UPOV

SYMPOSIUM ON THE BENEFITS OF PLANT VARIETY PROTECTION FOR FARMERS AND GROWERS

November 2, 2012
Geneva, Switzerland

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Key Note Speech

The importance of new plant varieties for farmers and growers

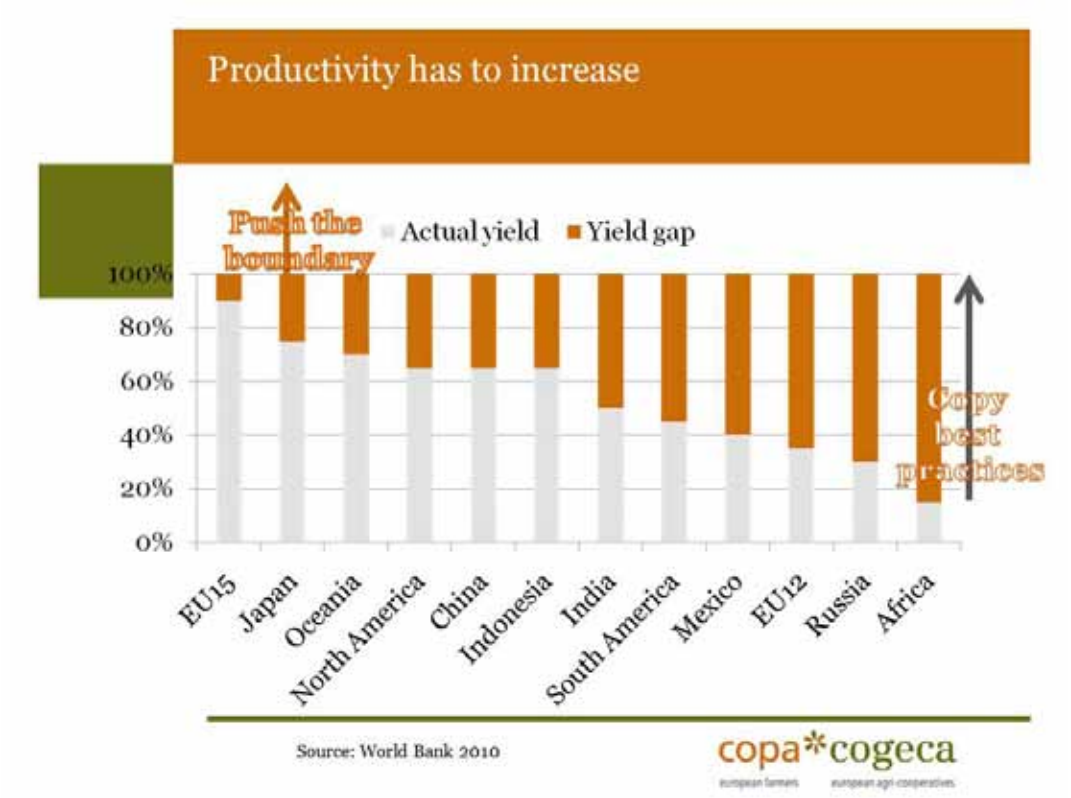
Mr. Thor Gunnar Kofoed (Committee of Professional Agricultural Organisations (COPA) – General Committee for Agricultural Cooperation in the European Union (COGEPA)) (Denmark)

Thank you for the invitation – I am very honored to be here today to try to explain a little bit about the importance of new varieties and the challenges we may face with new varieties in the future.

Before we go into that, I thought maybe I should explain a little bit about what is COPA-COCEGA. We are a Brussels based umbrella organization representing a lot of national farmers' unions, national agriculture cooperatives and federations and we actually have about 72 organizations in COPA-COCEGA. We have about 12 million farmers and farm workers as members of this umbrella organization and 36 000 cooperatives. So it is very difficult to find a joint common position in this organization, but we do normally achieve this. We are dealing with organic farmers and conventional farmers, even farmers who want to grow genetically modified organisms (GMO) and seed producers, manufacturers, sugars, oilseed and protein crops, just to mention a few. We deal with environmental issues – food and health and safety and consumer affairs being the hot issues at the moment. This is just to give you an overview of what COPA-COCEGA does.

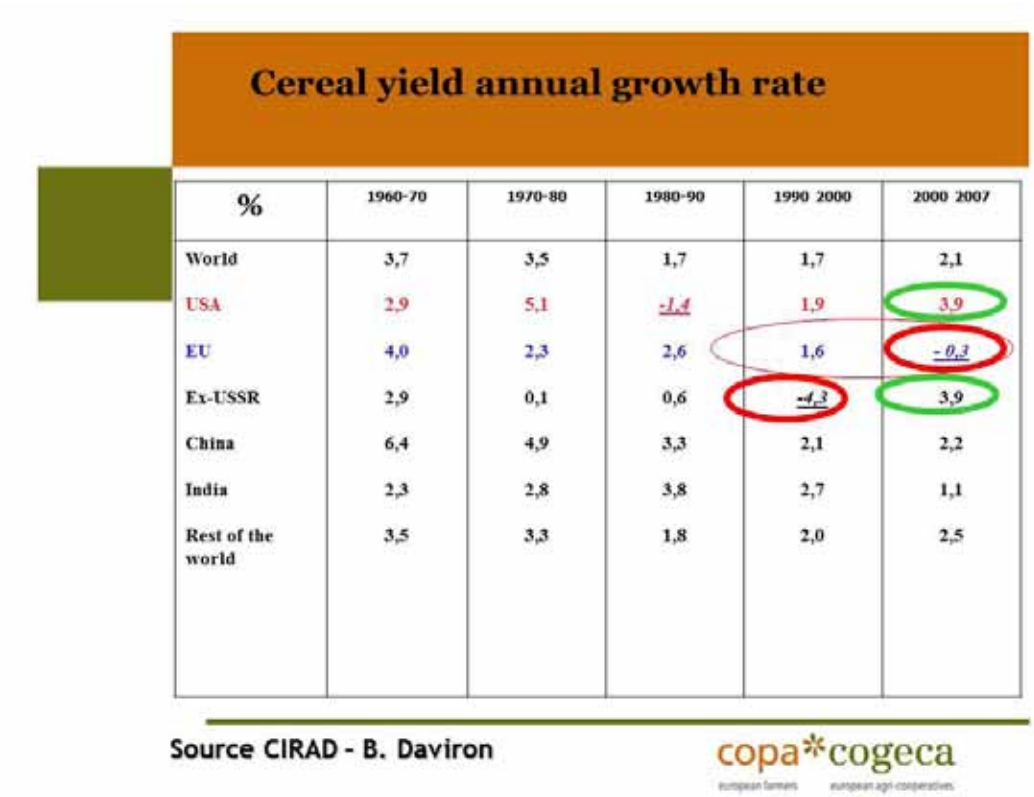
If we look at agricultural challenges in the future, we have an increasing food demand in the world because the poorest people in the world are getting a little richer and then they want enough to eat every day – this is the first point. If they need to go to bed without being hungry, then we need to produce more in the future. The second point is the middle class – if they also want to have meat, we have to produce even more. If they are getting a little bit richer, they may also want a beer, then we have to produce even more so it is a very big challenge that we have here.

Another thing we know is that all politicians, especially in Europe, are talking about bio-energy. It is also taking part of the land that would otherwise be used for food production – so this is also a challenge. Then we have climate change – it is getting hotter and drier – this is also a challenge. Now and in the future we need the breeders to be continually producing new and improved varieties to meet these challenges. Then the consumers in the richer parts of the world want to have better quality, higher standards for the production we make – this is another challenge we have to face. Then all the costs for farmers are getting higher so we need to have production that is more profitable for the famers and then, finally, in a few years time, in 2030, we will be 9 billion people – how can we feed them? We can't expect that we will have more arable land in the world – the amount of arable land is actually decreasing since we use more and more land for cities and infrastructure in the world.



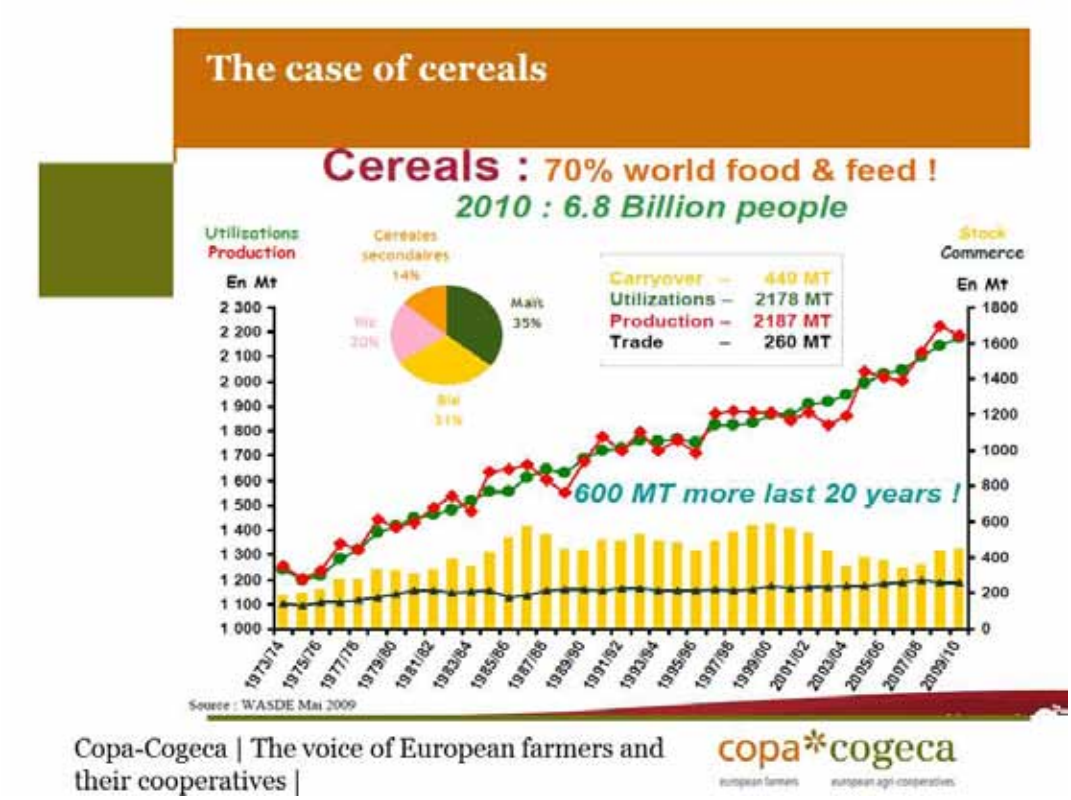
The first step we have to look into is the yield gap. If we look first at Europe, we are at about 90% of the potential of the plant production in Europe at the moment and the potential yields from the varieties we are using. If we could use better varieties, maybe we could lift that maximum potential – it is the future, but if you just use the potential yield that we have today, it is the first challenge that we have to face. What does it matter if the breeders are making a lot of good new varieties if no-one is aware of that – if the farmers do not know about the benefits of new varieties and therefore do not use them – then you can't feed the world. So, as a main point for the future, we need to encourage the farmers to use the new varieties in order to get rid of this yield gap that we are seeing in Europe. In Europe we are trying to do this, but all over the world we are faced with the same problem, particularly in Russia and Africa, where the yield-gap problem is more evident and we need to do something about it. We can't just continue saying that it is not our problem – we are all faced with this problem.

If we look at cereal production over the last 30-40 years, we have increased production in the world and we have been able to meet the increase in demand, but the question is can we find a way to produce these 12000 metric tons in the next 20 years? We can't do it by simply talking about the yield-gap, we need to have new varieties, to enable us to satisfy these future demands.

