Uruguay in this regard are marked in red. Consequently, many of the foreign alliances formed by Uruguayan companies involve partners in those regions.

Therefore, once alliances or cooperation agreements concerning genetic breeding have been established, companies must set up various mechanisms in order to ensure delivery of the technology developed to the end user (the farmer). This diagram (slides 18+19) sets out the amount of time each stage takes, with the longest stage being that of the development of new varieties (over 10 years). During these "early" stages, companies must define the objectives of their breeding programs and the partners with whom they need to develop links (e.g. universities, research centers, individual breeders, seed companies and companies providing biotechnology).

Strategic alliances will be formed depending on the level of innovation and added value to be incorporated. However, it is always important to take into account the fact that the technology developed and incorporated in seeds must eventually end up in the hands of the producers; strategic partners – the seed companies – are therefore vital.

Experience shows us that the more added value we wish to incorporate, the more time is required. This means more resources and, in order to recoup this investment, it is necessary and indeed, I would say, essential, to manage plant breeders' rights properly, as well as to make appropriate use of licenses and agreements.

This is a very basic point but it should never be forgotten that, when a company identifies a variety with market potential, the first thing it should do is to protect that variety. The company holding the plant breeders' rights may then choose how to manage its genetic material through the use of licenses. There is a range of licenses to choose from, including:

- research and development licenses;
- production licenses;
- marketing licenses;
- a combination of the above;
- other.

Licenses should serve as a tool to facilitate the development of and access to new plant varieties, thus developing the market and production.

There are many types of license, these documents being drafted on a case-by-case basis, depending on the objectives of each of the parties. It is under these agreements, however, that the rights and obligations of the parties are established, along with the technical, production and economic aspects.

There are various types of interaction possible when establishing alliances: public-private, public-public, private-private, involving actors with different interests. Those interests must be reflected in those licenses. As will be pointed out later on, the interests involved may be technical, economic or, in the case of the involvement of research institutes, official. There may also be political interests at stake.

The appropriate use of plant breeders' rights will contribute to the strengthening of technology transfer, with enforcement of those rights being central to this process. It is therefore recommended to address any aspects linked to enforcement in the agreements signed.

Plant breeders' rights are essential and necessary if companies and research institutes are to establish sustained breeding programs that can provide competitive varieties for the market.

However, proper enforcement of these rights is also necessary. As I said earlier on, I am here in my capacity as representative of the Plant Breeders' Association of Uruguay (URUPOV). One of the messages we always try to get across is that enforcement of rights must be undertaken both by the breeders and by the official institutes. This is undoubtedly one area in which both parties (industry and government) have a responsibility and must work together in order to ensure that any action they take is effective. Such joint enforcement could, in fact, be described as another type of public-private alliance.

Over the years, both the management of plant breeders' rights and technology transfer strategies have become more complicated. Slide 24 is a diagram of the various stages involved, from breeding to adoption. It is clear that what is currently required is a team of specialists in these areas with the capacity to draw up licenses/agreements that are favorable for the parties, while always taking into account market demands.

When we were invited to give this presentation, we were told that it was important to give examples of licensing in Uruguay encompassing the official sector. Given that in Uruguay, the main breeder is INIA and that its breeding programs and varieties are spreading across South America, we believe it would be interesting to share some of the Institute's strategies with you. The INIA's Board of Directors is made up of the executive (Government) and the producers. In turn, the two sectors are funded equally (50 per cent each). These questions were penned by the research institute rather than by me and are those addressed by INIA prior to the release of a variety onto the market. They were brought to my attention by the agronomist engineer José Silva (INIA's Technological Links Manager).

Although all of the questions included on this slide are important, I should like to highlight three which provide food for thought when looking at research institutes:

The first question is: how to transfer such technology from a public institution perspective? That is to say, how can such an institution both comply with the mandates entrusted to it by its statutes and be competitive on the market?

How are the economic benefits shared out? That is to say, when, on the one hand, you have an official institute and, on the other, you have a counterpart within the context of a private license, the role that each party is to play must be clearly established, along with arrangements concerning the distribution of any benefits derived from the license.

Finally, from an official institute perspective, how can such bodies contribute to improving social welfare through their breeding programs? This is therefore a major objective, but it also has to be made clear that, once operating in the market, we will have to compete with the other actors and it is therefore vital to set out clear strategies from the start.

Once they have bred new and competitive plant varieties, companies must reflect on the process to be followed in order to ensure market delivery and the adoption of their varieties by farmers.

In short, "How can we deliver to the end consumer?" INIA has also allowed us to share this example with you. As this diagram shows, there are key points that INIA works to address and analyze. I should like to highlight the points marked in yellow, the first point being to protect varieties (INIA now protects 100 per cent of the varieties it launches onto the market). Once a variety is protected, INIA establishes its royalty collection policy. Royalties are not necessarily collected for all protected varieties. There are a number of concrete examples in which it was decided to release protected varieties for the benefit of small farmers without royalties being collected, although licenses were set up to regulate the use of those varieties. This regulation is designed to maintain the genetic identity and quality of the seeds.

The terms of licenses are fundamental in guaranteeing that the varieties developed end up being marketed. In the case of the INIA in Uruguay, rather than selling seeds directly to farmers, the Institute sells the first generation for propagation and subsequent marketing to third companies. This approach is employed in tandem with the rigorous use of licenses in a way that is beneficial to all the parties and that ensures that the technology developed is delivered to the producers.

I should like to cite a few specific examples of licensing. As I said, INIA as an institution has links with national and foreign counterpart institutes, breeders, seed companies and biotechnology providers. Action is taken depending on where INIA wishes to position itself with regard to the breeding and stabilization of varieties. The most important point here is that efforts are made to try to guarantee market delivery of the technology developed.

The example of licensing in the case of forage crops: INIA has an early partnership agreement. What does this mean? The Institute works with seed companies throughout the various stages of genetic breeding, maintaining joint breeding programs and guaranteeing that the best material possible is available. The companies involved in these early alliances are then granted exclusive licenses for that material. Turning to this morning's Grasslanz presentation, we have a concrete example right there - INIA has links with New Zealand, carrying out joint breeding activities and producing joint varieties with the New Zealand company PGG Wrightson, which has its South American base in Uruguay. Interaction is carried out in coordination with the licenses issued in order to ensure market delivery of the best varieties.

A similar example is that of wheat. INIA has formed an early alliance with cooperatives which are administered and funded by agricultural producers. These producers' cooperatives participate in the early stages of breeding and selection of varieties together with INIA, as well as propagating and marketing the varieties protected and released by INIA.

Another type of license is direct licenses that the INIA can develop concerning its own breeding program, the strategy here being to use a tender process. This means that INIA can set its own conditions and terms of reference with regard to the marketing of its varieties. Licenses may be exclusive (a single company commercially exploiting the variety) or non-exclusive (more than one company) and may be national or regional in scope. Once granted, such licenses are registered with the Plant Breeders' Association of Uruguay (URUPOV) and are developed commercially.

The marketing strategy for barley and rice is different. In Uruguay we have what we call closed production and marketing circuits between the mills and the producers, with INIA taking on a very important role for Uruguayan varieties of barley and rice. Here INIA has sought to form consortia which integrate the entire industry, in order to be able to release varieties to consortium members. In this case, licenses are a fundamental tool for the development of varieties.

Finally, I should like to share some thoughts, which can be summed up by using the term "co-existence".

There are many, rather than just one, licensing models and they all co-exist. When trying to obtain germplasm and to carry out the process of breeding and releasing varieties onto the market, it is important to have clear objectives. These objectives depend on where we are positioned in the chain and we need to bear in mind the fact that the appropriate use of plant breeders' rights through the use of licenses and the enforcement of those rights will lead to the generation of technology that will be quickly adopted.

Thank you very much.

## Technology Transfer by the Private Sector

**Mr. Evans Sikinyi, Kenya**

### Role of the Private Sector in Kenya

Briefly I will just outline to you the role of the private seed sector in promoting technology transfer in Kenya and I will look at the role of agriculture technology development and transfer in the past and present and then make some recommendations.

Kenya has a total land surface of 58 million hectares of which only 11 million receives adequate rainfall, because most of the agriculture in Kenya is rain fed. Of these 11 million hectares only 7 million hectares are actually in agricultural production, which means that there is still some potential for increased agricultural production.

Agriculture directly contributes 26% to the gross national product of Kenya, however there is also an indirect contribution of 27% through links with manufacturing, transport and related services. Overall 60% of export earnings come from agriculture – this shows how important the agricultural sector is to Kenya.

We face several challenges: one of these is the population increase. In 1970 the population of Kenya was 20 million – this has increased to 42 million today. This means we have to increase food productivity, which may also require us to expand into the rest of the land that is not yet in productive agriculture, which means that we have to come up with technologies that will enable us to do this. Unfortunately we have unpredictable weather patterns, which leads regularly to crop failures, which means that we need new crops, appropriate varieties and production technologies to be able to meet the challenges of this unpredictable climate. In all these areas we require private-public partnerships in order to move forward.

Another challenge that we face which comes with increased population is employment. Kenya is agriculturally based, so agriculture is a major employer, but we need to diversify in the kind of crops that are grown to be able to employ the labor that we have. Looking at agriculture, and specially horticulture, it is one of those sectors of agriculture that is very labor intensive. Presently horticulture employs directly some 2 million people, with 3.5 million indirectly associated with related activities. This is why I will specifically talk about horticulture, because it is one of the most successful activities in the country, where the private sector has had a large role to play.

When it comes to production, inputs have been touched on by a number of speakers. We find that the identification of appropriate varieties and then quality of the seed of the appropriate varieties is a key component in the production of food. This is the area where the private sector is of most importance, because it is the private sector that produces seed and it is the private sector that is also involved in variety development. However, we also have one limiting factor in terms of fertilizers and other inputs where the government or the public sector plays a big role. We have to have these close partnerships for us to move forwards.

### What has been the role of the public sector in technology development?

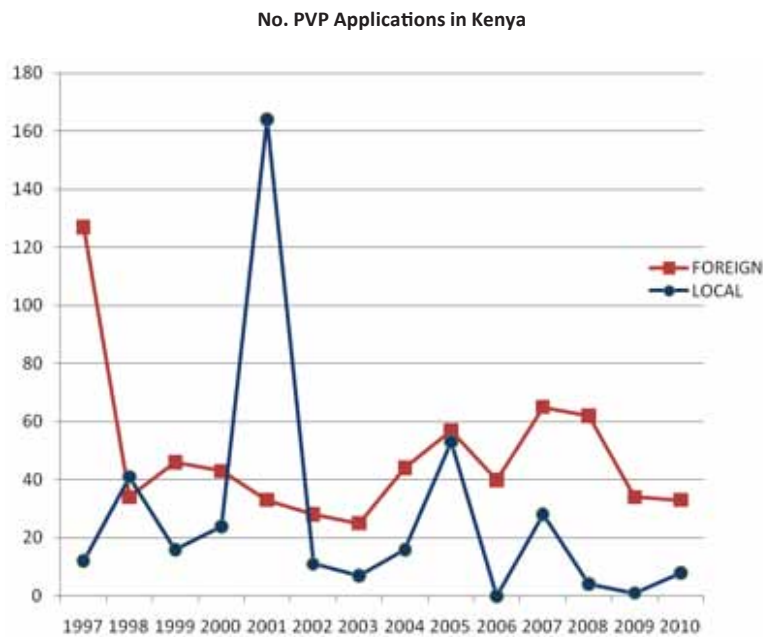
In the past, most variety development has been carried out by the public sector and these technologies were disseminated through specialized public organs. For instance, previously the Kenya Agricultural Research Institute (KARI) used to develop varieties which were then passed to the Kenyan Seed Company, which was also a government organ, to bulk up and distribute to farmers. However, due to reduced public funding for research, there is less research money for these organizations, so the strategy has had to be changed. One of the things that the government did was to set up research foundations to fund research in some commodity crops, for example tea, coffee, pyrethrum and, for a while, some of these commodity crops were successful – Kenya has been one of the leading producers in some of these crops because of that arrangement where the private sector farmers were able to fund research to feed into new varieties that were produced. Similarly, public institutions such as

KARI and the Universities have had no choice but to collaborate with the private sector in terms of research, in terms of licensing of technology so that some of the money is now being ploughed back into the institutions to assist in research.

The Government also found it necessary to develop some authorities to support commodities. Looking once again at the horticultural sector, earlier on in the late 1970s and early 1980s, the Kenyan government developed the Horticultural Development Authority, whose role was to give information on marketing and also to train farmers and to assist with production and export of agricultural crops. In the same vein, they also created incentives in terms of tax rebates, free inspection by the government, etc. so that the private sector was encouraged to participate and invest in the horticultural industry and hence we see some of the positive results that you have seen.

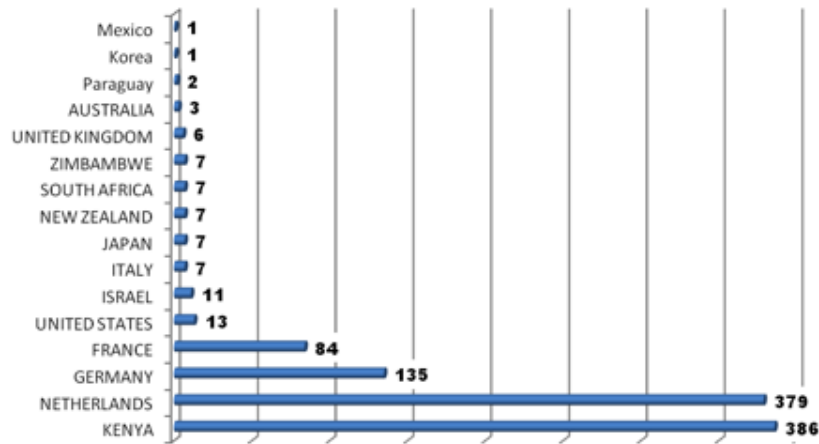
#### What is the current situation in Kenya?

The private sector has invested in breeding. Similarly, the private sector has been able to access public varieties, the ones that are bred by public institutions, I know this was after a lot of lobbying from the private sector for the public institutions to make some of this germplasm available to the private sector and things are improving. We have had a lot of collaboration between public and private sectors in funding and prioritizing – because previously research was done for purposes of publications, but now we are prioritizing what kind of research the private sector requires. This also helps when it comes to technology transfer because the research was seen as helping the user. These are just some of the examples. Within the last 20 years, the number of seed companies, which are mainly private, has increased from 13 to 83.



If we look at the PVP applications, we find that most of the foreign applications are by the private sector, whereas the local applications are mainly from the public sector. Looking at the origin of the applications, the majority is from Kenya.

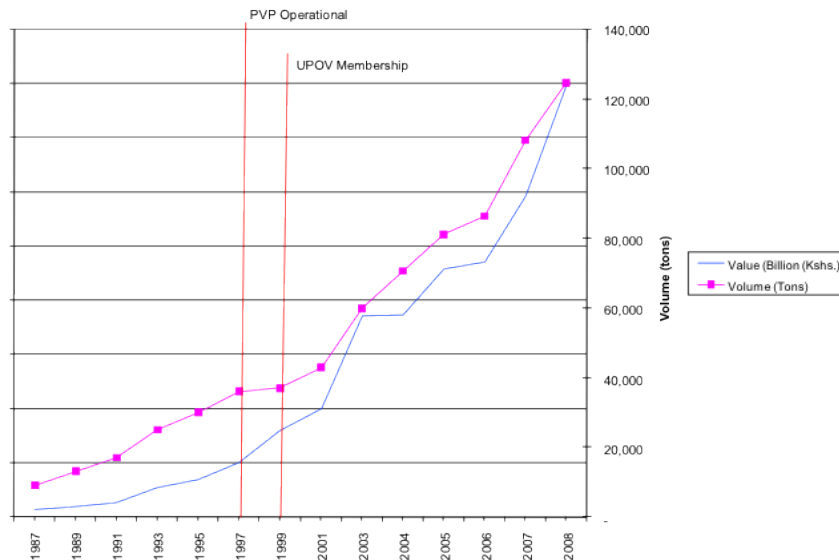
Country source of PVP applications



The Kenyan applications are mainly either food crops or agricultural crops, whereas if you look at the foreign applications, these are mainly in the horticultural or floricultural industry.

When you look at local food and agricultural production, we find that we have had a lot of varieties that have been released in maize, which is a major staple crop, and unfortunately, this is one area that we have to work together with the public sector. For example, in maize, we almost 160 varieties released, but there are only 30 varieties that are actually in production right now. This is where the private sector needs to come and lift this material from the shelves and get it to the consumer.

Figure 2: Export of Kenyan Cut Flowers



Looking at another example from a presentation that we had for the World Seed Conference in 2011, if we look at the horticultural sector, we see that volume has increased over time – the volume of what is exported has increased gradually, particularly after Kenya acceded to UPOV and also once plant variety protection became operational. However, what is also noticeable is that when it comes to value, the value has increased at a higher rate, to the extent that at the moment the value we have reached is over 60 billion Kenyan shillings from horticultural exports.

This only shows that because there has been a lot of private sector involvement, it means that we also have high value varieties that are available. There are low volumes, but they have higher value.



### **What has been the role of the private sector?**

The private sector has invested in breeding and infrastructure. There have been partnerships locally and internationally developed between the private and public sectors. We have had multiplication and bulking sites established in Kenya, both by foreign and domestic breeding companies. We have the introduction of new technologies, where we are finding that sometimes the private sector is breeding in Kenya and sending some of the breeding materials to other countries and then, even within the floriculture industry, we have an association of breeders whom we are trying to get into the Seed Trade Association of Kenya (STAK) at one point or another.

### **Seed Trade Association of Kenya (STAK)**

This is an Association of registered seed companies and operated on a voluntary basis, but now it has a Secretariat, with more than 30 members, it accounts for over 90% of all formal seed sold in Kenya and its role is to promote and support efficient production and trade in quality seed in the Kenyan region and internationally. One of the ways it does this is via policy, legislation and regulatory structures, so STAK does advocacy in these areas. It does capacity building for seed companies and distributors, sellers and farmers. It promotes ethical practice by members and also promotes regional seed trade.

There are key areas that have been found to impede seed movement – we are talking of technology movement. These were particularly of a regulatory nature: variety evaluation and release and registration, seed certification, phytosanitary measures, plant variety protection and import/export documentation. So the private sector and the public sector cooperated, to bring about a review of the national laws. In fact one aspect that I can highlight is the participation of the private sector in seed certification. We have also reviewed the law so that we are now compliant with UPOV 1991 Act, even though we have been operating under the 1978 Act of the UPOV Convention. We have the national seed policy in place which is being launched and we already have the variety testing and release regulations in place.

Regionally, we are working on harmonization within the Eastern African region dealing with 10 countries and also under Common Market for Eastern and Southern Africa (COMESA), which covers 19 countries, we are in the process of encouraging that harmonization. The private sector has played a big role in sourcing funds to assist, together with the Government, to push this process forward.

### **Conclusion**

The private sector has a major role to play. It has a role in technology transfer. The private sector has a big role in collaborating with the public sector – however, we need facilitation in terms of legislation and incentives for us to move forward. So how can we attain this objective? We believe that harmonization will improve trade within the region. We are working on requesting the authorities as we negotiate for the private sector to be more involved in decision making on technology transfer and use. For example, sometimes it is necessary to have subsidy programs within the region. If this is done individually by the public sector, you often find that technologies they choose and the people they target may not be those able to promote technology transfer. We have examples where all the seed companies are allowed to provide the technology that is available to be accessible to those who are getting subsidies and in one or two countries, this has proved to work very well and we are working in this area.

Certification by the private sector would assist in efficiency. Sometimes the official regulator is under a lot of pressure to be able to meet the requirements and we are still pushing for more access to public technologies. One area that we are hoping will work is that all the associations in the agricultural area are going to form a federation, hoping that in this way we will have a louder voice to push forward our agenda.

## SESSION 3: International Research Centers

### Perspective of the Consultative Group of International Agricultural Research Centers (CGIAR) Consortium

**Mr. Lloyd Le Page,  
Chief Executive Officer, CGIAR Consortium**

It is my pleasure to be here with you today at the invitation of UPOV. We certainly appreciate the ongoing relationships between UPOV and the CGIAR, we look forward to enhancing this relationship in the future.

While most of you are no doubt already aware of the CGIAR, I would like to take this opportunity brief you on “who are we”, and “where we are”. The CGIAR, which is celebrating its 40<sup>th</sup> anniversary this year, recently went through a reform process and the CGIAR Consortium was formed in April 2010 as part of that process. The Consortium is made up of 15 international agricultural research centers that operate in over 150 locations world-wide. The Consortium, which unites the Centers under a single international organization, aims to strengthen collaboration between these different centers for greater research efficiency and development impact:

The Centers are:

- Africa Rice Center
- Bioversity International
- CIAT - Centro Internacional de Agricultura Tropical
- CIFOR - Center for International Forestry Research
- CIMMYT - Centro Internacional de Mejoramiento de Maiz y Trigo
- CIP - Centro Internacional de la Papa
- ICARDA - International Center for Agricultural Research in the Dry Areas
- ICRISAT - International Crops Research Institute for the Semi-Arid Tropics
- IFPRI - International Food Policy Research Institute
- IITA - International Institute of Tropical Agriculture
- ILRI - International Livestock Research Institute
- IRRI - International Rice Research Institute
- IWMI - International Water Management Institute
- World Agroforestry Centre (ICRAF)
- WorldFish Center

Today, we are faced with rising and volatile food prices caused by increasing demands for food, feed, fuel and fiber. All of these increase pressure on land and natural resources and threaten the world’s most vulnerable populations. We are also faced with threats from climate change and from the potential impact it has on food supply. In addition, we are confronted with instability, both in terms of political situations but also due to urbanization and rising costs of fuel and the resulting impact on food demands and prices.

The CGIAR vision today is to reduce hunger and poverty, to improve human health and nutrition, and enhance ecosystem resilience, which I think are key areas that we need to focus on. Not only do we need to increase food supply, we need to do it in such a way that does not jeopardize human and ecosystem health, nor future food production.

## Our Vision

**Task :** ① To reduce poverty and hunger, ② improve human health and nutrition, and ③ enhance ecosystem resilience



**How:**

- high-quality international agricultural research
- partnership and leadership

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CGIAR 40  
Years CGIAR

We are executing our vision through our new set of CGIAR research programs, our main mechanism for planning and conducting research. The CGIAR Research Programs (CRPs) are built on 3 core principles.

1. Their impact on system level outcomes (SLOs): These are: a) reducing world poverty; b) improving food security; c) enhanced nutrition and health; and d) sustainable management of natural resources. Through this, growth in agriculture, achieved through improved productivity and better developed markets, further contributes to reducing poverty. The CGIAR is also encouraging small and medium enterprises to develop and partner with us. Increasing global and regional supplies of key staples will buffer price rises and volatility that can make food unaffordable for millions of urban and world poor. Improved crop varieties and diversified production systems can provide nutrients often lacking from the diets of the poor, particularly women and children. Sustainably managed natural resources are essential for both food production and the provision of eco-system services to and by the poor, particularly in the light of climate change. We also want to highlight the role of women in agriculture and in research.
2. Integration: we are striving to get better integration across the CGIAR core competencies.
3. At all stages, we are encouraging appropriate partnerships through research and development. This does not only apply to research, but also to the development aspects.

## CGIAR Research Programs

**Main organizational mechanism for planning and conducting research**

**Built on three core principles**

- **Impact on system-level outcomes**
  - *reduced rural poverty*
  - *improved food security*
  - *improved nutrition and health*
  - *sustainably managed natural resources*
- **Integration across CGIAR core competencies**
- **Appropriate partnerships at all stages of R&D**

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I would like to highlight the 15 research programs that we have put together. In total, these programs come to an annual budget for 2011 of \$ 790 million. We are pleased that out of these 15 proposals that have been developed, 5 have already been approved by the CGIAR Fund<sup>9</sup>. In addition to these programs, we also have developed a proposal for preserving gene banks to ensure that we are securing not only the short and medium term needs of the CGIAR and the world’s agriculture, but also the long term needs.

Each CRP sets out expected outcomes, clearly defines risks and assumptions and clearly identifies verifiable targets and indicators. This is the first time that we have had a common strategy across all 15 centers. We are working through coherence across CRP’s, with shared goals and objectives focusing on agricultural research for development.

## CGIAR Research Programs

Title	Lead Center
Integrated agricultural production systems for the poor and vulnerable in dry areas	International Center for Agricultural Research in the Dry Areas (ICARDA)
Integrated systems for the humid tropics	International Institute of Tropical Agriculture (IITA)
Harnessing the development potential of aquatic agricultural systems for the poor and vulnerable	WorldFish Center
Policies, institutions and markets to strengthen food security and incomes for the rural poor	International Food Policy Research Institute (IFPRI)
WHEAT – Global alliance for improving food security and the livelihoods of the resource-poor in the developing world	International Maize and Wheat Improvement Center (CIMMYT)
MAIZE – Global alliance for improving food security and the livelihoods of the resource-poor in the developing world	CIMMYT
GRISP – a global rice science partnership	International Rice Research Institute (IRRI)

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9 As of September 2011, 11 proposals have been approved

## CGIAR Research Programs

Title	Lead Center
Roots, tubers and bananas for food security and income	International Potato Center (CIP)
Grain Legumes – enhanced food and feed security, nutritional balance, economic growth and soil health for smallholder farmers	International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)
Dryland cereals: food security, better health and economic growth for the world's most vulnerable poor	ICRISAT
More meat, milk and fish by and for the poor	International Livestock Research Institute (ILRI)
Agriculture for improved nutrition and health	IFPRI
Water, land and ecosystems	International Water Management Institute (IWMI)
Forests, trees and agroforestry	Center for International Forestry Research (CIFOR)
Climate change, agriculture and food security	International Center for Tropical Agriculture (CIAT)

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I would also like to brief you on our intellectual asset management, a work still very much in progress. The Consortium and its members regard results and outputs of our research and development activities as goods for the public at large, otherwise known as international public goods. We are committed to their widespread diffusion and use, and we seek to achieve maximum possible access, scale and scope of impact from them. These are to be provided for the benefit of the poor, especially for farmers in developing countries.

## Intellectual Assets and the Consortium

**The Consortium and its member Centers regard results and outputs of our research and development activities as goods for the public at large (IPGs)**

- committed to their widespread diffusion and use
- seek to achieve maximum possible access, scale and scope of impact from them
- for the benefit of the poor, especially farmers in developing countries;

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When we look at these goals, we must highlight the need for ongoing partnership. We realized in the past that open access does not equal widespread dissemination or use, and it is only through partnerships downstream that we can encourage the uptake of the innovations that our research has provided.

## Observations

- Open access ≠ widespread dissemination or use
- Many new varieties developed, but varying degrees of uptake by farmers and companies
- Ensuring more reliable supply of seed requires multiple types of seed supply, especially in remote areas
  - private sector and formal systems
  - farmer/community based, informal seed systems
- PVP provides incentives for breeders, local seed entrepreneurs and producers

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Many new varieties have been developed, but there have been varying degrees of uptake by farmers and companies. Ultimately, our beneficiaries- the farmers -need to have access to the varieties and new innovations that are being developed. In order to do this, we need to be able to partner more effectively. Ensuring a more reliable supply of seeds requires multiple types of seed supply, especially in remote areas. This can be achieved through private sector and formal systems, as we are discussing here today, but also through farmer- and community-based informal seed systems, particularly in remote areas. We believe that plant variety protection (PVP) provides incentives for breeders, local seed entrepreneurs and for producers to take the innovation of the research and to transfer it to the farmers that need it.

To achieve the CGIAR mission, partnerships are essential. The CGIAR has a wide range of partnerships: farmers, national agricultural research systems, advanced research institutes, civil society organizations, government, national, regional and international organizations and the private sector, both small/medium and large private sector companies. I would recall that farmers are the first step in the private sector chain. They also are looking to make money out of their production.

## Essential Role of Partnerships

- **To achieve the CGIAR mission, partnerships are essential.**
  - The CGIAR has a wide range of partners
  - Farmers, national agricultural research systems, advanced research institutes, civil society organizations, governments, national, regional and international organizations and the private sector
- **Partnership needed to ensure**
  - access to the best knowledge and innovation
  - harness efficiencies in product development
  - achieve maximum impact through effective delivery and deployment of research outputs to target resource-poor farmers
  - such partnerships may require incentives that must be innovatively designed, carefully managed and diligently monitored
- **We recognize the indispensable role of farmers, agricultural professionals and scientists in breeding and conserving genetic resources**

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Partnerships are needed to ensure access to the best knowledge and innovation, to harness the efficiencies in product development, to achieve maximum impact through effective delivery and deployment of research outputs to target resource-poor farmers. These partnerships may require incentives that must be innovatively designed, carefully managed and diligently monitored. Again, we recognize the indispensable role of farmers, agricultural professionals and scientists in breeding and conserving genetic resources.

More effective partnerships equal more impact and that is our goal - partners in research and development, partners in development as well as partners in dissemination.

Let us review some key principles that we consider in our intellectual assets: Firstly, we are committed to managing intellectual assets in ways that fully support the CGIAR mission. We are committed to maximizing their global accessibility and ensuring that they lead to the broadest possible impact on target beneficiaries. We shall not impose or allow conditions that restrict global availability of the intellectual assets produced by members, unless these are necessary for their further improvement and/or to enhance the scale or scope of the impact on target beneficiaries at that point and time. We support the general principle of non-exclusive access, but in those cases where there may be some exceptions, we limit those exceptions as much as possible in duration, in territory and/or in field of use. In all cases, those exceptions remain available for research and development in developing countries, as well as for the NARs in support of the CGIAR Mission. We support the sound stewardship and IP management in accordance with all applicable national and international laws. We are bound by the principles of integrity, fairness, equity, responsibility and accountability, wherever these operate.

**Some key principles we consider on our intellectual assets**

- Committed to managing intellectual assets in ways that fully support the CGIAR Mission**
- Committed to maximizing their global accessibility and ensuring they lead to the broadest possible impact on target beneficiaries**
- Shall not impose or allow conditions that restrict global availability of the intellectual assets produced by members**  
unless necessary for further improvement and/or to enhance the scale or scope of impact on target beneficiaries
- Support general principle of non-exclusive access**  
exceptions, if justified, are limited as possible in duration, territory and/or field of use in all cases remain available for research and development in developing countries as well as for ARIs in support of the CGIAR Mission
- Support sound stewardship and IP management in accordance with all applicable national and international laws**  
integrity, fairness, equity, responsibility, and accountability wherever they operate

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There are certain specific provisions with regard to genetic resources under the Plant Genetic Resources for Food and Agriculture Treaty. Member Centers provide facilitated access to the following PGRFA (both Annex 1 and non-Annex 1 materials), for the purposes of research, breeding and training for food and agriculture, under the Standard Material-Transfer Agreement (SMTA) adopted by the Governing Body of the Treaty:

- a. all PGRFA are held 'in trust' by Member Centers in gene-banks placed within the purview of the Treaty under the agreements signed in 2006 by the hosting Member Centers and the Governing Body of the Treaty;
- b. all PGRFA are received by a Member Center under the SMTA; and
- c. breeding lines, genetic stocks and other materials are developed/improved by a Member Center that incorporate the above materials.

## Specific provisions we support with regard to access to genetic resources.

**Plant Genetic Resources for Food and Agriculture ('PGRFA') under the purview of the Treaty.**

**Member Centers provide facilitated access to the following PGRFA (both Annex 1 and non-Annex 1 materials), for the purposes of research, breeding and training for food and agriculture, under the terms of the Standard Material Transfer Agreement ('SMTA') adopted by the Governing Body of the Treaty:**

- a) all PGRFA held 'in trust' by Member Centers in gene-banks placed within the purview of the Treaty under the agreements signed in 2006 by the hosting Member Centers and the Governing Body of the Treaty;
- b) all PGRFA received by a Member Center under the SMTA; and
- c) breeding lines, genetic stocks and other materials developed/improved by a Member Center that incorporate material described in sub-sections (a) and (b) above.

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Under the SMTA, Member Centers' developed improved materials, may be identified as PGRFA under development, and Member Centers may impose additional conditions to those set out in the SMTA:

- provided that such additional conditions are consistent with the SMTA and in line with the Consortium's IA Principles.