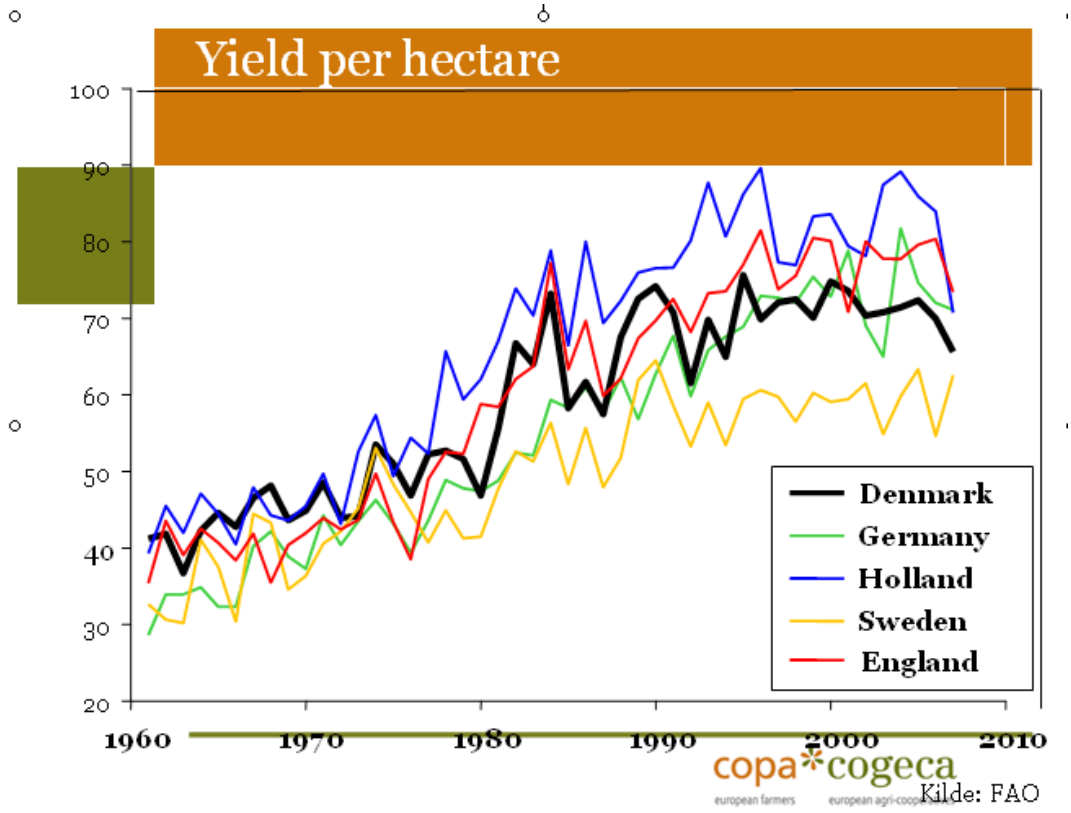


We can look at where the problem exists. In Europe, for example, we have lower increases in yields than we had ten years ago and this is due to several factors, which I will come back to later. In other parts of the world, there is a good increase of yields. We can see that here we have the European Union, in France we have a very high yield – this is because they have a better production tradition, they have better varieties and so on, but we have all these countries down here who need to do that same thing that we have done in Europe, which is to learn to use new varieties and to harness modern technologies and learn to treat the crop once it has been harvested. These are the things that we need to teach farmers. The average world yield for cereals is less than 3 tons/hectare, whereas the average for Europe is nearly 7 tons. We need to learn how to produce more.

Which crops have had a good evolution in the last 30 years? We had better yields, mostly in vegetables and a good part of that development is due to better varieties. If we then take the oil crops, we have nearly the same – also due to better varieties and the way in which we manage production. But if we look at cereals there is a problem – we need to manage this better, not only the breeders, but also the farmers because we need to use new varieties.



If we look at countries in different parts of the world, Europe has a good increase in yields, we have done this quite well. Asia more or less the same, but North America need to improve as does South America. We are choosing not only the new varieties, but also irrigation is necessary, so we need to find drought-resistant crops if we want to improve the yields in some parts of the world.



But coming back to Europe, since this is the area I know best, if we look at the yields for cereals per hectare in Europe, we can see that we have had an increase in yields since 1960. It is the same everywhere in Europe, only Sweden is a little bit behind, but I think this has more to do with the climate. However, there is one country that stands out which is Denmark, which follows the trend of the rest of Europe; however, in the same period they have reduced the use of nitrogen by 50%. They still have the same yields as the other countries, but they have reduced the use of pesticides by 30%. One very important thing, they ALWAYS use new varieties. We have the use of certified seed by nearly 90% of farmers. Farm-saved seed is not very popular because the farmers need, because of very strong environmental regulations, to use the best varieties for their production. How can we do this? This list is only in Danish, but it should be in English in the future because everybody needs it.

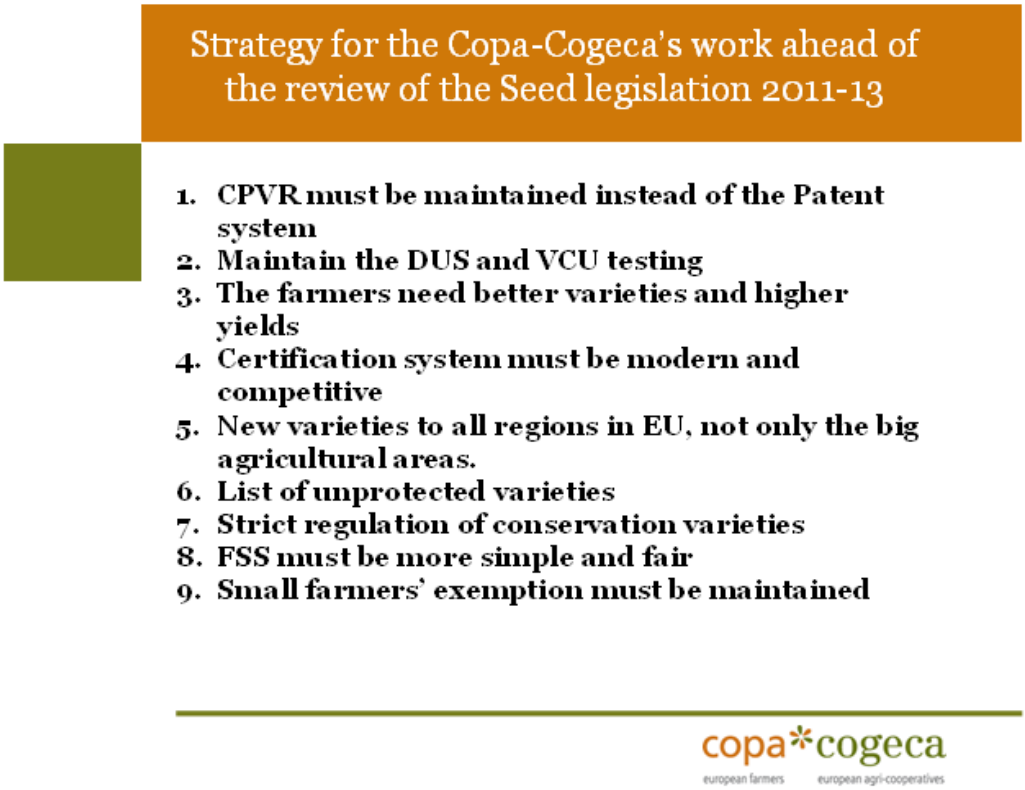
When a farmer wants to find a new variety, then the breeders believe that they contact the breeders to find a new seed – however this is NOT the way it is working.

Oversigt for vinterhvede (sorter i Landsforsøg 2010, nyeste data)

	Udbytteforsøg 1)	Målte dyrkningsegenskaber (Fra udbytteforsøg) 1)			Sygdomme (Observationsparceller) 2)					Dyrkningsegenskaber (Observationsparceller) 2)				
	Kerneudb. forholdstal (frit)	Stivelse, % i tørstof (%)	Råprotein i ts. (%)	Hekto-litervægt (kg/hl)	Meldug dækning (%)	Septoria dækning (%)	Gulrust dækning (%)	Brunrust dækning (%)	Meldug i ska. dækning (%)	Modnings-dato (dato for)	Døde planter (%)	Karakter for overvintring (kar. 1 - 9)	Strå-længde (cm)	Lejesæd (kar. 0 - 10)
År	2010	2010	2010	2010	2010	2010	2010	2009	2005	2010	2007	2007	2010	2010
Sortering														
1. 13011.21	103 (6)	70,0 (6)	11,0 (6)	76,7 (6)	10 (11)	7 (13)	0,3 (2)			12/8 (3)			80 (4)	0,8 (3)
2. Alfaromero	99 (6)	69,9 (6)	10,7 (6)	74,7 (6)	11 (11)	4,6 (13)	0 (2)	23 (3)		11/8 (3)	0,0 (10)	8	82 (4)	0,7 (3)
3. Aligator	96 (6)	68,5 (6)	11,2 (6)	72,4 (6)	10 (11)	12 (13)	0 (2)			11/8 (3)			75 (4)	1,2 (3)
4. Ambition	100 (6)	69,5 (6)	10,7 (6)	74,8 (6)	14 (11)	4,7 (13)	0 (2)	12 (3)	0,1	11/8 (3)	0,3 (10)	7	80 (4)	2,3 (3)
5. BA W9	95 (6)	69,3 (6)	11,3 (6)	77,4 (6)	8 (11)	9 (13)	0 (2)			12/8 (3)			75 (4)	0,7 (3)
6. Blanding vi-hved	100 (6)	69,5 (6)	10,7 (6)	74,1 (6)	8 (11)	6 (13)	0 (2)	7 (3)	8	12/8 (3)	0,0 (10)	8	75 (4)	0,2 (3)
7. CPB-T W150	90 (6)	69,1 (6)	11,6 (6)	77,6 (6)	0,1 (11)	8 (13)	0 (2)	1,2 (3)		10/8 (3)			67 (4)	0,3 (3)
8. CPB-T W157	95 (6)	68,8 (6)	11,6 (6)	75,5 (6)	2,0 (11)	12 (13)	0 (2)	1,3 (3)		11/8 (3)			62 (4)	0,3 (3)
9. Conqueror	101 (6)	70,0 (6)	10,3 (6)	74,7 (6)	11 (11)	13 (13)	0 (2)	10 (3)		11/8 (3)	0,4 (10)	7	70 (4)	0,5 (3)
10. Edmunds	93 (6)	69,0 (6)	10,6 (6)	74,2 (6)	5 (11)	12 (13)	0 (2)	0 (3)		11/8 (3)			65 (4)	1,5 (3)
11. Ellvis	99 (6)	69,6 (6)	11,5 (6)	76,0 (6)	4,7 (11)	4,6 (13)	0 (2)		5	11/8 (3)			84 (4)	0,5 (3)
12. Expert	97 (6)	69,8 (6)	10,9 (6)	75,7 (6)	9 (11)	10 (13)	0 (2)	0,3 (3)		12/8 (3)	0,9 (10)	6	75 (4)	0,5 (3)
13. Frument	99 (6)	69,3 (6)	10,6 (6)	73,2 (6)	5 (11)	8 (13)	0 (2)	5 (3)	1,0	12/8 (3)	0,0 (10)	8	76 (4)	2,3 (3)
14. Goshawk	94 (6)	68,9 (6)	10,9 (6)	74,0 (6)	3,1 (11)	15 (13)	0 (2)	4,3 (3)		11/8 (3)			66 (4)	0,3 (3)
15. Gravitas	93 (6)	68,9 (6)	11,0 (6)	74,6 (6)	2,7 (11)	6 (13)	0 (2)	0,5 (3)		11/8 (3)			68 (4)	0,3 (3)
16. Hereford	105 (6)	70,2 (6)	10,5 (6)	75,5 (6)	6 (11)	11 (13)	0 (2)	13 (3)		11/8 (3)	0,1 (10)	7	79 (4)	1,8 (3)
17. JB Asano	95 (6)	70,0 (6)	11,4 (6)	77,6 (6)	4,5 (11)	14 (13)	0 (2)	3,2 (3)	1,0	10/8 (3)			85 (4)	0,3 (3)
18. Jensen	101 (6)	70,1 (6)	10,6 (6)	76,8 (6)	1,4 (11)	6 (13)	0 (2)	14 (3)		12/8 (3)			83 (4)	1,8 (3)
19. KWS Dacanto	104 (6)	69,4 (6)	11,0 (6)	78,4 (6)	4,4 (11)	8 (13)	0 (2)			11/8 (3)			79 (4)	0,7 (3)
20. KWS Kite	88 (6)	69,5 (6)	11,2 (6)	74,2 (6)	6 (11)	10 (13)	0 (2)	0 (3)		11/8 (3)			73 (4)	0,7 (3)
21. KWS Podium	94 (6)	68,2 (6)	11,6 (6)	77,0 (6)	6 (11)	11 (13)	0 (2)	0,02 (3)		11/8 (3)			65 (4)	0,3 (3)
22. KWS Radius	89 (6)	69,1 (6)	11,7 (6)	77,3 (6)	2,1 (11)	9 (13)	0 (2)			11/8 (3)			79 (4)	0,0 (3)
23. KWS Santiago	100 (6)	69,1 (6)	10,5 (6)	73,8 (6)	7 (11)	14 (13)	0 (2)			14/8 (3)			74 (4)	0,7 (3)
24. KWS W179	96 (6)	68,9 (6)	10,9 (6)	75,9 (6)	3,0 (11)	17 (13)	0 (2)			12/8 (3)			68 (4)	1,0 (3)
25. KWS Yaris	99 (6)	69,0 (6)	10,6 (6)	75,9 (6)	5 (11)	7 (13)	0 (2)	7 (3)		12/8 (3)			78 (4)	0,3 (3)