Member Centers have agreed, going beyond their agreements with the Governing Body of the Treaty, to make center-developed/improved materials that do not incorporate material described in sections above, in the previous slide, also available under the SMTA.

And a reminder that any additional conditions would ensure that these are necessary for further development of the product or to enhance the scale or scope of this impact on target beneficiaries.

## Specific provisions we support with regard to access to genetic resources (cont..)

**Under the SMTA -**

**Member Centers' developed/improved materials may be identified as PGRFA under development and Member Centers may impose additional conditions to those set out in the SMTA**

- provided that such additional conditions are consistent with the SMTA and in line with the Consortium's IA Principles

**Member Centers have agreed, going beyond their agreements with the Governing Body of the Treaty, to make Center-developed/ improved materials that do not incorporate material described in sub-sections a) and b) in the previous slide also available under the SMTA.**

*NB. Any additional conditions that would restrict availability of PGRFA under Development would need to satisfy the conditions previously described in this presentation*

- *I.E conditions are necessary for the further development of the product or to enhance the scale or scope of its impact on target beneficiaries*

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Plant Variety Protection (PVP) is an option that can be successfully utilized in support of the new CGIAR Consortium strategic vision. We believe that it will stimulate partnerships that will more effectively commercialize new pro-poor varieties and traits.



PVP may be the best and only option for downstream partners to achieve commercialization in some of the countries.

Some new innovative Private/Public/Partnership models are being developed and these will be consistent and are consistent with the principles that we are developing at this time. We have some good examples of encouraging new relationships with a private sector at several of the research centers including CIP (The International Potato Center), ICRISAT (International Crops Research Institute for the Semi-Arid Tropics) (Spelt, Sorghum and Millet), IRRI (International Rice Research Institute), which we will hear about a little later, as well as many others. We believe that these do not jeopardize the mission to maximize global accessibility especially for the resource poor.

Under our intellectual asset principles, PVP is allowed, if required, to maximize access and availability and this applies to products of Centers' research, but not to germplasm held in trust under the Treaty.

## PVP and the CGIAR Consortium

- **PVP is an option that can be successfully utilized in support of the new Consortium strategic vision**
  - stimulating partnerships that will more effectively commercialize new pro-poor varieties and traits
  - PVP may be the best and only option for downstream partners to achieve commercialization in some countries
- **Innovative PPP models being developed that will be consistent with the principles shared**
  - encouraging and stimulating new relationships with private sector – CIP, ICRISAT, IRRI, and many others
  - without compromising the mission to maximize global accessibility, especially for the resource poor
- **Under our IA principles, PVP allowed if required to maximize access and availability**
  - applies to products of Centers' research
  - not for germplasm held in trust

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So to conclude, I would just like to remind you of our overall mission, that is to reduce poverty and hunger, improve human health and nutrition and enhance ecosystem resilience to high quality international agricultural research, partnership and leadership.



CGIAR

Reducing poverty and hunger, improving human health and nutrition, and enhancing ecosystem resilience through high-quality international agricultural research, partnership and leadership.

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Thank You

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Photo: CGIAR

## International Research Centers

**Mr. Ruairaidh Sackville Hamilton,  
Head, Genetic Resources Center, IRRI<sup>10</sup>**

### Use of Plant Variety Protection: the experience of the International Rice Research Institute (IRRI)

#### Introduction

The International Rice Research Institute (IRRI) is an international, not-for-profit organization, with a mission and mandate to develop improved rice varieties and production systems as global public goods for the benefit of the poor, particularly in developing countries. To claim legal protection over its varieties through plant breeders' rights (PBRs) has traditionally been considered inconsistent with this mission.

Yet for several years, IRRI has been grappling with the implications of the evolving intellectual property (IP) environment, and there has been growing awareness of the need for public organizations to take control of their own intellectual property<sup>11</sup>. In this paper, we present the rationale behind the need to change the approach to protecting IRRI-bred varieties, and the revised policy on Plant Variety Protection (PVP).

#### The traditional approach

The strength and focus of IRRI is the development of improved rice farming technologies, through partnerships with many stakeholders: improved varieties, improved cultural methodologies and improved post-harvest technologies, optimized for local environments, communities and markets. However, the final decision on whether or how to use the technologies always rests with the partner, and adoption by farmers is the farmers' choice. With varieties, for example, IRRI has bred elite lines, keeping them in the public domain without protecting its breeder's right, and has given seeds free to anyone under a Material Transfer Agreement (MTA). The MTA used in the past freely allowed the recipient to use the material as they wish, with no significant restriction except that recipients could not claim intellectual property rights on the material received. Recipients could use the seed to grow a crop, use it as a parent in a breeding program, release it directly as a national variety, commercialize through a formal seed production system, or repeatedly grow, save, exchange and sell seed in an informal seed system. If the recipient attempts to release the material as a variety, responsibility to comply with national procedures for variety release rests with the recipient.

In October 2006, IRRI signed an agreement<sup>12</sup> with the Governing Body of the International Treaty on Plant Genetic Resources for Food and Agriculture ("the Treaty")<sup>13</sup>, placing the ex situ collection held by IRRI in trust within the purview of the Treaty. Based on that agreement, in January 2007, IRRI started using the Standard Material Transfer Agreement (SMTA)<sup>14</sup> of the Treaty instead of the MTAs previously in use.

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11 Cantrell RP, Hettel GP, Barry GF and Sackville Hamilton R (2004). Impact of intellectual property on nonprofit research institutions and the developing countries they serve. *Minnesota Journal of Law, Science and Technology*, 6, 255-278.

12 <ftp://ftp.fao.org/ag/agp/planttreaty/agreements/pdf/irri.pdf>

13 [www.planttreaty.org](http://www.planttreaty.org)

14 [www.planttreaty.org/smta\\_en.htm](http://www.planttreaty.org/smta_en.htm)

### **The need for change**

Several factors are driving the need for change. One is the growing realization of the need for “defensive protection”. Unprotected inventions can be misappropriated and claimed by others. The same applies to varieties. Recipients of seed from IRRI could license seed production to third parties in their own name, or change the name of the variety without acknowledgement. Some minimal form of protection is required to prevent IRRI’s varieties being claimed or treated by others as their own varieties.

A second is the formal seed production system. This is seen in many countries as the key to ensuring the delivery of high quality seed to farmers, and thus to ensuring consistently high yields. Varieties are tested and registered for their value for cultivation and use, and breeders’ seed, foundation seed, registered seed and certified seed are produced under conditions assuring high seed quality. Although the process of registration is often independent of the process of protecting breeders’ rights, the primary value of PVP is to provide protection for the formal seed production industry, and they are usually parallel processes. IRRI will be better able to help countries in transition to formal seed production systems if it participates in the process of protection and seed production.

A third driver is the need to involve the private sector. Developing and strengthening public-private partnerships is seen as a strategically important objective, to exploit the complementarity of the two sectors for more effective delivery of improved technologies to farmers. In the case of varieties, the private sector typically has an advantage in the commercial production and sale of seed in the formal seed production system, in contrast to the limited capacity of IRRI and many national systems. There is a need to integrate IRRI’s expertise in developing improved varieties with the private sector’s capacity to market them. Yet the private sector often requires legal protection of its rights to commercialize. For seed production, this implies effective plant variety protection.

Fourthly, in some countries, PVP is linked to the registration process, such that seed cannot be produced commercially without first protecting the variety. IRRI’s traditional approach – allowing commercial use provided no IPRs are claimed – is not possible in such countries.

Lastly, after a period of uncertainty over how to manage the transfer of material under the Treaty, it is now clear that IRRI’s traditional approach is not permissible under the Treaty. It is no longer possible simply to transfer material to a recipient with an MTA that allows any use. It is now necessary to know the recipient’s intended use of the material before it is transferred, and to choose a legal instrument appropriate to that use. The reason is that all transfers of germplasm for the purposes of research, breeding and training for food and agriculture have to be made pursuant to the SMTA; and yet the SMTA forbids all other uses by the recipient, including direct use by farmers and the commercial production of seed for sale to farmers. Therefore, if a recipient wishes to use the material directly or commercially, the SMTA cannot be used: some form of license or other authorization must be used.

### **Issues arising**

In this section, we present the issues that needed to be addressed and resolved before changing from the old “free for all” policy to a new policy that would meet the above needs.

#### **Transfer for direct or commercial use under the Treaty**

As indicated above, to provide access to a variety for direct or commercial use, the SMTA must not be used.

For material that IRRI has received with SMTA, this is not permitted, by the terms of the SMTA: if IRRI distributes such materials to others, it has to do so with SMTA and it has to be only for the purpose of breeding, research and training for food and agriculture. Yet for material developed by IRRI, it does have a choice to distribute either with SMTA for breeding, research and training for food and agriculture, or with a different instrument for direct or commercial use.

The question then arises, what legal basis or proof is required to establish IRRI's right under the Treaty to authorize direct or commercial use of an IRRI-bred variety? What shows that IRRI is authorized to do so with one line (one bred by IRRI) but not with another (one received with SMATA)?

Formally claiming IRRI's plant breeders' rights through PVP in one country would clearly establish that right in law, and would establish it as a global right.

However, it appears unnecessary to claim full PVP. For the Treaty, it is necessary just to establish that it was bred by IRRI, through publication of its pedigree and characteristics, identifying the material that it was bred from so that distinctness can be demonstrated. Similarly, for defensive protection to prevent misappropriation, it is necessary just to establish the variety as a "variety whose existence is a matter of common knowledge"<sup>15</sup>. This can be done by subjecting the variety to distinctness, uniformity and stability ("DUS") testing and publicly documenting the variety and its traits in a database that would be recognized by PVP authorities. This has sometimes been described as "defensive PVP", gaining recognition of the existence of a variety without formally claiming intellectual property rights over it.

This introduces the possibility of two levels of protection over IRRI-bred varieties. In all cases it is necessary, as a minimum, to establish the variety as IRRI-bred, a variety of common knowledge, by publishing pedigree and DUS traits. In addition, where additional protection is required, for example for licensing commercial production to a private sector organization, an application can be filed for full PVP in each country where such protection is needed.

### **Reconciling the needs of the formal and informal seed sectors**

The informal seed sector is based on uncertified seed with few or no controls over the supply of seed to farmers. Farmers save seed from one harvest to sow the next season's crop. A farmer may obtain seed from any source: his or her own harvest, or – as a gift or by buying or trading or bartering – from a relative or neighbor or friend or farmer's organization or local extension officers or a local market; and the seed may be of local or distant provenance, of traditional or improved varieties.

A large percentage of rice production operates through this informal seed sector, especially in the developing countries served by IRRI. To fulfill its mandate, IRRI must support both the informal and formal seed sectors, in keeping with the specific national policies and laws of each country that IRRI works with.

However, in contrast to the formal seed sector, where PVP is a significant incentive to the production and sale of certified seed, PVP is often seen as working against the needs of the informal seed sector. The reality of the conflict differs between countries, and is a matter of national policy. Members of the International Union for the Protection of New Varieties of Plants (UPOV) can optionally apply an exception, allowing farmers to use farm-saved seed of protected varieties on their own holdings<sup>16</sup>. Yet the scope of this optional exception is more limited than the potential rights described in Article 9.3 of the Treaty<sup>17</sup>. Under the UPOV Convention, the exchange and selling of farm-saved seed of protected varieties is not permitted without the breeder's authorization. Some countries choose not to become UPOV members, and instead implement a sui generis PVP system that includes recognition of broader farmers' rights.

15 UPOV 1991, article 7.

16 UPOV 1991, article 15.2, provides for an optional exception to the breeder's right, "to permit farmers to use for propagating purposes, on their own holdings, the product of the harvest which they have obtained by planting, on their own holdings, the protected variety [...]" without seeking authorization from the breeder.

17 Treaty article 9.3: "Nothing in this Article shall be interpreted to limit any rights that farmers have to save, use, exchange and sell farm-saved seed/propagating material, subject to national law and as appropriate".

However, UPOV does not specify the conditions for the authorization. It would, for example, be possible for IRRI to issue a generic authorization for all farmers to engage in informally exchanging and selling farm-saved seeds of IRRI varieties, without seeking case-by-case authorization – provided, of course, that doing so is consistent with national policy and legislation. By this means, IRRI could support the informal seed system even in UPOV members.

Therefore, in practice, IRRI can and will work with both formal and informal seed systems. Where appropriate and required, it can use PVP to provide protection required for the formal seed sector and, where appropriate, and possible, it can authorize farmers to sell and exchange seed of its varieties.

### **Reconciling IRRI's mandate with the needs of the private sector**

Through its “breeders’ exemption”<sup>18</sup>, the UPOV Convention provides a key to reconciling, on the one hand IRRI’s mandate to make improved germplasm freely available with, on the other hand, the private sector’s need for some form of protection. The UPOV Convention grants the breeder the right to control the commercial production, sale, export and stocking of seed. However, the breeders’ exemption denies the possibility of the breeder to restrict further breeding and research.

Thus, the UPOV Convention provides the legal mechanism to protect commercial use as required by the private sector; and simultaneously ensures that the material remains freely available for further variety development, as required for implementation of IRRI’s mission.

### **Variety protection in multiple countries**

Many of IRRI’s varieties have been released in more than one country. However, the protection afforded by PVP is territorial in scope, implemented through legislation in each UPOV member. In the absence of regional agreements between countries, a variety protected in one country is not ipso facto protected in another; if protection is required in another country, protection must be sought separately in the other country.

Yet the concept of temporarily protecting intellectual property applies only to new inventions. In the same way, UPOV provides for protection only over new varieties. Under UPOV, a variety is “deemed to be new if, at the date of filing of the application for a breeder’s right, propagating or harvested material of the variety has not been sold or otherwise disposed of to others, by or with the consent of the breeder, for purposes of exploitation of the variety” more than one year earlier in the country where protection is being sought, or more than four years earlier in other countries.

This has special implications for an organization like IRRI that does not directly commercialize its own varieties, but commercializes them only indirectly through partners who make the decision to commercialize, with different partners in different countries. It means that as soon as one partner decides to commercialize an IRRI-bred variety in one country, that partner’s decision initiates a four-year window of opportunity for all other partners to seek protection in their countries. After the completion of that four-year window, the variety will no longer be eligible for additional applications for protection anywhere. In turn this implies a need for an additional sense of urgency and awareness; IRRI needs to inform all partners about the decisions of each partner.

### **The transition from variety development to commercial use under the Treaty**

Since the SMTA has to be used for variety development, but a different instrument is required to authorize direct or commercial use, it is necessary to define the precise point at which development (under the SMTA) ceases and commercialization (under license) starts.

18 UPOV 1991, article 15.1, provides for a compulsory exception to the breeder’s right, denying the breeder the right to control access for private and non-commercial purposes, for experimental purposes, and for the purposes of breeding other varieties.

Since the decision to commercialize is always made by IRRI's partners, not by IRRI, when IRRI first distributes an elite line, it is always at that moment under development, and it is therefore transferred with SMTA. The partner needs at least to conduct its own tests on the material under its own conditions before deciding what to do with it next. Then, depending on national legislation, if the partner wishes to consider commercial use, it may have to undergo a national process of applications and national tests. These may include filing for PVP, conducting the associated DUS (Distinctness, Uniformity and Stability) tests for PVP, registration, conducting the associated VCU (Value for Cultivation and Use) tests, and the production, deposit and maintenance of one or more of Breeder's seed, Foundation seed, Registered seed and Certified seed. When all that national process is complete, seed can be sold commercially. Thus after the period of genetic enhancement has been completed, a potentially lengthy period of institutional and national testing may be needed before a variety is ready for sale.

How much of this can be performed under the SMTA and what requires a license? To answer this we must refer to the SMTA. In its section on definitions, it states<sup>19</sup>:

- **“Plant Genetic Resources for Food and Agriculture under Development”** means material derived from the **Material**, and hence distinct from it, that is not yet ready for commercialization and which the developer intends to further develop or to transfer to another person or entity for further development. The period of development for the **Plant Genetic Resources for Food and Agriculture under Development** shall be deemed to have ceased when those resources are **commercialized** as a **Product**.
- **“Product”** means **Plant Genetic Resources for Food and Agriculture** that incorporate the **Material** or any of its genetic parts or components that are ready for **commercialization**, excluding commodities and other products used for food, feed and processing...
- **“To commercialize”** means to sell a **Product** or **Products** for monetary consideration on the open market, and **“commercialization”** has a corresponding meaning. **Commercialization** shall not include any form of transfer of **Plant Genetic Resources for Food and Agriculture under Development**.