copa cogeca
european farmers european agri-cooperatives

This variety list is an independent list of varieties, a small proportion of which is funded by the breeders, but the majority by the farmers. In this variety list you can see what is the yield potential for a variety not only in Kg/hectare, but also in proteins, amino acids, drought resistance, fungi resistance, straw length – everything you want to know about each variety. You cannot only see it by variety; you can also see it from the view point of the different parts of the country, the five regions that make up Denmark. So the farmers know exactly which is the best variety for their conditions, to make the most appropriate choice for his farm. This is actually one of the keys to finding a way to use the right new variety. The problem for the breeders is that the farmers are very focused on this list and so an 'old' variety in Denmark is only 5 years old. The focus is always on new and better varieties and, as you saw before, the breeders can earn money from this. To do this, you need to inform the farmers that they can earn money by using new varieties.



After I showed this slide in COPA, we agreed a strategy for the future and for the revenue of the seed legislation in the European Union – it was also in relation to the discussion on farm-saved seed in COPA. Because over the last 18 years it had not been possible to find a common position on farm-saved seed in COPA, but now we have one. The Community Plant Variety Rights (CPVR) system we have in Europe must be maintained instead of the patent system, because the CPVR system is easier to change and both parts can influence each other. We must maintain the Distinctness Uniformity and Stability (DUS) and the Value for Cultivation and Use (VCU) testing systems and maybe, in my opinion, develop them further. It is not yet the COPA position, but in my opinion, the testing system should be very close the Danish system, because it is helping to get new varieties out to the farmer and it is also a consumer guarantee in that consumers know what they are buying when they purchase a particular variety.

To conclude:

1. Yes – Farmers need better varieties – this is the message to the breeders: you need to continue to produce better varieties;
2. The certification system must be modern and more competitive. Under the certification system we have in Europe, too much of the money that farmers pay for certified seed is currently going to the bureaucracy of the system which was developed back in the 1950s. With modern technology we should be able to do this is a much more cost-effective manner today;
3. New varieties: we know that there is a big difference between the climate in north of Scandinavia and the south of Italy or the south of Spain, so we need to have varieties adapted to all parts of Europe – we have varieties for most parts of the world – it is very important that we do not only develop varieties for the biggest production areas of the world, because this would not enable us to feed the world;
4. List of unprotected varieties – this is very important. I know that a lot of breeders do not like this idea, but if you don't have a list of unprotected varieties, then these people who want to be able to use these unprotected varieties will make too much noise and they distract interest away from the best varieties, which is counterproductive;

5. In Europe we have discussions about regulations on conservation varieties – we cannot say that we do not want conservation varieties – they are needed because there are people in the world who want them. Let these conservation varieties be produced, but we need strict regulations. Since we have effective regulations on new varieties, it is a consumer guarantee – we have testing and analysis. We can't then have conservation varieties that you do not know what they are– perhaps they are varieties produced without any testing which are then put on the open market and that is why we need some strict regulations for these varieties as well;
6. Farm-saved seed: the system for farm-saved seed must be simple and fair to both the farmers and the breeders. The farmers need to know what they are paying for. There are farmers who want to save their own seed – but they need to know about new and better varieties in order to have the widest choice of seed for the future.

In Europe we have been talking about the small farmers' exemption. Of course, I can understand that breeders want to have the royalties from all the seed that has been sold to the farmers, but let these farmers continue with farm-saved seed. In Europe out of 12 million farmers, 8.5 million have less than 10 hectares and I don't think that we have to spend that much money collecting royalties from these farmers because then we only spend money on lawyers! Put the money in the breeding programs instead and let the small farmers continue as they did in the past because in the future they will not have much of an influence on world production since it will only be a very small part, so it must not be the focus of what we are doing.

To finalize my presentation, we need to have a simple way whereby a farmer can find the best varieties for his production. It is very important that we are able to find the best varieties.
We also need to have an independent testing system and advisory system about the quality of the new varieties under different geographic and climatic conditions, because when a breeder makes a commercial claim to have produced the best variety for the world this claim must be independently tested and verified.

SESSION I: The Role Of Pvp In Improving Incomes For Farmers And Growers

Introduction

Mr. Peter Button,
Vice Secretary-General, UPOV

The "Symposium on the Benefits of Plant Variety Protection for Farmers and Growers" completes the "Trilogy" of events that illustrate some important ways in which the UPOV system of plant variety protection provides benefits for society. The purpose of this paper is to explain the link of this Symposium to the other events in the Trilogy and to provide an introduction to Session I "The Role of PVP in Improving Incomes for Farmers and Growers".

UPOV Trilogy (Plant Variety Protection: Providing Benefits for Society)

The "Symposium on Plant Breeding for the Future", held in Geneva on October 21, 2011, (see www.upov.int/meetings/en/details.jsp?meeting_id=24133) demonstrated the importance of plant breeding to meet the challenges of increasing population, climate change, parallel demands for food and energy production and evolving human needs. An important conclusion of the UPOV Report on the Impact of Plant Variety Protection (Impact Study) (see www.upov.int/export/sites/upov/about/en/pdf/353_upov_report.pdf) was that the UPOV system of plant variety protection (PVP) provides an effective incentive for plant breeding in many different situations and in various sectors, and results in the development of new, improved varieties of benefit for farmers, growers and consumers. The "Seminar on Plant Variety Protection and Technology Transfer: the Benefits of Public-Private Partnership", held in Geneva, from April 11 to April 12, 2011 (see www.upov.int/meetings/en/details.jsp?meeting_id=22163), demonstrated the importance of plant variety protection for plant breeding in the public sector and the role that it plays in technology transfer by encouraging public-private partnerships. An important message from the Seminar was that plant variety protection provides a system to increase availability of varieties suited to farmers' needs and provides a mechanism to facilitate dissemination of varieties to farmers. That conclusion brings us to the theme the "Symposium on the Benefits of Plant Variety Protection for Farmers and Growers".

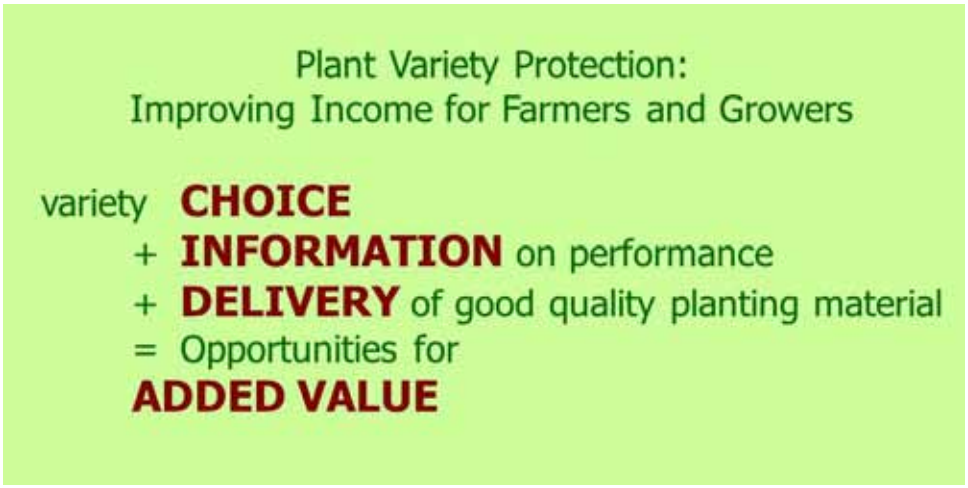
The Role of PVP in Improving Incomes for Farmers And Growers

The "Symposium on Plant Breeding for the Future" illustrated the range of benefits to society from the introduction of new varieties of plants. Farmers and growers deliver the benefits of new varieties to society through reduced food cost, efficient land use, high quality food, storability and a wide diversity of products. They deliver those benefits because they are the first beneficiaries of new varieties, which offer to them improved yields and profitability, resistance to pests and diseases, input efficiency and agronomic options that enable them to meet their own needs and those of consumers. In short, new varieties are their route to improved livelihoods.

The aim of Session I "The Role of PVP in Improving Incomes for Farmers and Growers" is to illustrate the role of PVP in improving incomes for farmers and growers in a range of sectors and in different regions of the World.

The Key Note Speech by Mr. Thor Gunnar Kofoed highlights the importance of variety choice for farmers and growers and that is the starting point for this paper. Farmers and growers rely on having a choice of varieties that are suited to their needs. However, a theoretical choice of varieties must be combined with information on variety performance and delivery of good quality planting material in order to provide farmers and growers with the best opportunity to add value to their produce (see Figure 1).

Figure 1



Variety Choice

With regard to the role of PVP in enhancing variety choice, it is important to consider new varieties, old varieties and overall variety diversity.

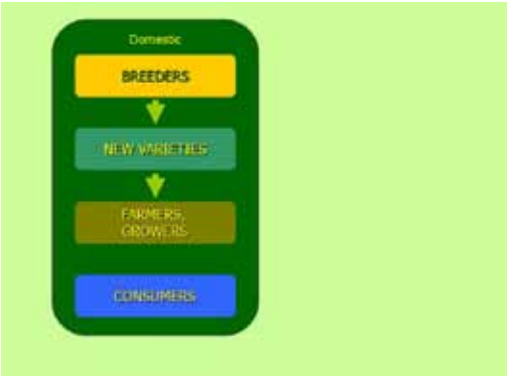
New varieties

UPOV's mission 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".