From these definitions, we deduce that the period of development clearly includes not only genetic enhancement, but also all the final testing, after the completion of the period of genetic enhancement, and ceases at the moment of first sale. A license is necessary from the moment at which the partner is ready to sell; up to that moment, the material is still not ready for commercialization, is still under development.

In addition, if the partner wants the protection of PVP, the partner is not allowed to do that, but must seek agreement from IRRI on a process for filing for PVP independently of the SMTA.

#### **Revised IRRI procedures on PVP and commercialization**

Based on the above considerations, IRRI has adopted an IPR policy enabling the following draft procedures for the direct and commercial use of its elite rice germplasm. Some elements are not finally established or agreed with relevant partners. In particular, further discussion will be held with national partners, particularly with regard to making sure that international germplasm exchange through networks such as the International Network for Genetic Evaluation of Rice (INGER) is not negatively affected. Therefore the procedures are still not operational, and are presented here as proposed rather than actual procedures.

19 Bold text in the SMTA is used for terms defined in the SMTA

As indicated above, two types of instrument will be used, depending on the recipient's purpose. The SMTA will be used if the recipient wishes to use the material for breeding, research and training for food and agriculture. If the recipient wishes to use the material directly or commercially for food production, a suitable instrument of authorization will be used. For direct use by farmers relying on informal seed systems, this could be a simple statement easily understood by farmers, like the statement proposed at the 4<sup>th</sup> session of the Governing Body of the Treaty in 2011<sup>20</sup>. For commercial use in the formal seed system, a license will be used. In most cases the license to commercialize will be non-exclusive, and for non-exclusive licenses to non-profit organizations it will be royalty-free, effectively continuing past policy.

In accordance with the terms of the SMTA, recipients of material with SMTA must not use it directly or commercially for food production, and they must not seek IPR protection on it. If they wish to do any of these, they must inform IRRI of their wish and seek appropriate authorization.

For any given line, the first time any recipient anywhere indicates a wish to use it directly or commercially for food production, IRRI will initiate the process of conducting DUS tests and registering it as a variety of common knowledge, in a form recognized by the PVP authorities of at least one country. Subject to further discussion, this could be the PVP Office of the Philippines. Each year, IRRI would report to INGER<sup>21</sup> members at its annual meeting on the new variety releases of the year. This annual reporting is a continuation of current practice, but will serve the additional function of notifying INGER members of the start of the 4-year window of opportunity for protecting the new variety.

The testing and registering of a line as a variety of common knowledge will occur only once, the first time a recipient anywhere wishes to use it directly or commercially for food production. Thereafter, since the variety will already be registered, IRRI will proceed straight to issue the appropriate authorization without repeating the other one-time processes.

If a recipient wants the security of legal IPR protection underpinning a license for commercial use, and if such protection has not yet been sought in the recipient's target country, and if the variety is still considered new enough to be eligible for IPR protection, then IRRI will negotiate terms for filing for protection in accordance with that country's legal system. This will be a one-time process for each country in which IPR protection is sought. In UPOV members and other countries with their own sui generis systems, this would involve filing for PVP. IRRI would seek to apply the "breeders' exemption" of UPOV even in countries allowing more restrictive plant breeders' rights, so that we can continue to make the material freely available for further breeding and research. In countries where the informal seed sector is significant and the country's policy is to continue it, IRRI would seek to authorize free use of protected varieties by farmers in the informal sector.

## Conclusion

Although it has taken several years of analysis to reach the conclusions presented here, indications are that it will satisfy most if not all needs. It is fully compliant with legal obligations under the Treaty. It involves no change in the management of accessions held in Trust and subject to the 2006 agreement between IRRI and the Governing Body of the Treaty. It provides the legal security needed by the private sector without compromising the needs of farmers who rely on informal seed systems, and it provides the potential for exclusivity needed by the private sector without compromising IRRI's mission and mandate to develop improved varieties and make them freely available for further breeding and research. Before the proposed system is implemented, further discussions will be held with IRRI's national partners, particularly with regard to making sure that international germplasm exchange through networks such as INGER is not negatively affected.

20 The wording recommended in Appendix 7 of the Report of the Second Meeting of the ad hoc Technical Advisory Committee on the Multilateral System and Standard Material Transfer Agreement" presented to the Governing Body, was simply "This material can be used by the recipient directly for cultivation, and can be passed on to others for direct cultivation". ([www.itpgrfa.net/International/sites/default/files/gb4i08.pdf](http://www.itpgrfa.net/International/sites/default/files/gb4i08.pdf))

21 <http://seeds.irri.org/inger/>: The International Network for the Genetic Evaluation of Rice is IRRI's network for distributing nurseries of elite materials among its major partners.

## International Research Centers

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### Possible approaches for Technology Transfer by International Research Centers

#### Background

The goal of the various breeding programs of the International Agricultural Research Centers (IARCS), including those of the CGIAR, is ultimately to see improved germplasm become widely available to smallholder farmers as seed of improved varieties. This improved material carries with it important traits such as higher yield potential, disease resistance, improved nutrition, and resistance to abiotic stresses etc. An important component of this process is the channels through which seed of improved varieties are multiplied and disseminated to farmers. These seed systems also serve to deliver seed quality benefits and can also be important in replacing lost seed following civil unrest or natural disasters. Historically, IARC breeding programs have disseminated advanced parental lines and National programs have been responsible for variety development and diffusion. In the case of sub-Saharan Africa, National programs and government parastatal bodies also take on the role of foundation and certified seed production. Resource limitations have often resulted in amounts of quality seed of improved varieties (of particularly open-pollinated varieties and clonally propagated crops) falling a long way short of national requirements in many African countries. There is also the risk of a discontinuity between international breeding programs and farmer and market needs. The distribution of seed of hybrid varieties of crops, however, offers a clear business model and has seen more private sector participation, both national and international companies, in seed production and distribution in many developing countries. Thus, whilst more than 60% of maize seed planted in Kenya is quality seed of improved varieties, typically less than 10% of rice seed planted in many West African, and less than 1% of potato seed in East African countries, is quality seed.

This paper describes work undertaken by the International Potato Center (CIP) and its partners to improve the availability of quality seed of improved National program (Kenya Agricultural Research Institute (KARI) varieties which derived originally from CIP-bred germplasm. The addition of private sector capacity and the introduction of new rapid multiplication technology, to both the public and private sector seed capacity, are seen as key elements of the strategy.

#### Importance of potato in Kenya and East Africa

Improvement of the potato production system in sub-Saharan Africa (SSA), where potato is an important cash and subsistence crop, can be a pathway out of poverty. The potato has a short cropping cycle and a large per area and per time production, making it a smallholder cash crop for the densely populated East and Central African highlands. In Kenya, potato is the second most important food crop after maize, while in the densely populated highlands of south western Uganda and Rwanda potato production is key to supporting the income and food security of the rural population. Furthermore, potatoes can provide a cheap but nutritionally rich staple food required in the fast growing cities of SSA, contributing protein, vitamin C, zinc and iron to the diet.

In SSA, Scott et al. (2000) projected a 250% increase in demand for potatoes between 1993 and 2020, with an annual growth in demand of 3.1% (much of this demand coming from a rapidly urbanizing population). The growth in area under production is estimated at 1.25% a year, the rest of the increase being achieved through a predicted growth in productivity.

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Current average potato yields in Sub Saharan Africa stand at 7.8 tonnes/ha (FAOSTAT, 2005). Yields of 25 tonnes are, however, being attained by progressive farmers in Kenya, using best production practices, under the same rain-fed conditions as their neighbours who attain yields of 5-6 tonnes per hectare. This yield gap can be attributed to the use of low quality seed potatoes (Kinyua et al., 2001; Gildemacher et al., 2009a), low yielding varieties, poor disease management (Gildemacher 2009b; Kinyua et al. 2001 et al., 2009b; Wachira et al., 2010), and inadequate soil fertility management (Gildemacher et al., 2009a).

### **Strategies for developing additional capacity for quality seed production in Kenya**

Potato growers have two choices when faced with the decision of where to obtain their seed for planting. They can either save some seed from the harvest of their previous crop, and accept higher disease levels each season, or they can purchase seed either from a neighbor, the local market or from a specialist seed multiplier. In Kenya, the seed multipliers in turn get their input seed traditionally from public or parastatal programs who supply certified seed. Certified seed production is regulated and inspected by the Kenya Plant Health Inspection Service (KEPHIS) the mandated government agency implementing national seed regulations. Certified seed itself is derived from basic seed produced by the national programs by multiplying disease free “minitubers” in isolated fields, which are traditionally grown in pots in insect-proof screenhouses. These mini-tubers are also known as pre-basic seed. Because of the inherently slow rate of multiplication of the crop, this whole cycle typically takes 5-7 seasons and the potato seed stocks inevitably accumulate seed-borne diseases such as virus or bacterial wilt in any subsequent cycles of multiplication outside the certification process.

Between 2008 and 2010 CIP developed and, with its national partners, tested the components of an innovative seed strategy in Kenya which both dramatically lowers the cost of production of pre-basic seed coupled with extension based interventions to train smallholders in the better on-farm management of their own seed. Engagement with the private sector as a means to widen the supply base and satisfy demand for clean seed was also a key component of the strategy. Because the strategy involved delivering certified seed to growers following one generation of minituber production followed by 2 generations of field multiplication, the new strategy was named the “3G” system.

A key component of the new 3G seed potato seed system was the mass production of minitubers of new, improved varieties through an introduced technology called aeroponics. In this system, plants derived from virus indexed invitro plantlets are grown in an insect proof screenhouse with their root system hanging in special boxes and the roots sprayed with a nutrient solution. Potato minitubers can be harvested from inside the light tight boxes on a regular cycle for a number of weeks and multiplication rates of up to 50 minitubers per plant can be achieved, compared with perhaps 5 to 10 per plant in conventional systems.

In Kenya, the aeroponics technology was installed in both the national potato (KARI) research station and the parastatal seed company charged with potato seed production, as well as with 5 large private farms and companies. In vitro plantlets were produced by either public or private tissue culture laboratories. The minitubers were subsequently field multiplied for two generations by registered growers. All stages of production were overseen by KEPHIS and samples of minitubers and plants tested on a seasonal basis for viruses and bacterial wilt. Capacity building with the private entities was facilitated through public-private partnership agreements, in which a maximum of 50% of the capital costs and free technical backstopping was supplied by the public sector and the remaining capital costs and all of the operational costs were borne by the private sector. Some provision to guarantee seed sales in the early phase of the project was also offered to the private sector partners.

By 2010, capacity for the production of potato minitubers of improved varieties in Kenya had increased from 30,000 per year in 2007 (all in the public sector) to 504,000 per year (with 312,000 produced in the private sector). Production of certified seed in Kenya also increased from 225 to 556 tonnes per year (KEPHIS data) in the same time frame (recognizing that there is a time lag of two seasons between minituber production and availability of certified seed). Thus, there is likely to be a sharp rise in certified seed production evident in 2011 and beyond. There is also evidence that the private sector has continued to rapidly expand its seed production capacity in the season following the end of the formal project.

#### **Strategies for the dissemination of quality seed of improved varieties**

Two basic strategies for the dissemination of quality seed to smallholder farmers were carried out within the project period. Firstly, potential small entrepreneurial seed multipliers were identified by Ministry of Agriculture extension officers in more than 20 potato producing districts in Kenya. These farmers were trained as specialist seed producers by KARI staff and others and put in contact with suppliers of certified seed from whom they were able to purchase seed. These seed multipliers are then able to supply seed to local ware potato growers on a decentralized basis as well as acting as a source of information and effectively demonstration sites for the improved varieties and the benefits of quality seed. Additional on-farm yield trials with this certified seed also demonstrated yield increases of two or three times that of farmers' own seed, which can be largely attributed to control of seed-borne viruses (Wachira et al., 2010).

The second strategy was to sell small pack sizes of certified potato seed directly to small-holder potato farmers as a mechanism to raise awareness of improved varieties and quality seed. For this, KEPHIS agreed that 5kg bag sizes could be certified and sold rather than the more normal 50Kg bag size. During the period of the project, a specialized NGO (FIPS-Africa) sold seed to more 12,000 small-holder farmers.

#### **Strategies for accelerated variety development**

Table 1. describes the pattern of release of improved potato varieties by KARI in Kenya utilizing germplasm largely originating from CIP. The table demonstrates that the process from first cross to the date of release typically takes 17 years, which does not include the time needed to bulk seed and make it widely available. The table also shows that seed production and availability of these varieties is patchy.

Acceleration of this process would be highly desirable and progress has already been made by the Kenyan Ministry of Agriculture in waiving the need for multi-locational trials, prior to national performance trials, if alternative preliminary relevant and promising data is available. Efficiency gains can probably also be made in the breeding component, germplasm distribution and evaluation part of the process through better targeting to match agro-ecologies. Bulking seed in parallel to final selection would also be beneficial.

Table 1. List of potato varieties (derived from CIP germplasm unless indicated) released by KARI in Kenya from 1981 to present day

Variety	Date of first cross	Date of release	Characteristics	Area adopted
Asante	1981	1998	Early, LB resistant	10 %
Tigoni	1981	1998	LB resistant, good processor, good storability	20 %
Kenya Faulu	1998 (cross of CIP clones)	2002	Medium LB resistant, good processor, good storability	0% never bulked
Kenya Karibu	1998 (cross of CIP clones)	2002	LB resistant, good processor, good storability	1% limited bulking
Kenya Mavuno	1998 (cross of CIP clones)	2002	Early, LB resistant, good processor,	0% never bulked
Kenya Sifa	Mexican variety	2002	High LB resistance,	0% never bulked
Purple Gold	1991	2010	LB resistant, very good processor	0- bulking
Kenya Mpya	1993	2010	Very high LB resistant	1 – bulking
Sherekea	1993	2010	Very high LB resistant, good processor	0- bulking

### Conclusions

A principle conclusion of this work is that the private sector was shown to be willing and able to participate in potato seed production and thus adding much needed capacity within the country. The injection of private sector resources and expertise is also seen as important. Considering that resources are also often limiting for variety development and public breeding it could also be argued that there is a place for the private sector to participate in variety development, particularly registration, for staple foods for the so-called orphan crops in SSA. This might warrant re-examining policies and strategies in regard to managing access to proprietary varieties arising from public breeding programs within the context of international treaties- at least on an experimental basis. A system of nonexclusive commercial licensing, policed by regulatory bodies such as KEPHIS, could both incentivize further private sector investment as well as providing much needed royalty benefits to public breeding programs. Any such strategy would need to be shown to materially benefit small-holder farmers through increased access to quality seed of improved varieties at an affordable price.

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## Discussion Transcriptions

### SESSION 1: Use of Plant Variety Protection by National Research Centers

Chair: Ms. Enriqueta Molina Macías

#### 10.10 National Agriculture and Food Research Organization (NARO), Japan

Mr. Ryudai Oshima,

Deputy Director, Intellectual Property Division, Ministry of Agriculture, Forestry and Fisheries (MAFF)

Mrs. Wéré Régine Gazaro

(OAPI)

**I work at the African Organization of Intellectual Property which is a regional organization with 16 member States. Since 2006, this organization has implemented a Plant Variety Protection scheme. This system is in line with the 1991 Act of the UPOV Convention. I'd like to thank the Mr. Oshima for his excellent presentation. However, I would like to have clarification in the framework of rights. As I understood it, the rights belong to the employer. This is the same provision provided for our convention, incidentally. I would like to know, in the case where a protected variety helps the institution, is there any incentive provided for the employee researcher that contributes to the development of this variety?**

Speaker: In the NARO there is an incentive payment given to the employee who is involved in breeding. NARO gives compensation to the breeders as an incentive. The amount is about 50% of the royalty income for the portion less than 5 million Yen, and the breeders earn 20% of the royalty income for the portion exceeding 5 million Yen every fiscal of NARO. So they receive some incentives and I think this is the one factor that contributes to promoting plant breeding in the public research institute as well.