Plant breeding is a long and often an expensive process. However, at the end of that process, many new plant varieties can be very easily and quickly reproduced. Therefore, a system of protection is needed in order to allow breeders to recover their investment. The Impact Study provided extensive information on the role of plant variety protection and UPOV membership in encouraging the development of new varieties of plants. It may be useful to recall that the Impact Study illustrated the impact in terms of increasing number and 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 and investment as a result of the introduction of the UPOV system of plant variety protection.

The Impact Study explained that the positive effects of a PVP system may be realized in the form of an incentive to stimulate new breeders and new breeding work and/or providing a basis for more effective breeding work at the domestic level. It also explained that an effective PVP system and membership of UPOV can provide important benefits in an international context by removing barriers to trade in varieties, thereby increasing domestic and international market scope. In short, breeders are likely to be reluctant to release valuable varieties into a country without adequate protection. With access to a broader range of new, improved varieties, domestic growers and producers have more scope to improve their production and also have more scope to export their products. It is also recalled that, as a consequence of the breeder's exemption in the UPOV Convention, domestic breeders also gain access to a broader range of new, improved varieties for use in their breeding programs (see Figure 2). This international aspect is an important means of technology transfer and effective utilization of genetic resources.

Figure 2



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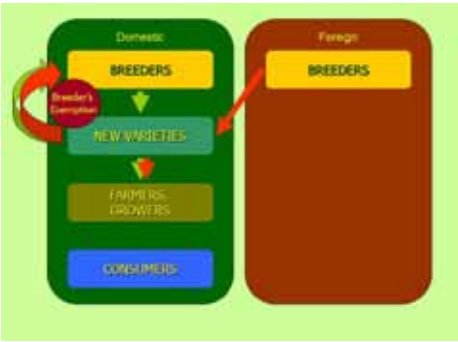
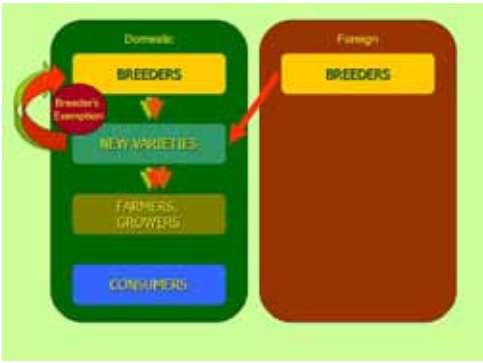
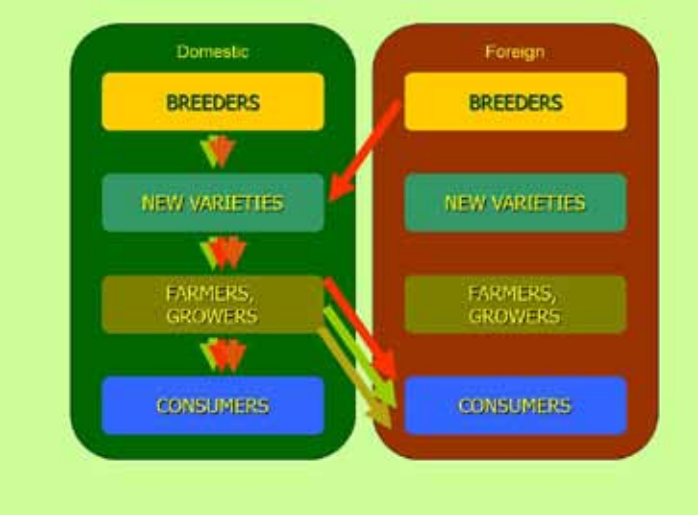
An effective PVP system and UPOV membership can provide important benefits in an international context by removing barriers to trade in varieties.





As a consequence of the breeder's exemption in the UPOV Convention, domestic breeders also gain access to a broader range of new, improved varieties for use in their breeding programs.



With access to a broader range of new, improved varieties, domestic growers and producers have more scope to improve their production and also have more scope to export their products.

Old varieties

It is, unfortunately, common to encounter misunderstandings with regard to the relationship between plant variety protection, or plant breeders' rights[1], and old varieties. Therefore, it is important to start by clarifying that access to old, unprotected varieties is not governed by plant breeders' rights. It is equally important to emphasize that only new varieties are eligible for protection and only the breeder of a new variety is entitled to protection. The definition of breeder provided in Article 1(iv) of the 1991 Act of the UPOV Convention, states that "'breeder' means - the person who bred, or discovered and developed, a variety, […]"

Figure 3

1 The protection offered by the UPOV system is in the form of a "title" of protection, "granted" to the breeder, for the variety concerned. With respect to the UPOV system, that title is sometimes referred to as a plant breeder's right (PBR).

With regard to "discovered and developed", a discovery might be the initial step in the process of breeding a new variety. However, the term "discovered and developed" means that a mere discovery, or find, would not entitle the person to obtain a breeder's right. Development of plant material into a variety is necessary for a breeder to be entitled to obtain a breeder's right. A person would not be entitled to protection of an existing variety that was discovered and propagated unchanged by that person.

Variety diversity

The two following studies considered crop diversity over recent decades.

Genetic Diversity in Agriculture: temporal flux, sustainable productivity and food security (Gediflux)

The European Union funded project "Genetic Diversity in Agriculture: temporal flux, sustainable productivity and food security (Gediflux)"[2], provided the following introduction:

> **"It has been claimed that plant breeding reduces genetic diversity in elite germplasm, risking future crop losses and prejudicing the continued ability to improve crops. The objective of this project was to determine any changes to genetic diversity over time in four widely grown agricultural crops: barley, wheat, maize, and potato. Any genetic erosion that might have occurred over the past 50 or more years in these crops was evaluated."**

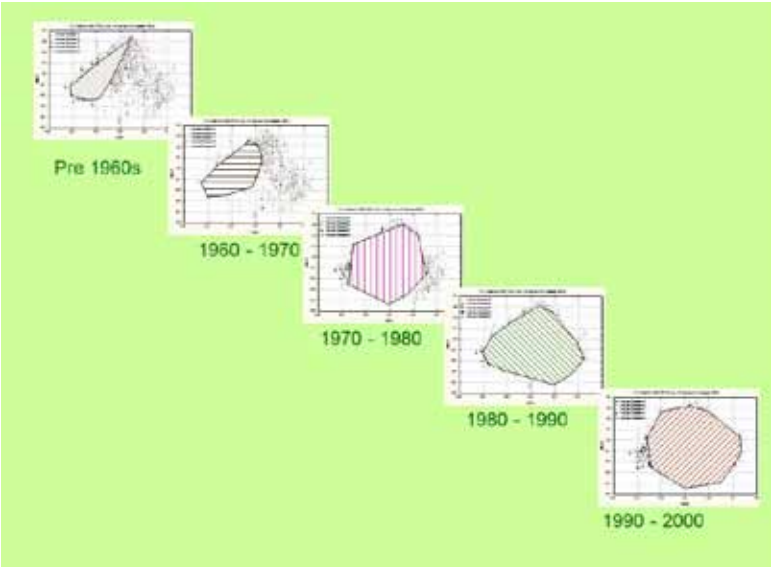
The summary of the report of the Gediflux project contained the following conclusion:

> **General Trends**
>
> **"Overall, the results show that there has not been a significant change in crop plant diversity over time or as a result of the variety production and delivery systems, with the different molecular techniques, statistical analyses and different crop species giving convergent results. This observation applies to the four crops studied in this project (maize, wheat, barley & potato) and their diversity over the past fifty years which was the main source of material used in this project. The diversity in a small number of progenitor varieties from 100 years ago or so was also studied for some of the crops (barley and potato) and was not measurably greater than that seen in the modern varieties, suggesting that diversity was not significantly reduced by any scientific breeding activities, although we are not able to comment on the level of diversity that may have existed among the landraces that were the mainstay of agricultural production before the 20th century. The similarity in the way diversity has been maintained between crop varieties suggests that this is could be expected to be the normal situation and we might predict that other crops would show the same trend. This is also reflected by the parallel studies in maize, where separate but similar approaches were taken to analyse the diversity in French and German maize varieties. The period under study has shown many changes in the way crops have been bred and delivered to agriculture, but none of these activities has had a deleterious effect on crop diversity. On the contrary, the only significant change in diversity detected was with the comprehensive study of disease resistance genes (and analogues) in potato, which showed an increase in diversity attributable to attempts to increase disease resistance through the use of crossing with wild relatives of potato with high specific disease resistance genes. […]"**

Figure 4 provides a summary of the analysis of Nucleotide Binding Site profiling (NBS Profiling) of Wheat in Europe by means of Principle Coordinate Analysis (PCO), which was deemed to provide the best graphical representation of the data. The convex "hulls" show the extent of divergence.

2 A European Union funded project carried out by the following: F Leigh([i]), E Chiapparino([i]), P Donini([i]), M Ganal([iv]), J Guiard([ii]), S Hamri([iii]), M Heckenberger([iii]), X-Q Huang([v]), M van Kaauwen([viii]), E Kochieva([viii]), R Koebner([vi]), J R Law([i]), V Lea([i]), V Le Clerc([ii]), T van der Lee([viii]), G van der Linden([viii]), L Malysheva([v]), A E Melchinger([iii]), S Orford([vi]), D O'Sullivan([i]), J C Reif([iii]), M Röder([v]), A Schulman([vii]), B Vosman([viii]), C van der Wiel([viii]), M Wolf([iv]), D Zhang([ii]), J C Reeves([i]), ([i]) NIAB, ([ii]) GEVES, ([iii]) University of Hohenheim, ([iv]) TraitGenetics GmbH, ([v]) Institut für Pflanzengenetik und Kulturpflanzenforschung (IPK), ([vi]) John Innes Centre, ([vii]) University of Helsinki (UH) and MTT Agrifood Research Finland, ([viii]) Plant Research International (PRI).

Figure 4



(slide 8)

Analysis of Nucleotide Binding Site profiling (NBS Profiling) of Wheat in Europe by means of Principle Coordinate Analysis (PCO). The convex "hulls" show the extent of divergence.

Genetic diversity trends in twentieth century crop cultivars: a meta analysis

The Abstract of the paper "Genetic diversity trends in twentieth century crop cultivars: a meta analysis"[3] explained that, in recent years, an increasing number of papers had been published on the genetic diversity trends in crop cultivars released in the last century using a variety of molecular techniques. In the meta analysis, 44 published papers were used, addressing diversity trends in released crop varieties in the twentieth century for eight different field crops, wheat being the most represented. The Abstract further stated that:

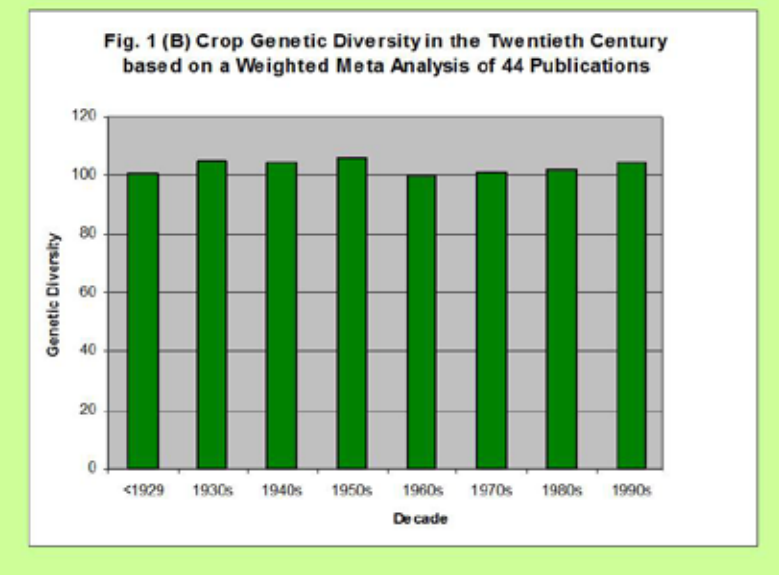
> **"[…] The meta analysis demonstrated that overall in the long run no substantial reduction in the regional diversity of crop varieties released by plant breeders has taken place. A significant reduction of 6% in diversity in the 1960s as compared with the diversity in the 1950s was observed. Indications are that after the 1960s and 1970s breeders have been able to again increase the diversity in released varieties. Thus, a gradual narrowing of the genetic base of the varieties released by breeders could not be observed. Separate analyses for wheat and the group of other field crops and separate analyses on the basis of regions all showed similar trends in diversity."**

The meta analysis combined information on barley, flax, maize, oat, pea, rice, soybean and wheat and included information from many regions of the world. Many of the countries from which information was obtained are UPOV members.

Figure 5 provides a graphical representation of crop diversity on the basis of the meta analysis.

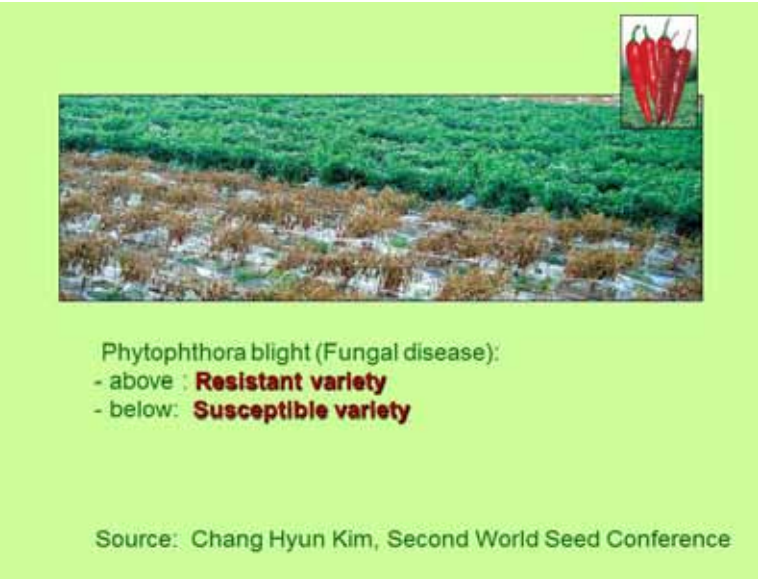
3 Mark van de Wouw, Theo van Hintum, Chris Kik, Rob van Treuren, Bert Visser; Theor Appl Genet (2010) 120: 1241–1252.

Figure 5



Plant genetic resources form the raw material for breeders' work in developing new varieties and diversity of germplasm is an important basis for progress in breeding. The concept of the "breeder's exemption" in the UPOV Convention, whereby acts done for the purpose of breeding other varieties are not subject to any restriction, reflects the view of UPOV that the worldwide community of breeders needs access to all forms of breeding material to sustain greatest progress in plant breeding and, thereby, to maximize the use of genetic resources for the benefit of society. However, it should also be recognized that it is not necessarily beneficial for farmers and growers to continue to grow old varieties. For example, old varieties that are susceptible to disease, requiring more inputs to achieve the same yield, or varieties unsuited to the evolving climate, might represent valuable genetic resources for breeding but would not allow farmers and growers to meet their needs, or those of society as a whole.

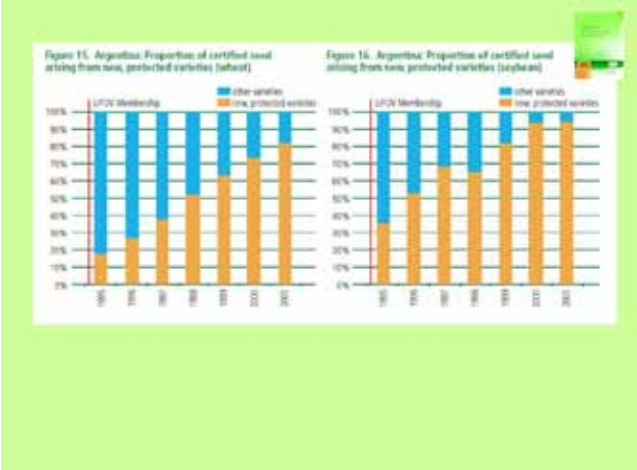
Figure 6



The UPOV system encourages the development of new varieties, in order that farmers and growers have better choices.

The impact of PVP on the improvement of varieties was seen in the Impact Study in Argentina by the extent to which new, protected varieties gained market share, indicating their value to farmers. As shown in Figure 7, for wheat, there was a continual increase in demand for certified seed of new, protected varieties compared to older varieties, rising from 18% of the total area for certified seed production in 1995 to 82% in 2001.

Figure 7



Information and Delivery

In order for farmers and growers to gain the greatest benefit from new, improved varieties, variety choice needs to be based on information on performance and to be combined with availability of good quality planting material.

The conclusions of the "Seminar on Plant Variety Protection and Technology Transfer: the Benefits of Public-Private Partnership" demonstrated the value of plant variety protection for encouraging the development of new varieties of plants that respond to the needs of farmers, growers and consumers and for encouraging investment in the delivery of those varieties to farmers and growers.

Figure 8
Seminar on Plant Variety Protection and Technology Transfer: the Benefits of Public-Private Partnership
Conclusions of the Chair of Session 3: International Research Centers

- 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 SME's, particularly local breeders and seed distributors
- [...]

It is not always recognized that "encouraging the development of new varieties of plants, for the benefit of society" requires investment in breeding, but also investment in:

- researching the needs of farmers and growers in order to establish breeding goals
- assessing the performance of varieties
- providing information on variety performance to farmers and growers
- producing and delivering high quality planting material at the critical time

The following presentations illustrate the role of PVP in support of delivery of varieties that are suited to the needs of farmers:

Mr. Stephen Smith, Pioneer Hi-Bred International Inc. (United States of America)
Investing to deliver the varieties that farmers and growers need

Mr. Smith explains that Pioneer has a huge diversity of farmer-customers, from those with 1 hectare plots in China to 1,000 hectare farms in Iowa and to 5,000 hectare farms in Brazil. Nonetheless, across this diversity, all customers have one thing in common—each is looking for seed that will work for them and meet their needs; seed that will be a good investment for them and for their family. He concludes that the genotype x environment interactions that occur between plants and their environment are inescapable realities that plant breeders and farmers seek to manage and to optimize.

Mr. Vuyisile Phehane, Agricultural Research Council (South Africa)
Delivering high performance varieties to subsistence/small-holder farmers

Mr. Phehane explains that, as a public entity in South Africa, the Agricultural Research Council (ARC) is obliged to ensure that the outcomes of its research and development initiatives are effectively disseminated. To that end, the 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. Licensing of the transfer of varieties to smallholder 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 smallholder farmers 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 agribusiness. This royalty-free period would be carefully managed, ensuring the recipient understands their contractual obligations (for example protection from unauthorized propagation, performance milestones and periodic reporting on commercial activity). Mr. Phehane provides the following examples and models of the delivery of high-performance varieties to smallholder farmers: Collaboration with rural-based universities for the delivery of sweet potato varieties; Development of floriculture-based rural enterprises in South Africa; ARC's contribution to the development of smallholder farmer citrus producers; and Provision of access of ARC-bred wheat varieties to smallholder producers.

Opportunities for Added Value

In addition to encouraging the development of new varieties of plants that respond to the needs of farmers and growers, PVP also provides opportunities for farmers and growers to add value to their produce. The following presentations illustrate some of the ways in which PVP provides such opportunities:

Mr. Simon Maina, Senior Inspector, Kenya Plant Health Inspectorate Service (KEPHIS) on behalf of Mr. Stephen Mbithi, Fresh Produce Exporters Association of Kenya (FPEAK)
The experience of small-holder flower growers in Kenya

The experience of FPEAK in vegetable and flower production illustrates the role of PVP in enabling smallholder participation in the value chain.

Mr. Philippe Toulemonde, President of Star Fruits (France)
The use of plant variety protection to add value for fruit growers

The information on Star Fruits highlights the way in which plant breeders' rights, combined with trade-marks, allows supply of fruit to be aligned with demand and provides traceability from the orchard to the consumer. PVP enables all the actors (breeders, nurseries, producers, packers, distributors) to participate in the overall project and to benefit from its success.

Mr. Eduardo Baamonde, Director General, Cooperativas Agroalimentarias (Spain)
Adding value for grower cooperatives

Mr. Baamonde explains the aims of grower cooperatives in introducing new varieties. In addition to the agronomic qualities that new varieties bring, such as increased yields, disease resistance and early maturity, reference is made to the market quality of new varieties and the way in which PVP has enabled the development of Spanish cooperatives. Examples are given of how innovation has enabled the Valencian Community and Anecoop to achieve success for their farmer members.

Mr. Oscar Stroschon, Sementes Produtiva (Brazil)
The use of plant variety protection to add value for farmers in Brazil

Mr. Stroschon's story illustrates how the introduction of PVP in Brazil enabled him and other farmers in Brazil to have access to the new varieties that enabled the country to transform its agricultural productivity.

The Experience of Small-Holder Flower Growers in Kenya

Mr. Stephen Mbithi,
Fresh Produce Exporters Association of Kenya (FPEAK)

I am a farmer and I represent farmers. I am going to speak about intellectual property rights and food security from that perspective. In Kenya we have a vibrant horticultural sector – fruits, vegetables and flowers. It is largely small holder farming and that is what I represent. Furthermore, I represent also the Horticultural Council for Africa. That is an association of 13 private sector organizations from 11 countries, comprising for example pineapple producers from Ghana, flower and vegetable producers from Ethiopia, bean producers from Egypt and farmers in Tanzania, Uganda, Ruanda, Malawi, Zambia, Zimbabwe and South Africa. We work together with the objective to facilitate trade with the products concerned. So, I shall talk about agriculture, but more from the point of view of a fresh product farmers, a horticultural producer.

Let me start with an introduction to horticulture in Africa: it is a fast growing sector. In some countries it is growing by 14% in terms of value per year. A huge part of the production is for domestic consumption, difficult to quantify since we are speaking about fresh produce. Domestic consumption sometimes amounts to 95% in terms of volume and 65% in terms of value of the total production. Export is always the smaller part. However, for two countries, South Africa and Kenya, the value of trade in fresh produce exceeds 1 billion US dollars per year. For South Africa, that trade concerns essentially fruits and, to a lesser extent, vegetable and flowers. In Kenya, it is 50% fruits and vegetables and 50% flowers. Of course, what matters for export is high value and low volume. You would not export cabbages by air from Kenya to Europe. However, the situation is different, for example, for green beans and flowers. For Kenya, revenue from horticultural exports of 1 billion US dollars is a considerable economic factor. It exceeds the income from tourism, tea and coffee exports. That is just exports; the value of the domestic market, difficult to assess, is estimated at another 2 billion US dollars. Those are clearly impressive indicators of the economic relevance of the sector, at least for an African country. It is important to note that, in this context, post harvest losses are estimated at 30% of volume. Improvements in that respect would obviously have a major impact on food security.