Mr. Friedel Cramer

(Bundesministerium für Ernährung, Landwirtschaft und Verbraucherschutz BMELV, Germany):

**I have a question concerning slide 6 which dealt with the use of breeders' rights and you told us, that you are selling the rights by a licensing system. If I understand you correctly, this is not to give possibilities for breeding but just licenses for the multiplication and the actual sowing and the use of seeds. In the slide you also showed the publication of research results. Are these research results made available without costs, so that private breeders can also use these research results for their own attempts at breeding?**

Speaker: Thank you for your question. For the second question, this IP policy is not limited to the plant breeders' rights. So publication of the research outcome is not in the scope of the plant breeders' rights. This is, for example, in the case of an improvement in agricultural production techniques. Technologies should be shared widely among farmers. So in such cases, publications may be the best approach. And to your first question, licensing policy of NARO is not intended to sell its intellectual property rights to third persons. It's license is only an open license and not an exclusive license. So, it earns royalties but does not limit the access to intellectual property rights.

#### 10.35 Grasslanz Technology, New Zealand

Ms. Jenn James, IP Manager

Mr. François BURGAUD

(Directeur, Groupement national interprofessionnel des semences et plants GNIS):

**I'd like to thank you for your presentation. You said that you only gave non-exclusive licenses. Is this true for all species? And if you only hand out non-exclusive licenses, does this mean that the marketing costs are born by you? Because this is a problem that we have had in French companies. These companies refused to represent certain varieties which were the result of public research in France, because of these questions of non exclusivity.**

Speaker: We don't have non-exclusive licenses, the norm is to have exclusive licenses with companies, but often with things like endophyte and other technologies, we are able to offer non-exclusive licenses. Please could you clarify the question concerning French companies.

**Mr. François BURGAUD**

(Directeur, Groupement national interprofessionnel des semences et plants GNIS):

**Yes the seed companies refused to represent varieties which were issued from public research in certain markets because the public research companies or entities did not give them exclusive rights to the variety. And therefore, these French companies said, I'm not going to invest in the creation for a market for a certain variety if other companies can come and compete with regard to the production and sale of that variety.**

Speaker: We use mostly exclusive licenses. For non-exclusive licenses, there is quite a battle between the seed companies. A competitive nature comes out: we see that the companies seek a niche for themselves and the product that we can license to them and they try to find any point of difference within it. But we mostly use exclusive licenses.

**11.30 Agricultural Research Council, South Africa**

**Mr. Shadrack R. Moephuli,**

Chief Executive Officer (presented by Mr. Raimundo Lavignolle, Office of the Union)

No questions

**11.55 Brazilian Agricultural Research Corporation (EMBRAPA), Brazil**

**Mr. Filipe de Moraes Teixeira,**

Head, Technical Innovation Office

**Mrs. Carmen Amelia M. Gianni**

(Coordinadora de Propiedad Intelectual / Recursos Fitogenéticos, Instituto Nacional de Semillas INASE, Argentina):

**Could you explain to me, when you talk about titles with regard to transfers of IP between associations, did they share the titles or are they given to one of the others? How does it work?**

Speaker: It depends on the negotiation basis. We have some that are co-owned with the partner and some that are applied only in EMBRAPA's name. For example, in the partnership for Soybean, we apply only as EMBRAPA, but we have some partnerships in fruits that we have applied together with the partner. It depends basically in how much contribution, how much research the partner puts in the partnership. If they only put money, probably they will have only exclusivity rights not co-ownership. But if they research together with us, or they develop the market with us, in this case they will have a co-owner.

**Mr. François Burgaud**

(Directeur, Groupement national interprofessionnel des semences et plants GNIS, France):

**Could you give us an example of spreading royalty for genetically modified soya between the owner, co-ownership, the owner of the genetic modification and the owner of the variety? And I was wondering, how do you recover your rights on farm-saved seed of soya?**

Speaker: Thank you. Yes, we have the example soybean today and in Brazil we have a PVP law and also at the same time the patents law, as in most of the world. And we believe that the two laws apply over the seed. So you have at the same time the patents law protecting the biotechnology inside that seed and the PVP law. Usually, we separate it this way: We charge the farmer for the PVP law and the company charges for the patent. So there are two different charges for the same seed and the producers are paying differently for us and for them.

**12.20 National Institute of Agricultural Research (INRA), France**

**Mr. Yves Lespinasse,**  
INRA Research Director

No questions

**SESSION 2: Technology Transfer by the Private Sector**

Chair: Ms. Kitisri Sukhapinda

**14.30 DSP SA, Switzerland**

**Mr. Willi Wicki,**  
Responsible for Varieties Administration

**Chair: I would like to know if the DSP is also responsible for marketing of the seeds to the farmers? How do you get the seeds to the farmers? Do you have to license those seeds to another company to distribute the seeds to the farmers?**

Speaker: We only produce up to the generation of basic seed. And then, in Switzerland, there are multiplier organizations that obtain a license and to whom we supply basic seed. Abroad, we have partners that represent our varieties in the respective countries, to deliver the basic seed to these partners, which then are responsible for the marketing and the distribution of certified seed.

**14.55 Masstock Arable UK Ltd, United Kingdom**

**Mr. Barry Barker,**  
National Arable Seed Product Manager

**Mr. Marcel Bruins**

(Secretary General, International Seed Federation ISF):

**Mr. Barker, we know that for more or less the last century, we've seen that the progress in agricultural yield increase came 50% from the genetics and 50% from the agronomic improvement in fertilizer and agro-chemical products. But lately, in the 10-15 years, we are seeing that there is a much higher component of the genetics. Especially research in the United Kingdom has indicated that around 90% of recent yield increase is due to genetic improvement. Two questions for you: Would you concur from your side? And second, does that lead to any adaptation in your approach? You have shown in the penultimate slide also fertilizer, also crop-protection products, how do you deal with that shift in pro rata?**

Speaker: As a supplier of inputs and not a plant breeding company, I would like to think that we make more than 10% contribution, but I'm sure the figures are easy to measure from the yields perspective and the genetics perspective. Yes, unquestionably, the improvement of plant genetics is what is going to consistently drive forward the performance for growers, whether it is the United Kingdom or whether it is any other country in Europe. But one thing that we are finding that is changing is the regulations about the use of chemicals, the use of fertilizer. And in many cases, that the need to reduce the amount that we actually have, and we use on a daily basis. In the United Kingdom, we already have restrictions on certain chemicals, because of the way they get into the waterways. So looking at varieties and varieties that could perhaps perform better with lower inputs, this is as important as looking at varieties that perform with one input or another or with greater level of inputs. So it is still applied integrated agronomy. And that also applies to different machinery techniques. The level of fuel prices, for example, is very high at the moment and I'm sure they will go higher. So for many growers, if they can find a variety that works better using a minimal establishment technique, one that uses less fuel, then that may become even more important in the future than it currently is. So there are many areas still to keep us employed, despite improving genetics.

**Mr. Friedel Cramer**

(Bundesministerium für Ernährung, Landwirtschaft und Verbraucherschutz BMELV, Germany):

**You had a very broad test and research program every year. Can you tell us what the criteria are? What sort of influences you use to choose the types of varieties to test? And perhaps, do you have reference varieties which can be used for let's say 10 years as control so that the farmer can also see the relation over the years?**

Speaker: It is very difficult for us to choose the topics because there are so many different factors that we could look at. Because we have 150 advisors whose job it is to walk farms every single day to provide advice, many of the topics we choose to look at, come from them. So it comes from the farmers themselves working with their advisors. And the problem I illustrated, of black grass in wheat and using varieties, was a very big problem but only in the eastern half of the country. However, for them, it was a very significant problem. So we have a panel of approximately 12 specialists and myself who discuss what things we should be looking at for the next 2-3, or 4-5 years even, because you cannot just take one years results. It is very difficult sometimes to make that decision, but it has to come from what is happening in the field or what you think will happen in the next 1 to 2 years, like reducing use of Nitrogen for example. You need to look now, because this problem will occur in the near future.

You ask a second point about control varieties. This is very difficult because there are official controls from official trials, but these may not be always the most popular variety for farmers. So for us, we tend to choose the varieties that are most popular with our customers, because that is what we are working with on a day to day basis. This may not agree with the national trials, but it is most relevant for our information, that we are working with..

**15.20 Uruguayan Breeders Association (URUPOV)**

**Mr. Diego Risso,**  
Executive Director

**Mr. Ruairaidh Sackville Hamilton**

(International Rice Research Institute):

**You emphasize the importance of enforcement. I think this is something that worries a lot of people. Could you explain a little bit more about how you do that and how much it is a responsibility of the private sector's side versus the public sector's side?**

Speaker: Thank you very much for your question. In the particular case of Uruguay, in respect to the seed law, it is the responsibility of the International Seed Institute. They are the mandated in the law. However, URUPOV plays a big role too and carries out the enforcement on behalf of the breeders. From a practical point of view, URUPOV does endeavor to be on the ground, in the field, trying to detect irregularities. And one of the biggest measures taken, with the best result, has been that the creation of a royalty collection system, whereby the producers pay royalties This arrangement has strengthened the situation for producers, particularly in the area of wheat.



## 15.45 Role of the private sector in Kenya

**Mr. Evans Sikinyi,**  
Kenya

**Mrs. Carmen Amelia M. Gianni**

(Coordinadora de Propiedad Intelectual / Recursos Fitogenéticos, Instituto Nacional de Semillas INASE, Argentina):

**I wanted to ask about the national seed policy that you are implementing.**

Speaker: Kenya has the seeds and plant variety Act of 1972. This Act comprises seed certification and plant breeders' rights. And it is this law that we used to accede to UPOV because it is complied with the 1978 Act. When we wanted to do the revision of our Act, a question was raised as to what was the national policy that informed the revision? So we went back and had to develop the national seed policy, where we had all the statements of intent and which way we need to go.

### Discussion with panel of speakers:

**Mrs. Chutima Ratanasatien**

(Senior Agricultural Scientist, Plant Variety Protection Division, Department of Agriculture, Ministry of Agriculture and Cooperatives, Thailand):

**My question is to Mr. Yves Lespinasse. During your presentation, you mentioned that PVP provides the access to plant material as a genetic resource while ensuring a financial return for the creator of a new variety. I am not clear regarding a financial return for the creator of a new variety – could you please give more information on this?**

**Mr. Yves Lespinasse:**

In INRA, the inventor or the creator/the breeder has personally no return in terms of money. No return in terms of money, it very important to know that. The money goes to the institution INRA and the only way of getting extra money is to enhance our work especially in the crops you are breeding for. Personally you know, I agree really with this position of INRA, because a new variety is not a creation of one individual. Breeding a new variety is a collective work of a team involving scientists, engineers and technicians. During the scientific committee, I remember in the beginning of the 90's, the breeders in this committee were against this proposal, because INRA had to find a way to give some money to the breeder, because this is necessary in the French law. But we are against this proposal for the reason I've said. This is a French position at the moment at INRA.

**Mrs. Kitisri Sukhapinda:**

I would like to address the panel, because this morning we have heard from Mr. Oshima that the Japanese system has this sharing benefit, sharing to the breeders. So I would like to hear his comment on the benefits of having the benefit sharing to the researchers?

**Mr. Ryudai Oshima:**

Thank you for your question. In the case of NARO, and before 2001, it was a part of a national government and the breeders of the national government did not earn any money, just like in the case of France. But after the transition in 2001, employees of NARO can get a royalty income, 50% of the royalty income generated by the varieties bred by them. I think this is one of the reasons why, in NARO, we have a lot of new varieties of plants. I think that this can be an incentive for the employees of NARO, the public research institutes, just like in private sector companies.

**Mr. Evans Sikinyi:**

From our experience, this was also one of the key areas that Kenya faced. Initially, if you saw the diagram I had on local applications, initially, there were no applications for several years, and then those have shot up. All applications were made by local breeders. Most of the breeders were in the public sector. The institution itself plus the breeders did not see any value in protecting varieties because there was nothing that was coming to them. So as long as they produced publications, showing that they had developed a variety and it is recorded for purposes of promotion, they would leave

it at that. But now, after they understood the institutions and understood the value of protection, there has been an increase in protecting varieties. In my presentation, I mentioned that most of the institutions now have an IP policy in place where it is clearly spelled if a variety is developed, what portion goes to the breeder, what portion goes to the institutions and what goes to the rest of the people. That has encouraged breeding and the breeders are interested in protecting varieties that they develop. Although there is debate from other quarters on why public institutions should protect varieties when it is a public good, but we've left that one with the institutions.

**Mrs. Kitisri Sukhapinda:**

I would like to go back to Mr. Oshima and Mr. Evans Sikinyi to address the question that was raised by Yves Lespinasse that, because a variety is developed by many people, how do you address the problems of sharing the benefits among a group of people who have contributed to that particular variety?

**Mr. Ryudai Oshima:**

Sorry, I am not an employee of NARO, so I don't know very much about how the benefits are being distributed within the group of the breeders. But I think the incentive payment is given to the group as a whole. So, the money does not go to some specific persons, I think the group may distribute within the group the benefit. But, I am sorry, I am not very sure about that.

**Mr. Evans Sikinyi:**

The institutional policy is where it is clearly stated. In most of the institutions, some percentage goes to the institution. If they have a department, some portion goes to the department and then the rest goes to the breeders. Of course, there has been an argument that even the agronomist is involved in the development of the variety. But when you think about it, you are protecting the variety, and the intellectual input in coming up with the variety. But the institutions have the choice to have their own policy.

**Mr. Rolf Jördens (WIPO):**

I wonder whether the question which Mrs. Chutima Ratanasatien has raised, was really about this distribution between the breeders. Because, Chutima, I think you spoke of access to plant genetic resources and benefit sharing. So I think the real question is probably to the panel, how do you see the benefit sharing in relation of the free access to plant genetic resources, which is possible under the UPOV system because a protected variety can be used without the authorization of the breeder for further breeding? So how does the panel see this in relation to benefit sharing? What role does that play in the framework of that discussion?

**Mrs. Kitisri Sukhapinda:**

Yes, I have noted the questions from Mrs. Chutima Ratanasatien and I just wanted to clarify the comments first, so now I am going to throw the questions to the panel. You have any comments on the benefit sharing from the free access of the genetic resources? How do you address that?

**Mr. Filipe de Moraes Teixeira:**

For EMBRAPA it is not a problem because there is a company owned by the government. We have a social mission, so if any company, mainly Brazilian companies, would like to use any of our varieties to create a new one or even use the same genetic bank that we are using for creating new varieties, that is not a problem considering that the Brazilian producer will have the access for a better technology to use. So we think that, at the end of the line, our producer in Brazil, the grower there has access to the best technology. Of course, we are a player also in the market and we try to act as a player. Creating new varieties is even more competitive, but it is not a problem if anybody who wants to, uses the same variety to develop new varieties. We don't ask any kind of share of benefits.

**Mr. Evans Sikinyi:**

I see two benefits of protected variety. Firstly, the farmer has a better variety, so I think that's a benefit for the farmer and for the breeder, who benefits mainly with royalties. Secondly, availability of this variety, it is available for further breeding. Meaning, it gives an opportunity to the industry to get a better variety than what is existing, benefitting the farmer even further. It is incremental in that there is further development in the system.

**Mr. Yves Lespinasse:**

When we exchange material, we sign an MTA (Material Transfer Agreement). In this MTA, we have a guarantee for traceability and for the ownership of the material. But nothing is said about using the pollen for example, because of the breeder's exemption in the UPOV system. If they produce a new variety after using this pollen, it would be important to have this information, to be able to know that the genetics were useful, interesting for breeding a new variety. This is our policy.