In Kenya, horticulture or fresh produce provides employment for about 4.4 million people, directly or indirectly. Those comprise growers and farm workers, people involved in the value chain – transporting, merchandizing, processing. That amounts to 11% of the working population. Those figures may give you an idea of the social relevance of the sector for Kenya. Fruit and vegetable growing is essentially a matter for small holders. They contribute 70% to the overall production. Those farmers have one or two acres. Actually, in Kenya at the moment, the largest exporting companies which provide the world market with fresh horticultural produce heavily depend on small holders. There is a strong integration; regardless whether you are a small scale or a large scale exporter, the basis of your business is small scale horticultural production. Those one or two acre farmers cumulatively in the last two years have had average earnings of about 350 million US Dollars per year. They are semi-schooled farmers, some of them with limited formal school education. But they actually know very well how to grow vegetables to the standards required in Europe, the most demanding market. The basis of their participation in that chain from production to the market is their ability to meet international standards of food safety in the first instance and other environmental and social standards. Of course, uniformity and quality standards are a key to market success. They depend essentially on the proper choice of the plant varieties to be grown.

What is the food security dimension of horticultural production in Kenya? The first reality is that land holdings in Africa, and in Kenya especially, are fast shrinking. At the moment, the average size may be about 2.5 acres of land per household in Kenya. In areas with higher agro-climatic potential, the holdings tend to be even smaller, perhaps around 1 acre. That is the case in many parts of Africa. In some countries such as Rwanda, it is even worse. That is what needs to be noted in the first place: there is a squeeze on land.

The second reality is that farming continues to be by far the main source of livelihood. It is not an option for most families in Africa to easily diversify their sources of livelihood. Except in those few countries where, for example, mining is significant, in the vast majority of situations land is the basis of income. Certainly, other sectors such as manufacturing, services and high tech activities are starting to grow, but it will take considerable time until those sectors will absorb a larger part of the work force.

With those two realities, you have to respond to the basic needs: one is food – food security, the other one is medical care – medicine and medical treatment and the third one is school fees – education. Farmers with little land as the only basis of income and a family to care for tend to react very rationally. They will go for high value agriculture with the objective to maximize economic return per unit of area. We see that increasingly in Africa. That is the main reason for growth of horticulture in Africa. There is no particular need for promotion of horticulture. It is just obvious to the farmer that half an acre of tomatos feeds his family and the surplus money pays for medical care and for the school fees of his children much better than half an acre of cassava. If, however, a farmer has 100 acres, the ration between land and available work force might be very different and, therefore, the economically appropriate production pattern might also be different. That farmer might wish to make the best use of the limited work force of his family and might go for staple crops which are less labor intensive to grow such as maize and cassava. Thus, given the small size of holdings in Africa, there is a need to maximize the revenue per unit of land, and that means horticulture – fruits, vegetables and also flowers. Even some very small scale farmers in Kenya are producing what we call summer flowers, less demanding flowers which can be grown in the open field.

The real issue with food security in Africa and in Kenya specifically – and I am saying that as a farmer – is not production, it is the market. Farmers have suffered far too long because it does not pay to be a farmer. Therefore, they tend to neglect their farm because it does not solve their basic needs. It needs to be good security, not food self sufficiency. Small scale farming can work very well if it is market oriented, regardless whether it is the domestic or the export market. What matters is food in the pocket of the consumer, not in the granary. We have hunger in Africa because the markets do not function properly, farming does not pay. If the markets were functioning properly, farmers would respond rapidly.

What does intellectual property mean in this context? Firstly, to produce for a demanding market – and 82% of our horticultural production for export is for the European market – you need to be able to comply with high standards and to offer uniform products. For example, beans from Kenya with a particular texture and taste and other quality parameters are uniform and very predictable. That is only achievable through superior varieties which need to be bred by somebody. That brings us to intellectual property rights. We have 150,000 small scale farmers who are entirely dedicated to export horticulture in Kenya. You can multiply that figure by ten to get the total number of farmers who depend entirely on export horticulture (previously, I mentioned 4.5 million people in total working directly or indirectly in the entire horticultural sector). Secondly, in order to be competitive as a small scale farmer you have to be very productive, you need to lower the cost of production. If you have a variety that does not produce optimally you will be struggling to make the margins because commodity markets for fresh fruit use are so tight that the margins are very narrow. It punishes you to have an inefficient production system. That may include, in the future, genetically modified varieties that may be doing quite well. Thirdly, in fresh fruit production, you need to be very quick at adapting to new technologies – a new flower color or a new bean variety that the consumers prefer.

What is the way forward? IPRs in developing countries for small holder farmers are extremely important. It is most important to understand that smallholder farmers are able to integrate in the value chain of any market in the world. They are successfully doing that. For them to be competitive, IPR is an important tool. They need technologies and varieties that come through IPRs. Good IPR mechanisms promote innovation. We need somebody to invest in that kind of knowledge and that, of course, stimulates technology transfer. In a country such as Kenya, which has signed up to IP conventions, it was with a view to promoting investment by breeders through protection of their rights. The horticultural sector appreciates that: it is good for the farmer; it is good for the breeder. We are increasingly seeing that IPRs are becoming a very important tool for market access. Increasingly, we are seeing that as soon as a new variety is developed, the markets are actually demanding that variety. However, we need a mechanism for ensuring fair play, which recognizes breeders and growers as key players.

The use of Plant Variety Protection to add Value for Fruit Growers

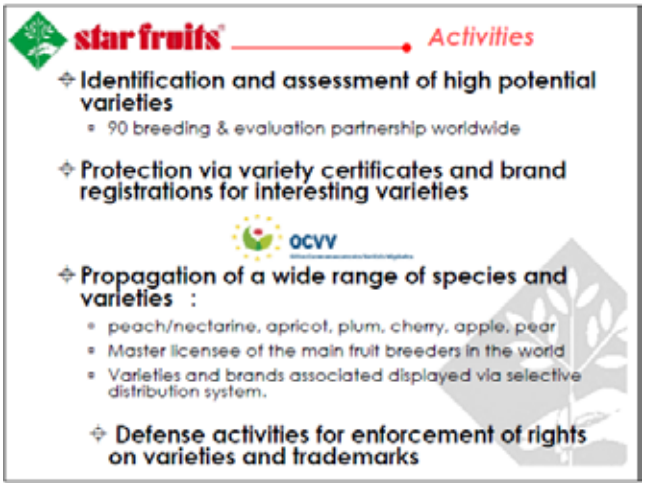
Mr. Philippe Toulemonde,
President of Star Fruits (France)

I am not a doctor or an institutional body, I am a real farmer and am involved in the nursery. So before I start the presentation, I would like to say that intellectual property in the fruit industry is something that we have been using for more than 40 years and, moreover, in France, we have the chance to have respect for intellectual property and in the difference methods for the protection thereof. We are used to working with intellectual property and plant breeders' rights (PBR) and, in the fruit industry, I think we have a good knowledge from the grower and the distributers about respecting royalties and PBR. We can develop a protected variety and have a good acceptance within the fruit industry for the system of protection.

My presentation will be in three parts: the first part is a quick presentation on the Starfruit group to understand what we are doing, the second part is on the added-value of the plant breeder's right (PBR) for the fruit industry and the growers and to give you an example with "Pink Lady®" that we developed in Europe and a third part is on what we are doing with PBR in the fruit industry.

Starfruit is a group of French nurseries in the South of France and we were, at the beginning, more involved in peaches, nectarines and stone fruits, but also in apple and pears. In 1968, Starfruit was created to encourage international breeders to introduce new varieties in Europe, mainly in France, and to develop these varieties for the European industry. So, initially six nurseries were involved in the production of fruit trees and the goal of Starfruit was to create a research & development service and to benefit from the confidence of international breeders to give us the varieties best suited for multiplication in France, but also in the rest of Europe. Nowadays there are four nurseries in the group, some of whom are second generation, as was the case for me, and some of the partners are third generation. We have eight employees in the Office and we are based in the south east of France – in the Rhone valley and along the Mediterranean Sea.

The goal of Starfruit was to be the link between breeders and the production of fruit and trade operators. The role was to provide plant material of the new varieties to the Starfruit members and also we developed our own varieties to sell to other third party nurseries. Our aim was to generate interest in innovative varieties and satisfy consumer expectations but, at the end of the day, we needed to motivate the consumer and provide consumer satisfaction by way of high quality of the product. It was essential that, now and in the future, the benefits of these innovations were protected by the PBR. We also sought to develop selective distribution systems and the coordination of technical inputs, because for new varieties you need to have very good agronomic support and you also need to have a marketing program to develop the product.



The identification of the variety – you see we have 90 breeding and evaluation partnerships worldwide. Following the identification of the variety in the breeding program we need to protect these varieties, because if we do not protect the variety, we cannot do anything. We have been protecting varieties via a PBR system for the last 30 years and brand registration for commercially valuable varieties. We propagate a wide range of species: peaches, nectarines, apples, cherries, plums, pears, apricots and we develop variety and brand association as displayed via a selective distribution system.

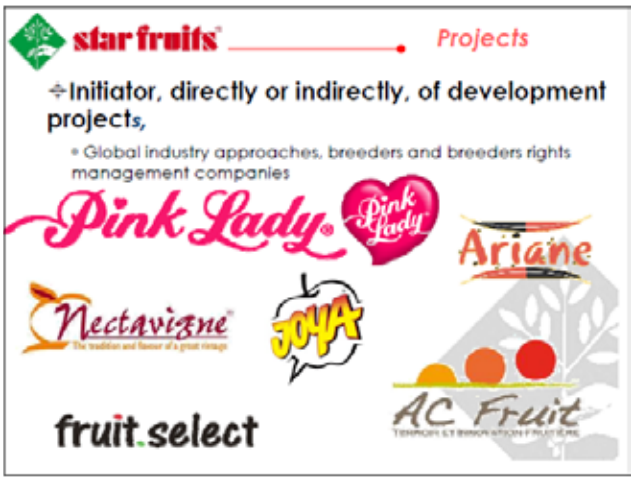
A key point of the whole system is enforcement of our rights. As I said before, in France there is a respect for protection within the fruit industry, but there is always temptation from outside the system. So PBR plays a vital part in the defence of the product in France, but also, in other parts of Europe, when we develop a variety we need to protect our varieties with PBR and to enforce those rights.

Here you can see examples of different partnerships that we have developed over 40 years. First of all, with INRA/Novadi with a scab-resistant program we developed the apple variety "ARIANE" – perhaps you have heard of it.

In peaches and nectarines we have a French program run with Monteux Caillet. We developed a relationship with Dr. Tupy in UEB-Prague – another scab-resistant program for apple. With Bradford, in California, for peaches, nectarine fruits; with Rutgers, in New Jersey (United States of America), for peaches, nectarines, cherries and apples and in Canada, with Harrow-Vineland, for peaches, apricots and pears. With the Department of Agriculture of Western Australia (DAFWA) in apples – the most famous of which are Cripps Pink and Cripps Red, and with PREVAR, a New Zealand company working with an apple and pear research program. So it is a very international network. It is not only domestic, but also international and it is in the interests of the farmer to be able to access all these new varieties.

On the agronomic side we identify the best varieties and after that we develop them – and one of the best ways to optimize the value for the grower is with brand development: we do this with the grower, with the packing station and the marketers. The aim is to understand and to satisfy the consumer needs. This we have done with Pink Lady®, Ariane, Nectavigne®, Joya®, AC Fruit. In this way, we follow the whole activity, from the breeders to the consumers.

Before coming to the added value for the grower, I should just remind you about the added value in plant breeders' rights. First of all, breeding creates a source of innovation, of capital gains for producers – so it is an opportunity for the grower to differentiate his variety from those of his competitors. It improves fruit quality due to the fact that you give to the consumer the best fruit in way of taste, coloration, storage, etc. It leads to improvement in cultivating practice – less pesticides, for example, for scab-resistant varieties. We try to improve the growing methods. A virtuous circle – if the grower gets added-value with a PBR variety, it is a way of investing more, so that we are able to give back to the breeders some financial results and resources so that they can continue their breeding programs. It is a virtuous circle to try and supply the fruit industry with the best products.



Moreover, with PBR, we have the capacity to organize the production or the distribution and to put the emphasis on a quality approach at all the different stages of production.

Finally, with PBR, we have the possibility of taking action against any infringement, which is synonymous with 'loss'.

The use of the protection of the plant breeder is a creation of added-value and I will take the example of the variety club. I am not sure if you are familiar with this in other areas such as seed, but for about the last 15 years, in the fruit industry, we have organized a marketing club. The goal is not only to give the farmer a good product – at the end of the day it is to inform the consumer of the quality of the product and to have a complete circle of good work practices. We can do that using PBR and the trademark. PBR is effective in the agronomic field and the trademark is effective on the shelves of the supermarket chain. In this way we can ensure the continual improvement from the orchard to the point with sale.

PBR is the cornerstone of the collective organization and of the global organization. Without PBR you know the difficulties of agriculture when production is spread out between more than 10,000 growers in Europe. With protection you are able to regulate and organize the production. PBR is the basis of the collective organization.

In this way we prevent any uncontrolled production of our varieties and with the European survey we are able to make contracts with all the different partners of the fruit industry: starting with the nursery, after that the nursery supplies the trees to the grower (so we contract with the grower), the growers produce the fruit and give the fruit to the packing station (so we contract with the packing station) and finally the fruit packed by the packing station is bought by distributors or fruit marketers. So in this way we can organize the development of the variety through and with all the partners of the fruit industry.

But it is not only a juridical point, PBR facilitates a quality policy and in this way we can oblige all the partners in the industry to adopt high technical practices at every level of production, with special specifications. We can also define the best place for the variety to be grown. As there is a difference in climate between Finland and Spain, it can be quite different between Belgium and the South of France, so we can define the best choice of the area in which to produce the fruit.

With this kind of contract we can define the specifications of the tree, the fruit, the packing, the storage –specifications at each level of production. By doing this, we are able to ensure the best products for the consumer. Equally the aim must be to achieve a sufficient level of production to meet demand throughout the season. If you want a consumer to come back to your product, you need to have a high level of quality.

PBR together with a trademark enables our kind of organization to have a rational development policy. This means adaptation of supply to demand, which is a key point in the fruit and agriculture areas. Very often you have oversupply so the price goes down and we lose money. Or there is undersupply, so farmers and growers do not have enough production and they lose money. So in the fruit industry we need to able to marry supply and demand. With the contracting of the production, we are able to have traceability from the first fruit to the point of consumption and we are able to do that when you have the participation of all the members of the fruit industry involved in the strategy of the organization.

PBR together with a trademark, also enables us to have a marketing policy which generates added value. It is the same as in industry, you define a global marketing plan: first the product, you need to have the best product; and you apply the same rules ... you can't have a successful marketing plan if you don't have a good product! That is a result of successful experimentation and selection. Then you can put in place communication and advertising strategies, since you regulate production you can invest in communication and advertising. You can also set up a commercial policy with trade activities on the shelf and in the supermarket. It is a complete marketing plan. You can also take into account the political environment, because each country is different. You can take into account the type of distribution relative to that particular country and competition with other varieties. At the end of the day, you manage your product taking into account the global competition.

In this collective organization, you need to take defensive action with regard to PBR and the trademark. You need to act by defending your right, internally in your organization to ensure that all the members respect the collective rules, and externally, from the production of the trees to the supermarket chain. PBR allows you to take action against any infringing production. You can completely manage your product. The trademark on the supermarket chain enables you to fight against imitations or other cases of infringement.

In conclusion, the advantage of plant breeders' rights and trademarks together, is that you are able, via a collective organization, to manage production, you work on the quality, you try to maintain the best balance between supply and demand, you are able to put in place a marketing policy and you act against any infringement. At the end of the day, you arrive at consumer satisfaction and with consumer satisfaction you motivate the consumer to buy your product again, therefore adding value for the production and also for the for the grower and the result of this combined strategy is to give the means to the grower to be able to produce a good product, to invest in their production technologies in order to be able to meet all specifications and, at the end of the day, to satisfy the consumers throughout the season.

You see we can only do all of this due to the fact that we have plant breeders' rights (PBR). Without PBR you are not able to organize such widespread production with growers. But with PBR we are able to organize in a coordinated way the whole industry and each partner has his role to play – hence the Variety Club is the way we have found to do this successfully in the fruit industry with all the partners.

An example of this collaboration is "Pink Lady®", a new apple fruit developed from 1995 in Europe and also globally. At the beginning it was just another apple, the only difference was that the color of the apple was pink and not red, yellow or green. We thought that we could do something with it due to the fact that the coloration was good and the eating quality was unique. We needed to specify the characteristics of Cripps Pink, to develop the new system. "Pink Lady®" was one of the first branded varieties developed in the organized system. Star Fruit is the holder of the rights for 'Crisp Pink' and 'Rosy Glow', (a sport imitation of 'Crisp Pink'), apple varieties in Europe and we also have the exclusive license for the trademark 'Pink Lady®' so we worked within the fruit industry, with growers and marketers, informing them that we had an interesting product which we needed to develop further by working together. We did this with three French marketers. Although many growers hesitated to participate at that time, as of today we have 3000 growers, 14 European marketers in Spain, France and Italy, and we sell 140,000 tonnes in Europe and outside Europe. So it is a globally managed licensing system, based on a peer-to-peer arrangement with each partner of the license. We deal in sub-licensees and other licensees that the 'Pink Lady®' approach are members of the 'Pink Lady Europe Association' – starting with the nursery, the growers, the packing stations, the European marketers. The goal of the group is to satisfy the consumer.

'Association Pink Lady® Europe' is dedicated to the marketing and quality program for the 'Pink Lady®' apples produced in Western Europe. It consists of a team of 15 people. We have a contract with any grower, for each orchard (4,000 hectares in Europe at this time), each tree of each orchard is checked for authenticity of the legal origin of apple trees and well as fruit displayed on the market (that's through the trademark) and we have only one style of packaging. We cross-check data due to the expected production by each orchard to ensure the respect of the right of the trademark. Quality product and presentation are standard for apples released on the market under the 'Pink Lady®' trademark, we have the office "Veritas" in the European market checking the fruit in the supermarkets chains to see that the marketers respect the specifications. That is an intensive production and quality inspection program, which gives us the confidence that the consumer will be able to find in any market in Europe the quality of 'Pink Lady®'. It is in this way that we are able to maintain 'Pink Lady®' as a premium apple in European and worldwide stores.

Investing to Deliver the Varieties that Farmers and Growers Need

Mr. Stephen Smith,
Pioneer Hi-Bred International Inc. (United States of America)

Agriculture must serve both food production and environmental service needs to be sustainable.

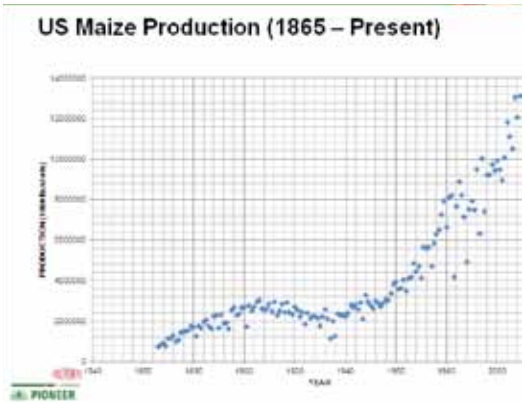
The world population is on the rise; increasing exponentially. We are at the 6.4 billion mark today, and the population is projected to reach 10 billion by 2050 and over 11 billion by 2100. Present and projected future population exerts enormous pressure on natural and managed ecosystem goods and services. It is imperative to find ways to produce enough food and fiber and other services in a sustainable manner. This means agriculture will need to contribute to reducing soil and ecosystem degradation, maximizing the effective use of available water, minimizing contamination of natural waters and while decreasing net CO2 emissions and other greenhouse gases. These are monumental tasks and challenges, and offer abundant opportunities for research and product development of new more productive crop varieties and husbandry.

To meet the expected future demand for food at today's yields would require either ploughing up 73% of permanent pastures of rangelands, or converting 63% of forest and woodlands to crops. However, since the most productive crop land has already, for the most part, been taken into cultivation, these lands would generally be less productive, so even more ploughed land would be needed. These solutions would be a heavy charge on the environment and are not sustainable. Therefore, the increase of yield on existing cultivated land is imperative.

Genetic-Plant Breeding Solutions

To further emphasise the importance of increased yield or crop productivity, examine the US land area that has been used in the cultivation of maize from 1865 to today (Figure 1). Land area under maize cultivation increased from 1865 and peaked in 1920 as farmers trekked west, opening up prairie and other lands. Then from 1920, the land area under maize cultivation fell until 1970, where it had reached the level that previously obtained around a century earlier in 1875. Since 1975, the land area devoted to maize in the United States of America (US) has risen on average over the years reaching levels last seen over a century earlier in the 1890s.

Figure 1



Let's review the amount of maize produced in the US across this same time period 1865 – today (Figure 2). From 1865 to 1920, although the land area under maize cultivation nearly quadrupled, maize production fell behind that trend and just about doubled. Even more dramatic is the contrast in land area under maize cultivation and maize production post 1920. While land area under maize cultivation fell to levels previously observed in 1875 and then to 1890 levels, maize production during the period 1970 – 1975 consistently rose to levels threefold of that a century earlier. By 2010, US maize production had reached fivefold the level compared to 1920—a period when the maximum amount of US land area was growing maize.

Figure 2

How can this disconnect between land area under maize cultivation and total US maize production be explained? Figure 3 provides the answer. It is the increase in maize yield per unit land area that provides the explanation. Studies by Don Duvick and colleagues and by others have been conducted specifically to determine the factors that have contributed to this yield advance. These studies measure yield of hybrids developed in different eras encompassing the 1930s to the present when grown at three different planting densities but otherwise under exactly the same agronomic conditions. These studies have shown that approximately half the yield advance is due to genetic change brought about by plant breeding. Other contributions have come from improved crop husbandry, significantly including the adaption of plants to higher planting densities by virtue of increasing their stress tolerance to crowding, heat, and drought stress. A preliminary analysis of genetic gain data from the Pioneer maize era studies (Figure 4) suggest that the rate of genetic gain has increased from the mid-1990s; the primary contributors to this enhanced genetic gain are likely to be through breeding effort that has been increased both in amount and in efficiency.