**Mr. François Burgaud** (Groupement national interprofessionnel des semences et plants (GNIS)):

First, I would like to add two things on the former debate. What was said by Mr. Yves Lespinasse about INRA is the same for private breeding companies in France. I don't know any breeder in a private company in France who has a direct link with the royalties which are collected by the company on this activity. He has a salary to be a breeder, the salary is the same if he has good results or bad results, and of course, if he has very bad results, he will be no more breeding in the company. The second is about what was said by EMBRAPA. Of course, what was said by EMBRAPA is exactly the same, the free access for all the varieties under UPOV, even in private companies, it's not special to EMBRAPA. But I want to go back to the subject of a meeting of today "Public/Private-Partnership". I think that all the reports of today, showed that expression to be a very bad expression. It's very bad because firstly, usually when public people talk about "Public/Private-Partnership", they just want to say that they want the money of the private sector. Secondly, very often people talk about regulation, harmonization of regulation and so on... This is not a partnership; this is the role of the public sector. This is the role of the State. It is true that private sector needs good regulations, but it is not a partnership, it is the full responsibility of the government to have good legislation. The private sector may address its needs to a government and the government may respond, but it is not the place of the private sector to decide about regulation. On the other hand, it is not the place of a public sector to decide about breeding. I think, you have two main sectors, where we need to have "Public/Private-Partnership". The first sector is genetic resources. It's impossible for a single breeder or a single breeding company to organize access to genetic resources. So it's the responsibility of the public. But a lot of genetic resources are today in the hands of a private sector. So we need a partnership, to exchange and to mix together this responsibility of conservation in exchange of genetic resources. And the second domain, and I don't understand why I didn't hear anything about that, it's the difference of breeding today and yesterday. It's true that today, it is very difficult for a single breeding company, medium size, to address all the issues you need to create new varieties, especially because of biotechnology. So here again, is the second domain we need this partnership and I think it's here where it's interesting to share UPOV. And because we are talking about UPOV and breeders' rights, what was explained in a way by the contribution by Mr. Yves Lespinasse and/or Uruguay, the fact that if you want to exchange between public and private at the level of breeding, we need to have the same system of intellectual property rights. We need to share the same rules, the same regulations. And here is very important maybe to go further. So I would like to know from the members of the panel, how they imagine more relationship between the private and public sector, in biotechnology, in molecular markers and so on.

**Mr. Diego Risso:**

First of all, I'm not a member of the National Institute of Agriculture but I'm quite close to them and I know more or less how they function. So, I will take the opportunity to answer this. In this case, it's very highly recognized Uruguayan institute in South America. Part of its success is the fact that they have very highly trained people, very experienced people as well, people and technicians who have been trained in many areas. So there is an emphasis on the importance of knowledge and skills that has also been gathered elsewhere. So this is part of cooperation and exchange of information. And there is access to technologies by institutes which if they don't update themselves quickly in their

skills, then they will not be able to keep up. One has to develop a variety with high technological value. Therefore, there is a great opening for the exchange with the world to link up with all the universities, with other research centers and also multinational enterprises. The most important product in Uruguay is soybean.. In the future, we'll surely see in Uruguay different lines of soybeans which are protected with transgenic elements from multinational companies. We have a system of patents here. So, in response to your answer, we should say that it's very important to have openings to the outside, to have people highly trained and highly skilled, developed technology that can be accessed from the outside of the institutes as well.

**Mr. Filipe de Moraes Teixeira:**

I can fully agree that money is not the most important in the partnership, but it is very important. I hope that my presentation didn't give this image of EMBRAPA. Of course, the most important part of the partnership is to be together with the partner. I mean, all the research project, all the business plans are developed together with the private partner. So they can not only say how big they want their variety to be, how fast, how thin, they can build that variety together and then build the market and put the technology together. So, in the partnership, the best part is the partner, and in our case not only one partner or one company, but there are hundreds of producers together in foundation to work with us. That is what we need. That is the most important part of our partnership, that they work together with us. Of course, the money needs to come, but we also put in money, so it's fair enough to have money coming from both parties. Of course, in GMOs we work with the companies, constructing new traits that work for our agricultural sector, so it's clearly more than money.

**Mr. Evans Sikinyi:**

Madame Chair, there is no way to divorce public sector from the private sector. There is some research, , particularly basic research, where public research might be best suited to do research and the private sector comes in for maybe applied reasons. So we'll still have to need that partnership.

**Mr. James Osando (Managing Director KEPHIS):**

I'd like to thank all the speakers for very good presentations. I think that there is merit in rewarding breeders. In the benefit sharing, there should be a component that goes to the breeder and just because breeders work with teams does not negate that effort. You just have to find a formula of sharing with the team members so that everybody benefits. And this encourages everybody, whether in Europe or the United States of America , people are encouraged if they are appreciated and given a small token. They work harder in respect of where they come from. Now in private sector, there might not be direct money give to a breeder for a job well done, but there are bonuses - and those bonuses are based on performance. If breeders come up with a variety that adds immense value to the business, there is a way that the breeder is rewarded in bonuses. So the idea that the private sector does not reward breeders is not true. It depends on the company and what sort of reward system the company has on good performance. And so that should apply across the board. Now Public/Private partnerships, they qualify to be a partnership if there is value that is derived by both. There must be something for both parties, something needful for both parties. So if it is a question of a conduit for funding, then it is not really a partnership. My experience in Africa is that a lot of these Public/Private partnerships are fashionable, they are seen as good things to have - and a lot of times, they are only on paper. I have yet to see many examples of true Public/Private partnerships where there is value of growing to both parties and where both parties find it important to cooperate, because they are benefiting from the partnership. I also wanted to mention that situations are very different from country to country and therefore you cannot simply say that breeding is for public sector or private sector. For example, you will find our country has some strategic food crops which have no value to business people. Therefore it would be very difficult for a company to breed sorghum or cassava or millet, for example, in Africa. These are important crops in that part of the World for food security. Because of the significance of these crops for food security, they are strategically important which means that only public sector can actually take interest in this. Situations are different and there are no hard rules across the board.

**Mr. Raimundo Lavignolle (UPOV):**

I am just going to highlight some aspects of the presentation that was prepared by Mr. Shadrack R. Moephuli in relation to benefit sharing. The mandate of the ACR is that all their research is for the welfare of the people of South Africa. On that basis they developed a policy in order to make the results of their research available for the society. They developed an IP policy with different features dependant on the target and the group of their society to make results available in the best way to each group. Poor resource farmers, micro-enterprises have a different treatment than commercial enterprises or commercial farmers. He presented that as a form of benefit sharing because the society gets the benefits,.

**Chair: Mrs. Kitisri Sukhapinda:**

I would like to go back to our discussion early this morning on plant variety protection or intellection property protection systems and Public/Private partnerships that incentivize or make available the possibility of benefit sharing among the researchers, among the breeders or with the farmers, to benefit society.

**Mr. Charles Roberts (CEETTAR):**

I'd like to thank UPOV for the opportunity to attend this seminar and to raise the issue of farm-saved seed of combinable crops and farm-saved seeds, which account for over 60% of the food production in the United Kingdom. The farmers and processors work very closely together with the British Society of Plant Breeders Ltd for royalty collection. None of your royalty collection schemes are licensing schemes that go past the seed companies to the farmers. Please can you tell me what the situation regarding farm-saved seed will be in the future and in your respective countries under your licensing schemes.

**Mr. Diego Risso:**

In the case of Uruguay, as mentioned my presentation, two years ago a definition was made of a smallholder, in other words the person who will benefit from farm-saved seed without having to pay royalties to the breeder. The definition has a number of elements which all need to be fulfilled. Some producers are covered by this definition, but very few. Today in Uruguay we have a system for wheat and soya which is called "Extended Royalty System" in other countries. Farmers pay royalties for the use of the product. Anytime the producer buys seed, he has to sign an agreement where he commits himself to using a certain amount of seed for his own use and pays royalties on these. For soybean, a large proportion of the land is sown with legal seed and 45% is sown with farm-saved seed that on which royalties are paid. The situation for wheat is quite similar. URUPOV manages that system in Uruguay.

**Mr. Barry Barker:**

I would point out that in some of the minor crops in the United Kingdom where the area reproduction is not great, if there was no royalty collection on farm-saved seed, there would not be sufficient income to keep breeding some of the minor crops. In the United Kingdom, in the case of winter-sown beans, maybe 60-70% of all the crop is sown with farm-saved seed. If there had not been a system to collect some royalty on farm-saved seed breeding would have disappeared from the United Kingdom and, effectively, there is practically none throughout the rest of Europe for that crop. So, in some instances, for smaller crops, maybe local issues means that it becomes more important than the largest crops.

**Mr. Willi Wicki:**

In Switzerland, the processors and the distributors demand traceability for their production, so if the farmer cannot prove that he has used certified seed, he cannot sell his harvest. In Switzerland, for example, we have over 90% of certified seed in wheat.

**Mr. Yves Lespinasse:**

INRA has specific agreements for breeding different crops. First of all, INRA is a public service and must not compete with the private sector. INRA has to demonstrate genetic progress that could be important for private companies and for the benefit for the society. For example, INRA produced the first apples resistant to “scab”. In that particular case, there are no private companies with enough money to do fruit-tree breeding. So INRA, as a public service, has to do the breeding because there is no private company. If a private company is interested, they sign agreements and they know in advance about the situation with regard, for example, to the royalties. We know exactly what proportion of the royalty goes to the private company and what part to the public.

**Mr. Ruydai Oshima:**

In Japan, in the case of major crops like rice, wheat and soybeans the use of farm-saved seeds is allowed. In the case of public research institutes, authorization of the plant breeders rights states that after the initial payment of the royalty, the use of farm-saved seed thereafter is free.

**Mr. Filipe de Moraes Teixeira:**

In Brazil, we are now proposing a new PVP law and hopefully by the end of the year we'll have a new PVP law. Farm-saved seed is allowed but only for small growers without any commercial interest.

**Mrs. Jenn James:**

In New Zealand, the farmer is allowed to save seed. However, we often have technology patented within these plant varieties which means that the farmer would not be allowed to use their seed.

**Mr. Evans Sikinyi:**

The law is silent on farm-saved seed, but that does not mean that it is not happening. In fact, in wheat, the exchange and sale of seed between farmers has really affected the seed companies. As we move the 1991 act, we shall have to make provision for farm-saved seed and we will have to put a mechanism for enforcement in place.

**Mr. Diego Risso:**

The use is free according to the law and one cannot ask people to pay for farm-saved seed. However, the law does not say that his seed cannot be sold if there is an agreement between the breeder and the producer. If there is a contract between the two it is established that the producer will pay certain royalties in the case of farm-saved seed.

**Mrs. Chutima Ratanasatien** (Department of Agriculture, Thailand):

My question is for Mr. Peter Button. In your presentation, you said that new varieties are a benefit to consumers, especially to reduce food costs. Could you please explain a bit more on how the new variety reduces the food costs when you pay more for the protected new variety.

**Mr. Peter Button** (UPOV):

I think it is very important to explain that a new variety will only be used by a farmer if he gets a benefit from growing that variety. He will not pay more for a new variety just because it is new. He will pay more for a new variety only if it gives him greater profitability, through higher yield, improved crop quality or reduced costs of production, for example through disease resistance. The farmers' profitability is increased if the cost of his production is reduced and the farmer can sell at a reduced price. The farmer's profitability can also be increased if the product can be sold at a higher price because the quality better responds to the needs of the consumer. In both cases, the profitability of the farmer is linked to meeting the needs of the consumer – and, therefore, to the benefit of society. The farmer will choose the right variety, the one that makes efficient use of land, the one that produces the best product for the market. Increasingly there is more and better information on the performance of varieties, particularly when the private sector is involved. Farmers have the opportunity to very clearly judge whether it is a good variety, whether it will improve their production and that ultimately will feed benefits through to the consumer. The benefits of a new variety must pay for the royalty many times over for the variety to be successful. Otherwise the farmer will just not use the variety.

**Mr. François Burgaud** (Groupement national interprofessionnel des semences et plants (GNIS)):

I would like to add some figures in response to that question. When we had the food crisis in 2008, the cost of wheat was the same as the cost of wheat in 1971. So at the height of the food crisis, we just reached the price of wheat forty years before. At the same time, if you look at the increase of yield, the increase of yield in wheat has multiplied by three and in corn by four. There is no doubt about that. I want to go back to the benefit to the society. Of course, the main benefit to society of the breeders' rights is the decrease in the price of food. And there is no doubt in that.

**Chair: Mrs. Kitisri Sukhapinda:**

At this time, I want to make a conclusion remark: We had really good sessions, both in the morning and this afternoon and the panel discussion. We've had really good questions and there are some questions that have been answered, but yet we have other questions that are still out there. So I encourage all of you to talk to our panel if you have time and otherwise, keep on coming to this kind of seminar, to converse with different people from different countries and take the experiences that we have here from different countries and perhaps make it your own. Modify it to fit your own countries and your own companies. I would like to thank you, the audience, the organizers, the panelists here and also our interpreters who have worked so hard.

### SESSION 3: International Research Centers

**Chair: Mr. David Boreham**

Perspective of the Consultative Group on International Agricultural Research (CGIAR) Consortium

**Mr. Lloyd Le Page,**

Chief Executive Officer, CGIAR Consortium

**Chair: Mr. David Boreham:**

**Lloyd, you did say in one of your points, that PVP provides incentives for breeders, local seed entrepreneurs and producers. Could you expand on that a little? Just how you see PVP playing a role in that?**

Speaker: Yes, what we are recognizing is that, in order for us to get some of that innovation and the varieties off the shelf, to our partners downstream in the seed value chain, we need to be able to capture some of the benefits from that. We have realized that to get to the scale that we need for massive dissemination of improved varieties and hybrids and other innovation, we need to use private enterprises. That's the only sustainable way which will enable long term and a more reliable supply of seed products. Of course, in terms of vegetative crops, there are other systems that are effective which are not in a traditional formal seed sector. We want to keep encouraging those as well, but we need the large-scale.

**Mr. Christopher Barnaby** (Assistant Commissioner/Principal Examiner, Plant Variety Rights, Intellectual Property Office of New Zealand):

**I have a question about the ownership that you talked about. Because an essential part of PVP is that there must be an owner. So with the varieties that you produce, with partnerships and so on, when they are going into the market place, and are not protected, where does the ownership lie? With CGIAR is it a joint partnership or how does that work?**

**Mr. Ruairaidh Sackville Hamilton** (International Rice Research Institute):

It has to be case by case. There are many people contributing, almost all our breeding work is a collaborative effort, with sometimes one national partner, sometimes many. So we have got to make sure that ownership of intellectual property is established correctly at the time of making the PVP application.

**Mr. François Meienberg (APBREBES):**

**You didn't differentiate between UPOV 1978 and UPOV 1991. In UPOV 1991, there could be some problems for farmers to exchange seeds freely. Can't this be a problem for the further dissemination by farmers and for farmers?**

Speaker: We continue to examine those implications of UPOV and both of the Acts, and would encourage ongoing dialog to solve some of the problems that are there. I think that the following speakers might be able to give some more guidelines on that. But we continue to look at the options that we have, to be able to solve some of those challenges faced by small community based producers and to be able to help them to disseminate and to overcome those challenges.

**Mr. Peter Button (UPOV):**

Yes, I think that's a very important point, because in fact, in these situations it is a matter for the owner of the plant breeder's rights to determine the terms. It is not the UPOV Convention that determines the terms, other than the exceptions. If the owner of the right decides to make this available in a particular way, that is entirely a matter for their choice, and they can make it as widely available, they can make it available on certain terms, or different terms under different circumstances. So all these options are possible, and it is a matter for the holder of the plant breeder's rights to determine those terms.

**Mr. Friedel Cramer, (Bundesministerium für Ernährung, Landwirtschaft und Verbraucherschutz BMELV, Germany):**

**I would like to know something about the IP policy and the close connection between the different CGIAR research centers. Are all your research centers bound by your rules or do you have some research centers that are using different rules?**

Speaker: Thank you for that question. We are for the first time working together as one Consortium and the Consortium will adopt the principles. It is up to the member centers of the Consortium to adopt those principles. They remain as independent organizations with their own boards. However, all of the research programs that have been funded by the CGIAR fund will come under the mandate of the principles that we are adopting.

**Can I just make one additional comment?**

I think also, for those of you who know the CGIAR, I think we are now transitioning from a center based approach to a research program based approach. And I think that point is very important, that we understand that we are driving through these research programs, the principles that we are following.

Experience of a CGIAR center: International Rice Research Institute (IRRI)

**Mr. Ruairaidh Sackville Hamilton, Head, Genetic Resources Center, IRRI**

**Mr. Ian Barker (Syngenta Foundation):**

**If you are issuing the commercial license, would you think you'd still stay within the spirits of the International Treaty on Plant Genetic Resources for Food and Agriculture (Treaty) and perhaps just paying the 0.7 % of the Treaty, to stay if you like in the spirit of the original idea?**

Speaker: That's a very interesting question. It's not a requirement because the material is freely available for further breeding research. Under the Treaty there is no obligation to make that 0.7% payment to the treaty. But you can still make it voluntarily. That is something I think we still have to discuss with our partners as to whether anyone feels it would be a good idea to try and make these voluntarily payments. At the moment, it looks like there are very few payments coming to the Treaty. I understand there has been one made so far by breeders and that was a voluntarily payment. So it could actually be an interesting option in support of the Treaty that let's say, let's make a voluntarily contribution. But it would be purely voluntarily because of the way this is working, that this is keeping the material freely available for breeding and research and therefore there is no obligation to make that payment.



Possible approaches for Technology Transfer by International Research Centers

**Mr. Ian Barker,**

Head of Agricultural Partnerships, Syngenta Foundation

**No questions**

### Discussion with the panel of speakers

**Mr. James Onsando (KEPHIS):**

Mine really is not a question, but just to say how glad I am that CGIAR eventually is beginning to move towards impact, beginning to move towards packaging their products including varieties so that they can be taken up quickly. Protecting varieties is one vehicle to facilitate uptake because it does show the consumer that you value the product. If you try to protect it, people begin to see that this might be a valuable product. Protection is not going to hinder the uptake and impact and I am glad IRRI has put that in perspective. Clearly the criticism about CGIAR is going to disappear because I can see a business approach to doing things and this is what the agricultural community globally has been looking for. It gives me great pleasure that the movement is towards the correct position. I also wanted give a comment on the Kenyan potato story. This is a success story and it does show how the partnership is a true partnership in this case. The way forward for the potato story in Kenya is to enhance the virus index incapability and once that is done you combine that with tissue culture and provide clean plant material. In the right package in the right varieties, I think that is the easiest way to sort out food insecurity not only in Kenya but in the surrounding East African countries. Clearly, this is a success story as long as we realize that it's opening us to a bigger challenge of commercializing the operation. Once that operation is fully commercialized and running, clearly you will have been part of the history that is going to make Kenya and that part of the region food secure.

**Mr. Lloyd Le Page:**

We thank the leadership of Kenya in particular KEPHIS, KARI and others who have really set the course for the sub region. So we'd like to respond to that with thanks to Kenya, and please pass that on to your Minister and obviously for yourself as well.

**Mr. Ian Barker:**

There is something I should have said, that this is a success story, it was a partnership. The hard work was done by the Kenyan institutions and Kenyan growers and very importantly, I should have said that the work that was done there was under the umbrella of "the potato seed master plan", which is part of the seed strategy of Kenya consistent with that. It is necessary to see this in the context of a national crop policy which was signed off by the Agricultural Secretary enabling policy environment that gave the green light if you like for the involvement of the private sector to play its part alongside the public sector, which is actually the key thing.

**Mrs. Chutima Ranasatien (Department of Agriculture, Thailand):**

My question is for Mr. Ruairaidh Sackville Hamilton. From your experiences, since the treaty entered in 2004, have any benefit sharing payments under the SMTA have been received so far?

**Mr. Ruairaidh Sackville Hamilton:**

Yes, I believe one has made a voluntary payment. All the other contributions to the benefit sharing fund have been made at the level of countries. Norway for example has contributed a percentage of its national seed sales. Several other European countries have contributed to the benefit sharing fund.

**Mr. Luis Salaices (Spain Plant Variety Office and Focal point for Spain and International treatment of future genetic resources):**

I wanted to clarify and say that this fund has not yet dealt with the commercialization under the Treaty. The treaty is very recent; it only just entered into force. The germplasm samples have been taken or have been exchanged, I don't know if any variety has actually come onto the market today, perhaps not yet, because the process of developing varieties and crossings takes a series of years.

We hope that as soon as possible this will take place. Nevertheless, I would call on by the breeders and the governments from the various countries to show the example of making contributions to the fund. Norway has set the example and Spain has also given \$ 2.2 million to this voluntary fund. They continue to be the biggest contributor in the world to this particular fund for the moment and I hope that somebody will take over, either companies or governments and that this amount of contribution is exceeded.

**Mr. Ruairaidh Sackville Hamilton:**

Thank you very much for the second clarification. Yes, I think Spain is well acknowledged is being the biggest contributor. Now there has been a significant number of projects funded through this benefit sharing mechanism and just a small number of countries that have made it possible.

**Mr. Friedel Cramer** (Bundesministerium für Ernährung, Landwirtschaft und Verbraucherschutz BMELV, Germany):

I have a question on the separation of the various seed areas. In the various presentations, we talked about the formal and the informal sector, In respect of this, there is another issue related to the use of plant breeders' rights under the UPOV convention that is important, the size and the market orientation of the user of this variety, whether a farmer has a commercial or non commercial use. It's far more important of whether it's informal or formal area. So could you add this distinction between different types of farmers, who are perhaps excluded from the plant protection or are they a subject to it.

**Mr. Ruairaidh Sackville Hamilton:**

It's up to the law that of the country. If I understand the question correctly, it's up to the country to decide which farmers are excluded from the scope of the breeder's right.

**Mr. Patrick Ngwediagi** (Registrar, Plant Breeders' Rights Office, United Republic of Tanzania):

As my colleague from Kenya said, we are happy that CGIAR centers are changing but we need to be clear whether you are changing from a non profit organization status to a commercial status organization especially when you are saying that you will be issuing licenses. What type of licenses will you be issuing and which legal frameworks will you be using to issue licenses in different countries?

**Mr. Lloyd Le Page:**

Thank you for that question. I think, to be very clear, what we are trying to encourage here is downstream commercialization of products: not commercialization by the CGIAR itself. We believe very strongly in the nature of those partnerships and that the topic of this session really is about that. How do we stimulate and catalyze Tanzanian companies, Tanzanian entrepreneurs, and small farmers to become seed producers and to be able to take the products that we distribute to use for them to sale or to distribute? Obviously, the incentives need to be there for them to do that. They are not going to do that just purely for social needs, although there are some non profit organizations and farmer groups that might be able to do that: we would certainly not discourage that. In terms of licensing, there is such a thing as license without any remuneration back to the license , so it can be that kind of situation.

**Mr. Ruairaidh Sackville Hamilton:**

In the case that the people who want to commercialize the seed will not be taking up exclusive licenses, if they are happy to work with non exclusive licenses, it will be more or less a continuation of what we have always done, which is, it will be a remuneration-free license. They will have to pay for the license to be able to commercialize, but it will not be exclusive. If they want an exclusive license, which some of the private sector companies will want, than that takes it a little bit beyond our traditional mode of practice and the license fees wouldn't be for profit. If they want to take that exclusive approach, they have to justify it in some way and there might be some remuneration to pay for the work that created what they are using.

**Mr. Lloyd Le Page:**

Just to add an additional point. I think that we are certainly looking at other public institutions around the globe, for example the academic sector. We are also looking at, for example, EMBRAPA and many other organizations of a similar nature that have done exactly the same type of approach where at the end of the day, we are responsible also to our donors. We are committed to our mission of a non profit organization across the globe. We continue to be committed to reducing poverty and hunger, improving human health and nutrition and ecosystem resilience for mostly farmers. But there is also a cost to delivering what we are producing, so we are looking at opportunities for us to continue our mission but at the same time look to recover some other costs that are being incurred.

**Mr. Ian Barker:**

There is just one thing I wanted to add. I am not now part of the CGIAR, so standing aside from my colleagues, I think what we are seeing here or I hope what we are seeing here is a change to the CGIAR for the public benefit, by actively managing the portfolio for which they are responsible. I think in the past, there has been confusion around what is meant by this international public good, where this isn't active management of a portfolio, it's just putting material out there and seeing who picks it up and hoping that someone would pick it up, even to the extent sometimes that we have seen in situations where two separate organizations have both tried to register the same material at the same time in the same country. I think it's really beholden on the CGIAR and it sounds like they are moving in the right direction and Director Onsando (KEPHIS) mentioned that a more impact orientated, a more serious, I guess we would say, approach to managing this, but remembering who we are doing this for. And it's not for income generation primarily, though there are resources issues, it's to get the technology out there. The delegate from Spain mentioned the Treaty. I would encourage you not to forget this other responsibility you have to the source of where the germplasm comes from. If you can find a mechanism, to engineer the system through these licenses and consider doing that so that 7% does get back into the system, that should be taken seriously as well.

**Mr. James Onsando (KEPHIS):**

I think it's good to put commercialization in context. If we want to transfer technology faster, you see the private sector route, all the commercial route is a much more robust system. Now commercial here doesn't mean exploitation. If people have to do business and reach more farmers in a country, make some little money, and the farmers get value out of the system, that is creating impact much faster. And yet, everybody has some benefit. That's a very healthy situation. So business does not mean exploitation. It means a value chain that leaves something for everybody that is involved in that value chain. That's the fastest way to actually transfer technology. If that technology delivers value and the value delivery has to be genuine, it has to be felt by the farmer. Otherwise the farmer is not going to buy. Farmers are good business people; they cannot buy it unless they make money out of it. So business is not necessarily bad if it delivers. It's for public good.

**Mr. Lloyd Le Page:**

I think, you know, what we should look at specifically also is the urgent need to make a difference in the areas of the world that have hunger today. We cannot afford to wait. It is something that we have to do together. We need to get beyond our sector mentality, our thinking about public versus the private versus the civil society; we need to be able to bridge those gaps. We need to be able to work together to solve the complex challenges that face us. And I can't say this enough. If you look at the history for example of the green revolution in Asia, one of the successes was not only the national governments commitments to agriculture in the farming sector or in the ministries of agriculture, it was also the commitment to agriculture in the ministries of health, a commitment to the agriculture in the ministries of education, a commitment to agriculture in the ministries of trade and across the board that that commitment to agriculture is the foundation for economic growth. We need to get to that stage. Again, using the same examples, in India the public sector worked very hard to create a stimulus and a catalyst that would enable small and medium enterprises to flourish, that would enable small seed companies in Sorghum and Millet, it worked with the national research centers ICRISA then others, to create this enabling environment where today there are hundreds, hundreds of small seed companies in India. Probably close to thousands and I know the same thing is true in China. There is a niche for everybody. And so we need to be able to create that sort of stimulating

environment which would allow some of the international research to be delivered and to be delivered through our partners downstream, both the NARS as well as the local seed companies that are operating those environments. When I look today for example in West Africa where, after 30 years of donor investment, still today, if you go to farmers, you talk to farmers, they can't any find any seed, there is no seed. So we need to get beyond just purely looking at the public solution or the private solution, there needs to be able to be this bridge between the sectors. That's why we are here today, to be able to create dialogue, I am very encouraged to see the International Seed Federation here and their partners downstream, the African Seed Trade Association and I would encourage that ongoing dialogue also at a national level, TASTA for example in Tanzania, STAK in Kenya, to come back to the CGIAR and say, look how can we access more of your materials? We want to help to be able to do that. We are creating some innovative partnerships; we are looking at different types of consortium model at a local level that will encourage small and medium enterprises to flourish. And we want to do more of that.

**Mr. Keun-Jin Choi** (President, UPOV Council):

Thank you for your discussion and presentation, but I think that we should be talking about the IRRI (International Rice Research Institute). IRRI is a non profit organization and has released varieties to the NARS without any profits, even though, each NARS may get some profits from the variety used, implementing the variety in their country., That is one of the main problems. And another problem is that each of the NARS can get the same varieties from IRRI, and maybe they can get PVP rights in each country.

**Mr. Ruairaidh Sackville Hamilton:**

Only the breeder can claim the right in all the countries. And if the breeder is IRRI, then no one else should be claiming the PVP at all. That should be clear even with the SMMA, whatever the MTA, they shouldn't be claiming the PVP as their own if IRRI bred the variety. If they bred a variety, of course, they can do, and if a breeder in country A bred the variety, then the breeder in country A can claim PVP in country B as well. That's maybe a competition which we would encourage. We don't particularly mind that they make a profit that we don't, that's part of the benefit sharing. We want the NARS from developing countries to make a profit,. As long as they are working in the same spirit as us, of not going for exclusive licensing, why shouldn't they make their share the profit? They need to make a profit. It's not our way or working. We need cost recovery in certain cases, but we are not in the business of making profits.

**Mrs. Rima Hajjar** (Minister of Agriculture, Lebanon):

I want just to ask for Mr. Sackville Hamilton a general question for the licensing under UPOV Convention. If we had a PVP, is there any limitation in the time for the income for this specific exclusive licensing or non exclusive licensing?

**Mr. Ruairaidh Sackville Hamilton:**

Yes, the primary thing is that it's to the country to decide through its legislation. In most countries there is a 20 year limit for rice. So that's a maximum limit. There is no reason why we shouldn't ask for a shorter limit. Of course, what we want to do is make it as freely available and if a company wants a shorter license, then we are happy to issue it. But the legislation will define the maximum duration of any exclusive license.

## Closing Remarks by the Chairs

### USE OF PLANT VARIETY PROTECTION BY NATIONAL RESEARCH CENTERS

#### Chair: **Enriqueta Molina** Conclusions – Session 1

Plant Variety Protection:

- Promotes private sector involvement in research and development
- Is a tool for technology transfer
- Provides a legal framework for financial investment
- Encourages innovation in breeding aims, particularly for the development of new or niche markets
- Focuses investment on meeting the needs of farmers and consumers

1. Ryudai Oshima, NARO
2. Jenn James, Grasslanz
3. Shadrack R. Moephuli, ARC
4. Filipe de Moraes Teixeira, EMBRAPA
5. Yves Lespinasse, INRA

### TECHNOLOGY TRANSFER BY THE PRIVATE SECTOR

#### Chair: **Kitisri Sukhapinda** Conclusions – Session 2

Private sector:

- Offers an effective means of delivering varieties to farmers
- Provides an assessment of the market potential of varieties
- Link between public research and the needs of farmers
- Provides a channel for income for public-sector research
- Facilitates strategic associations and coordinated technology transfer

1. Willi Wicki , DSP
2. Barry Barker, Masstock Arable
3. Diego Risso, URUPOV
4. Evans Sikinyi, KY

### INTERNATIONAL RESEARCH CENTERS

#### Chair: **David Boreham** Conclusions – Session 3

- PVP provides a mechanism to facilitate dissemination of varieties to farmers: open access does not ensure widespread dissemination or use
- PVP provides a system to increase availability of varieties suited to farmers' needs
- PVP provides incentives for small and medium enterprises (SMEs), particularly local breeders and seed distributors
- The breeders' exemption provides a mechanism to facilitate access to germplasm
- The use of PVP is consistent with the ITPGRFA and SMTA

1. Lloyd Le Page, CGIAR
2. Ruairadh Sackville Hamilton, IRRI
3. Ian Barker, Syngenta

## Speaker Biographies



### **BARRY BARKER**

Barry Barker is the National Arable Seed Product Manager for Masstock Arable UK Ltd and has been with the company for just over 20 years. Originally joining the company as a Sales Manager in a small subsidiary business which eventually took control of the sales and marketing of all seed within the then parent company of Dalgety Arable. Dalgety in turn was sold to Masstock in recent years and Barry's responsibilities have since focused on the arable seed sector (cereals, oilseeds and pulses) in the enlarged company. He has also worked for Nickerson Seeds (now Limagrain) in the wholesale trading department and for Monsanto as part of the UK agrochemical team.



### **IAN BARKER**

Ian Barker is Head Agricultural Partnerships at the Syngenta Foundation for Sustainable Agriculture, based in Basel, Switzerland. He works on improving the availability of quality seeds of improved varieties to small holder farmers, with a current emphasis on the situation in selected countries in East and West Africa. The work follows a development strategy based on the belief that engaging private sector skills and investment, through innovative public private partnerships, is the key to breaking the current bottleneck in seed availability. Dr. Barker is also interested in developing innovative models to accelerate the transfer of technology from breeding programs, through variety release and development and ultimately to farmers. He was previously Head of Seed Systems at the International Potato Center, based in Nairobi, Kenya.



### **DAVID BOREHAM**

Aged 67 David was born and educated in Cambridge.

From 1993-2000 he was the UK Controller of Plant Variety Rights and Head of Seeds Division. He was the UK delegate to UPOV and Vice President of the Administrative Council of the European Plant Variety Rights Office based in Angers, France. During his time in office he was responsible for steering through the UK parliament a new Plant Variety Rights Act to enable the UK to ratify the 1991 Act of the UPOV Convention; for "privatising" the National Institute of Agricultural Botany and for managing the United Kingdom Plant Variety Rights Office (PVRO) efficiently and effectively in the face of the challenging pace of change and innovation in plant breeding. A particular challenge he faced was to adapt the UK system to deal effectively with the introduction of "genetically modified" plant varieties.

Since retiring in March 2000 he has been a member of the Appeals Board of the European Plant Variety Rights Office; has commented to the Australian Government on proposals to amend its PBR law. He has spoken on plant breeders rights at regional seminars in Jordan, Trinidad and Tobago and the International Center for Agricultural Research in the Dry Areas (ICARDA) and has led an FAO mission to assist the Iranian government to develop a PBR system. He is a distance learning tutor on plant breeders' rights for UPOV.



### PETER BUTTON

Mr. Peter Button was appointed Vice Secretary-General of UPOV on December 1, 2010, having previously held the role of Technical Director at UPOV since 2000.

Mr. Button, a national of the United Kingdom, holds a B.Sc. Honors degree in Biological Sciences. From 1981 to 1987 he worked for Twyford Seeds Ltd., a UK plant breeding company, in the development of new cereal varieties.

Between 1987 and 1994 he was the General Manager of Twygen Ltd., a company which developed micropropagation systems for the commercial production of seed potatoes and soft fruit stocks and continued as General Manager, following the change of ownership, of GenTech Propagation Ltd. In 1994. In 1996, Mr. Button joined the British Society of Plant Breeders as Technical Liaison Manager, where his responsibilities included the operation of officially licensed variety trials. In 1998, he became Technical Liaison Officer for the UK Ministry of Agriculture, Fisheries and Food (Plant Variety and Seeds Division), where he was responsible for the operation of the tests and trials associated with the UK Plant Breeders' Rights and National List schemes and Seed Certification in England and Wales and was the United Kingdom representative in the UPOV Technical Committee.



### FILIFE GERALDO DE MORAES TEIXEIRA

Filipe Teixeira is a Brazilian attorney-at-law with ten years of experience in the IP area and a postgraduate degree in Intellectual Property and Cyberlaw from FGV/RJ.

He is the head of the Technology Innovation Office at the Brazilian Agricultural Research Corporation (Embrapa). Embrapa is a prestigious Brazilian Government-owned enterprise linked to the Ministry of Agriculture, Livestock and

Food Supply and develops activities in the area of science and technology.

Filipe is a member of the Brazilian Interministerial Group on Intellectual Property, representing the Ministry of Agriculture, and has represented Embrapa as a speaker in many forums and symposiums in Brazil and internationally.

He was also the Manager of Intellectual Property of Embrapa from September 2003 to September 2007 (nowadays this department is part of the Technology Innovation Office) and before that he worked as an outside counsel at a Brazilian law firm.

He developed activities at the Office of Technology Transfer of the Agricultural Research Service / United States Department of Agriculture (Washington, DC) from September to December 2007 and is a frequent invited speaker in Brazil and abroad.



### JENN JAMES

Jennifer James – Intellectual Property Manager, Grasslanz Technology Limited Born and raised on a sheep, beef, vineyard and mixed cropping farm in the Marlborough region of New Zealand.

Obtained first class honours in Agriculture Science from Lincoln University. Enjoyed working for the Ministry of Agriculture and Forestry (MAFF) as a biosecurity officer. Currently managing the intellectual property (IP) portfolio for Grasslanz, which is a subsidiary of AgResearch, a Crown Research

Institute. IP Managerial role includes researching, applying, processing and maintaining Plant variety rights, Patents and trademarks. Has recently enrolled to begin studying towards a Masters in Plant Breeding at Massey University.



### Lloyd Le Page

Mr. Lloyd Le Page is CEO of the CGIAR Consortium of International Agricultural Research Centres, formed in 2010 as a key component of the CGIAR reform process, and based in Montpellier, France. The Consortium represents 15 member centers operating in over 200 locations worldwide and works to reduce poverty and hunger, improve human health and nutrition, and enhance ecosystem resilience through high-quality international agricultural research, partnership and leadership.

Prior to his current role Lloyd led the Sustainable Agriculture and Development program at Pioneer Hi-Bred, a DuPont business. The program was focused on creating novel partnerships and innovative business approaches to reach previously under-served markets and to provide a foundation for sustainable business and community growth. In this role Lloyd interacted at all levels with private, public, non-profit and academic sectors both in the US and in developing countries. Previously Lloyd worked for Pioneer as regional supply chain manager for Africa, and previously as production manager for South Africa and Zimbabwe. In these roles Lloyd managed large capital expansion projects as well as addressing supply chain and product deployment challenges of reaching small and large farmers in Africa. He was also involved with trade and regulatory issues of seed movement and was responsible for implementing quality management systems such as ISO9001:2000 in Zimbabwe, South Africa and Egypt. Lloyd participated in various committees of Africa-Bio, SANSOR and the Seed Trade. Prior to joining Pioneer, Lloyd worked for several farming operations and agri-businesses in Zimbabwe. Lloyd has served on many not-for-profit Boards, and including the African Seed Trade Association, Global Child Nutrition Foundation, the Association for International Agriculture and Rural Development.



### Yves LESPINASSE

INRA-Research Director

#### BIOGRAPHICAL SKETCH

Senior scientist, specialist in apple genetics and breeding; he is the former head of the Fruit and Ornamental Plant Breeding Unit at French National Institute for Agricultural Research (INRA) Angers and currently coordinator of all the fruit breeding activities in France; he has a longstanding experience on apple genetics and breeding, especially as regards pest and disease resistance and fruit quality. He was the coordinator of the European project DARE (Durable Resistance in Europe) – 1998-2002. He is particularly concerned by selection of new apple and pear resistant cultivars with improved fruit quality, by organizing fruit experimentation all over France and by involving private partners as nursery SMEs for promoting the new varieties to the growers and finally to the consumers. He is one of the coordinators of the European Integrated Project ISAFRUIT (2006-2010) for increasing fruit consumption through a trans-disciplinary approach. He is an active member of several International Scientific Societies and has served as Secretary of EUCARPIA Fruit Breeding Section.

#### RECENT PUBLICATIONS

- Lespinasse Y., Aldwinckle H.S., 2000. Breeding for resistance to fire blight (chap.13). In "Fire blight: the disease and its causative agent *Erwinia amylovora*"; CAB International Pub, p.253-273
- Lespinasse Y., Durel CE., Eskes A., Esmenjaud D., Poëssel JL., 2003. Resistance to biotic stress in fruit trees. XXVI International Horticultural Congress. Acta Hort. 622: 303-315.
- Lespinasse Y. Chevalier M., Durel CE., Robert P., Guéris P., Belouin A., 2007. Pear breeding for scab and psylla resistance. 10<sup>th</sup> International Pear Symposium ISHS. Acta Hort. In press.
- Lespinasse Y., 2007. Review of pome fruit breeding in Europe; what strategies for the near future? 12<sup>th</sup> EUCARPIA Symposium on fruit breeding and genetics. Acta Hort. In press
- Lespinasse Y. 2007; Innovation variétale: démarche partenariale engagée avec les pépiniéristes producteurs de plants de pommier. Innovations Agronomiques, 1: 123-127.





### **Shadrack Ralekeno Moephuli**

President and Chief Executive Officer  
Agricultural Research Council (ARC), South Africa

Dr. Moephuli has been president and chief executive officer of the Agricultural Research Council (ARC), South Africa since 2006. He is a member of the Genetic Resource Policy Committee of the Consultative Group of International Agricultural Research (CGIAR), which is funded by the World Bank and member states. In the last 4 years he chaired the National Agricultural Research Forum, a multi – stakeholder consultative initiative.

Prior to joining the ARC, he served as acting deputy Director – General responsible for production and natural resource management in the Department of Agriculture, South Africa.

Since 2003 he served as the Chief Director for agricultural production in the same department. His responsibilities included developing and implementing policies and strategies for agricultural production, including agricultural research and development, as well as serving as technical advisor to the Ministry of Agriculture.

During the intervening period, he also served as the country's representative on various agricultural matters at the Convention for Biological Diversity (CBD), Cartagena Protocol for Biosafety (CPB), Food and Agriculture Organization (FAO), International Treaty for Plant Genetic Resources for Food and Agriculture (ITPGRFA), Organization for Economic Cooperation and Development (OECD).

Prior to joining government, Dr. Moephuli was a biochemistry lecturer at the University of the Witwatersrand, Johannesburg, South Africa. To his credit are a number of research publications, including invited speaking events. He obtained his doctoral degree from the University of Connecticut, USA.



### **ENRIQUETA MOLINA MACÍAS**

Agro-industrial Engineer, graduate from Chapingo University; she has post-graduate courses on intellectual property, plant variety protection, plant genetic resources, seed certification, bio-safety and phytosanitary measures in Mexico, Spain, Argentina, Uruguay, Bolivia, USA and Ukraine. Recently completed a Master's Degree on Public Administration.

Since 2003, she has been General Director of the National Service of Seed Inspection and Certification (SNICS).

She was part of the drafter group of the current Laws on Seed (2007) and Plant Variety Protection (1996), and has been responsible of the enforcement of the plant breeder's rights system in Mexico. She established the National System of Plant Genetic Resources (SINAREFI) and the consultative groups on seed and plant breeder's rights. She has also been a member of the technical committees on biosafety on agriculture since 1995, and has been elected as Co-chair of the seed AP/LLP forum (adventitious and low level presence of GMOs in seed) with the Seed Association of the Americas (SAA).

Currently she is part of the consultative group for drafting the amendment of the PVP and Plant Genetic Resources Laws.

Since 1996 she has been a Mexican delegate in UPOV meetings; she was elected as President of the Council during 2003-2006; the Secretary General of UPOV awarded her with a UPOV Gold Medal in recognition of her presidency.

She has given numerous courses and conferences regarding plant variety protection, plant genetic resources and seed certification, for universities, research centers, non-governmental organizations and for other national and international entities.



#### **RYUDAI OSHIMA**

Mr. Ryudai Oshima has been the Deputy Director of the Intellectual Property Division, Ministry of Agriculture, Forestry and Fisheries of Japan (MAFF) since September 2010. He is in charge of both domestic and international affairs related to plant variety protection (PVP); PVP law enforcement, measures against infringement (DNA variety identification, PVP advisors, customs measure, etc.), measures for preventing infringement (awareness raising, etc), international cooperation (East Asia Plant Variety Protection Forum (EAPVP Forum)), etc), international negotiation (EPA, etc.) and UPOV-relations. He is also a member of the task force on genetic resources policies, namely on national legislation under the Nagoya Protocol. Before joining the Intellectual Property Division, he worked in the Secretariat of the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGR), task force within the MAFF on the amendment of the PVP law, and as the manager of the MAFF's global environment programs.



#### **DIEGO RISSO**

Diego Riso has been the Executive Director of URUPOV (Uruguayan Breeders Association) since 2001 and is responsible for developing royalties collection systems and enforcing plant breeder's rights in Uruguay. He is a member of the International Seed Federation Working Group on Royalty Collection. He is also the Secretary General of the Seed Association of the Americas (SAA) whose headquarters are located in Montevideo, Uruguay. He obtained a degree in Agronomy in 1997 and in 2001 completed a postgraduate degree in Marketing. In 2005 he left URUPOV to take the position of Executive Director of the National Seed Institute (INASE-Uruguay) and returned in 2006. He represents SAA at UPOV meetings.



#### **RUARAI DH SACKVILLE HAMILTON**

Ruaraidh Sackville Hamilton is head of the T.T. Chang Genetic Resources Centre in the International Rice Research Institute (IRRI) in the Philippines, a position he has held since 2002. He graduated from the University of Cambridge in the UK with a BA in Applied Biology in 1975 and a PhD on plant genetic resources in 1980. Before coming to the Philippines he worked mainly in Colombia, Wales and Italy on many aspects of plant genetic resources including breeding, genetics, ecology, statistics, computer programming and data management. In the last 10 years or so, he has been involved with policy, law and intellectual property rights related to the management, use, exchange of plant genetic resources, particularly in relation to the International Treaty on Plant Genetic Resources for Food and Agriculture and the protection of varieties bred by IRRI and its partners.



### EVANS SIKINYI

Dr Evans Sikinyi is Executive officer of the Seed Trade Association of Kenya (STAK). He is the Secretary of the Eastern Africa Seed Committee (EASCOM), that is charged with implementation of the harmonization of seed regulation within the region. He previously was the Head, Seed Certification and Plant Variety Protection at the Kenya Plant Health Inspectorate Service (KEPHIS). He holds a PhD (Iowa State University), Horticulture (breeding and biotechnology), Masters of Science in plant breeding and Bachelors of Science in Agriculture (University of Nairobi). He was instrumental in setting and operating the Plant variety protection system in Kenya. He trained in Intellectual Property at Michigan State University, Cambridge in the United Kingdom, at WIPO and UPOV in Geneva, and at the United States Patent Office (USPTO), among other places. He is a trained trainer in intellectual property (USPTO Global Intellectual Property Academy) particularly plant variety protection. He was a key member of the task force that developed the Seed Policy for Kenya and the Vice-chair of the task force for developing policy and laws for Traditional Knowledge, Genetic Resources and Folklore in Kenya. He is a member of the Expert Advisory Committee of the Central Advisory Service on Intellectual Property for the CGIAR. He has led the Kenyan delegation to the International Treaty on Plant Genetic Resources for Food and Agriculture, apart from being a member of the Ad-Hoc Advisory Committee on the Funding Strategy for the Benefit Sharing Fund. He has been a member of the UPOV Council, Administrative and Legal Committee, Technical Committee and member of various Technical Working Parties in UPOV. He was the chair of the UPOV Study on the Impact of Plant Variety Protection



### Kitisri Sukhapinda, Ph.D., J.D.

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Kitisri Sukhapinda serves as an attorney advisor in the Office of Policy and External Affairs, United States Patent & Trademark Office (USPTO). Kitisri leads the United States Delegation to the Council of the International Union for the Protection of New Varieties of Plants (UPOV), and currently holds the position of the Vice President of the UPOV Council. Kitisri also leads the efforts in international training on intellectual property management and technology transfer for the Office of Policy and External Affairs.

Kitisri has a wide range of experience in both law and science, and in both public and private sectors. Before joining the USPTO, Kitisri worked in the private practice advising clients on patent-related matters. Kitisri had also held the position of the Director of Technology Licensing Office at the National Science and Technology Development Agency, Thailand. Prior to becoming an attorney, Kitisri worked for a Fortune 500 company, as a research scientist. Her roles included leading research programs in plant biotechnology, and coordinating collaborative research projects with universities. Kitisri was named a co-inventor of five U.S. patents.

Kitisri received a bachelor's degree in Crop Science from North Carolina State University, master's and doctorate degrees in Plant Breeding from Iowa State University, and a law degree from Indiana University, United States.

**WILLI WICKI**

1984-1986 Studies in Phil I, University of Zurich

1986-1992 Studies in Agronomy, Swiss Federal Institute of Technology, Zurich,

1992 Master Degree as Ing. Agr. ETHZ

1992-1993 Training at the Swiss Seed Growers Association, Solothurn (today swissem)

1994-1997 Scientific assistant in the group of plant breeding, Swiss Federal Institute of Technology, Zurich, Prof. Peter Stamp, 1997 Dr. sc. nat.

Since June 1997 member of research staff of Delley Seeds and Plants Ltd, main duties: Head of IP department, maintenance breeding in wheat

From 2002 extra official secretary of Swiss-Seedservice, an agency which provides breeders and variety holders with services in the field of contracting, license administration, controls etc.

# Liste des participants

## List of Participants

### Teilnehmerliste

## Lista de participantes

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<b>Diego RISSO</b>	Executive Director, Uruguayan Breeders Association (URU-POV), Uruguay

<b>Ruaraidh SACKVILLE HAMILTON</b>	Head, Genetic Resources Center, International Rice Research Institute (IRRI), Philippines
<b>Evans SIKINYI</b>	Kenya
<b>Willi WICKI</b>	Responsible for Varieties Administration, DSP SA, Switzerland

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**Francis GURRY**, Secretary-General

**Peter BUTTON**, Vice Secretary-General

**Raimundo LAVIGNOLLE**, Director

**Julia BORYS (Mrs.)**, Senior Technical Counsellor

**Yolanda HUERTA (Mrs.)**, Senior Legal Officer

**Fuminori AIHARA**, Counsellor

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