Figure 3

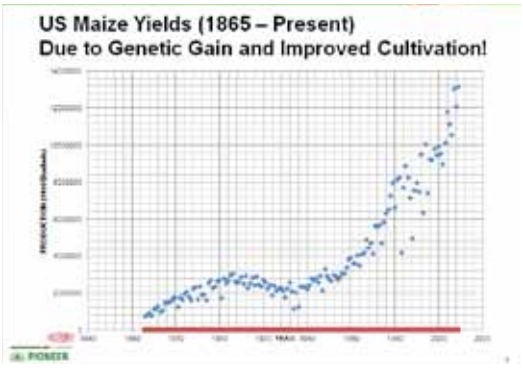
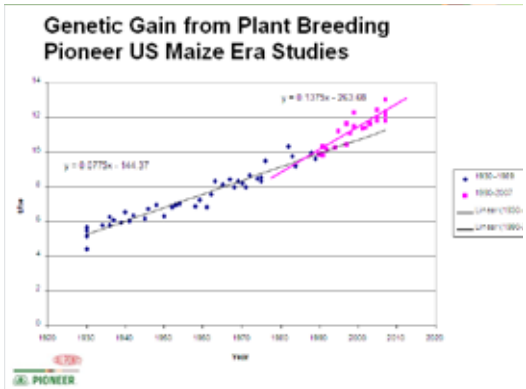


Figure 4



Investments in Research and Product Development

In 2011, DuPont invested approximately just under $1 billion into agricultural research and product development, close to a doubling of its research investments into this area since 2003.

Intellectual Property Protection

Investments into research and product development are made by the private sector because of: 1) possibilities to create new improved products that farmers will purchase as investments for their farming operation and their family; and 2) because products can be protected effectively as intellectual property and thus provide prospects for a sustainable business opportunity for DuPont; this is provided we are able to develop products farmers need and at the price they are willing to pay compared to our competitors. We take advantage of the full array of IP instruments depending upon their availability. These include:

- **Plant Variety Protection**
  Available globally, provides an essential level of protection with the 1991 Act of the UPOV Convention — providing an improved balance between traditional multi-trait breeding and more specific trait improvement including via the use of transgenics
- **Patents**
  Essential to encourage longer-term, higher-risk R&PD activities including to develop transgenics and to introduce a broader base of genetic diversity for multi-genic traits from initially unadapted or exotic sources
- **Trade Secrets**
- **Contracts**

Pioneer's customers

Today, Pioneer does business in more than 90 countries around the world; our success is inextricably tied to that of our customers. We have a huge diversity of farmer-customers from those with 1 hectare plots in China to 1,000 hectare farms in Iowa and to 5,000 hectare farms in Brazil. Nonetheless, across this diversity, all customers have one thing in common—each is looking for seed that will work for them and meet their needs; seed that will be a good investment for them and for their family.

Finding the Right Product for the Right Acre

To be successful in meeting these customer needs it is imperative that we know the agronomic circumstances (e.g., soil type, maturity, pests and diseases) and the needs of the farmer-customer. This knowledge is reinforced by seeking their continuous feedback including their participation in helping to decide which varieties we sell and in seeking their continued performance reports across a large and diverse line-up of varieties that are well documented, not only for their performance attributes, but also their shortfalls.

Our goal is to have very satisfied customers. Farmer-customers ultimately cast their vote on our (and our competitors') abilities to serve their needs during the annual sales season. The breeding goal is to provide the right product on the right acres to help growers maximize their productivity and profitability. Since 2006, Pioneer has doubled its investments in sales, seed distribution, and services including agronomy and GPS field mapping all with the goal of providing improved support to our customers.

To be successful, plant breeders must know the field environments of the customer. Genotype x environmental interactions between the plant and the environment are critical factors that plant breeders must manage in their breeding. Pioneer accordingly partitions a region into product evaluation zones within each of which there are similarities according to weather, crop maturity, and prevalence of diseases and insects. Breeding and product advancement takes place at the local level. By having clear evaluation criteria for potential new varieties within specific target environments we are able to develop the best products for the areas they are intended for.

Each year, for example in our North America maize breeding program, hundreds of thousands of new inbred parent lines of potential new hybrids are created. These are then tested over the next 4 – 5 years resulting in 10 – 20 new products. Meanwhile, the generation of hundreds of thousands of new inbred lines and their subsequent testing continues each year. Enabling technologies such as ultra high-throughput molecular markers, information management, use of double haploids, off-season nurseries, and improved phenotyping increase the throughput and efficiency of the breeding process. As numbers of new potential inbred lines decrease, so does the number of yield test locations and the rigor by which they are evaluated increases. A final stage in field evaluation is using Intensively Managed Product Advancement Characterisation Training (IMPACT) Plots. These plots are planted on farms, currently with 150 such locations on farms in the State of Iowa alone. It is unlikely that all areas of a field will have the same soil type, water or nutrient holding capacity. Therefore, we also work with farmers to map their fields for performance levels using GPS equipped combines to allow more specific placement of fertilizer, or planting densities to maximize yield performance.

All of the painstaking effort of plant breeders is lost if the improved genetics that have been bred into a seed then fails to germinate! It is therefore crucial to have a management system which takes the seed from the breeder and then produces it in volume and delivers the best quality seed to the customer. Hybrid seed is carefully produced and transported to a seed conditioning facility (known locally as a seed corn plant) for drying, shelling, seed sizing, application of seed treatments, bagging, and storage under a controlled climate. Seeds are carefully monitored for quality during this whole process. Each seed corn facility costs approximately $40 – $55 million to construct.

Conclusions

The genotype x environment interactions that occur between plants and their environment are inescapable realities that plant breeders and farmers seek to manage and to optimize. Local issues drive local product development. For example, soybean breeders and farmers situated in the north and northwest US have one set of challenges (iron chlorosis, phytopthora, cyst nematode, white mold) while those located in the southeast US, in addition to being in a completely different maturity zone have additional challenges to contend with (root knot nematode, stem canker, frogeye leafspot, sudden death syndrome).

Teamwork is essential across research, sales, marketing, agronomists, and seed production. The team must:

- Know the agronomic situation and needs of the farmer-customer
- Translate those needs into goals for the breeder
- Conduct the most efficient and effective plant breeding
  - » Well characterised genetic diversity, improved selection via genotyping and phenotyping
  - » Rigorous testing of the genetic basis of agronomic characteristics
- Use performance trials on-farms to determine if varieties are suitable for commercialisation
- Provide excellence in seed production quality
- Provide excellence in agronomic advice services to farmer- customers
- Develop a broad array of different commercial products that are well characterised
- Seek continuous feedback from farmers on variety performance

And the Pioneer team has to be one team with the farmer-customer.

Adding Value for Grower Cooperatives

Mr. Eduardo Baamonde,
Director General, Cooperativas Agroalimentarias (Spain)

The development of new plant varieties is of vital importance to the agricultural sector, not only with regard to the progress made so far, but also in terms of changing circumstances, which may, in the future, give rise to challenges that require new solutions.

In the past, the development of new plant varieties has contributed much to the agricultural sector in terms of vital elements such as: increased yield, disease tolerance, adaptation to specific agro-climatic conditions, improvement in terms of industry- and market-driven quality characteristics, etc. Without these contributions, the sector would not have been able to respond to global food needs.

Undoubtedly, given the current situation, the defense of plant breeders' rights is vital to the continuation of research work to improve varieties, with the aim of meeting the requirements of the market.

The development of new varieties stands for dynamism, modernity and permanent innovation. If we wish to remain competitive in a global system, then we must ensure that these features become a permanent part of the European grower sector. In this regard, it might be useful to imagine for a moment what the consequences would be if Europe had not supported biotechnology for 20 years.

The aims of grower cooperatives in introducing new varieties:

Increased yields. Over the next few years, the world will be faced with a challenge of global proportions, how to feed an ever-increasing population, with higher purchasing power, given that natural resources are limited, over-exploited and under constant environmental pressure. According to the Food and Agriculture Organization of the United Nations (FAO)[4], by 2050 the world's population will have risen by 50 per cent, growing to over nine billion inhabitants. In order to provide for that number of people, the agricultural sector will have to increase productivity by 70 per cent.

Moreover, we need to take into account environmental factors. European farmers and growers have made a huge effort to adapt to a plethora of requirements: cross-compliance, directives on the protection of waters and wilderness, a directive on nitrates, regulations on the control of polluting emissions and greenhouse gas emissions, a directive on the sustainable use of pesticides, a directive on waste, etc. The development of new varieties remains one of the few ways of increasing yields while allowing us to maintain our current approach in this area.

Disease resistance. Another of the main objectives in terms of work to achieve improvement over the past few decades has been disease- and, to a lesser extent, pest-resistance. Virus infections and bacteria can limit yield to the point of rendering cultivation unfeasible. Varietal improvement has resolved major problems affecting cultivated varieties of fruits and vegetables that could have endangered their future as crops in certain areas.

We are currently faced with a major challenge. The European strategy on the sustainable use of plant protection products introduces a new concept in terms of the control of pests and diseases, with the clear aim of reducing the use of plant protection products.

4 www.fao.org/fileadmin/templates/wsfs/docs/synthesis_papers/C%C3%B3mo_alimentar_al_mundo_en_2050.pdf

Earliness. This allows us to stagger the season, supply the markets and avoid over-production.

Organoleptic quality. The aim here is to find new varieties that fulfill completely all the requirements of the agri-food chain, both in terms of satisfying consumers' tastes and adapting to the markets.

Spanish cooperatives are currently working along these lines. Our efforts in the fruit and vegetable sector are concentrated on initiatives such as that involving the persimmon, which demonstrate that innovation in terms of fruit and vegetables not only helps to improve appearance and length of shelf life, but also contributes to the creation of new products. One case in point is that of the Valencian Community, where, in one decade, what was once a regional product with a limited market has been transformed into an increasingly popular commodity, exported to the centre of Europe.

Another example to be highlighted is the Bouquet watermelon. This fruit was the first seedless watermelon, breaking into the European market in 1992 thanks to the support of over 40 cooperatives which took part in the project. As a consequence, Anecoop has an advantage over other brands of watermelon, in that it has 15 years of experience in terms of innovation in the field. Recently, the "mini" watermelon was launched, an entirely different concept designed to adapt to the changing circumstances of consumers.

Climate change. Many plant species are able to adapt well to different agro-climatic conditions, but varieties behave differently from one area to the next. Therefore, there is an ever-increasing need for varieties adapted to differences in terms of water consumption, radiation, soil types, temperatures, low levels of inputs, etc.

Climate change is one of the main challenges facing us in the future and will play a significant role in terms of approaches to improvement.

According to a European Commission Green Paper of 2007[5], Spain will be one of the countries most affected by climate change, with agriculture being the worst hit of all sectors. The European Commission warns that, unless steps are taken, by the end of the century we could see a fall in yields of up to 30 per cent as a result of climate change and other issues such as desertification, erosion, forest fires, increased salinization and the appearance of new pests and diseases.

In order to tackle these possible new scenarios, we will require specific research, development and innovation (RDI) strategies focusing on crop-selection and the development of varieties that are better adapted to the new conditions, together with sustainability in terms of the sensible deployment of resources and the more economical and intelligent use of water, energy, waste products, etc.

The development of new varieties will doubtless be inhibited if breeders, the group committed to research into new varieties, are not compensated for their efforts. In Spain, we already have data showing that the situation in a specific sector, cereals, is as described above. Very few firms involved in breeding activities have plans involving improvement in Spain. Rather, they are concentrating on adapting varieties developed in other countries, where the agro-climatic conditions are very different from those of my country, hence the importance of the protection of new plant varieties for farmers and growers.

Meanwhile, efforts to offer profitable solutions to growers and breeders must continue. Let us not forget the "farmer's privilege", which allows farmers to save and re-use harvested seeds for the next season, and is recognized by the International Union for the Protection of New Varieties of Plants (UPOV). Indeed, in Spain, a little more than a year ago we looked into this complex situation with the aim of safeguarding the rights of both the farmer and the breeder, because we are aware that such an approach will be vital with regard to future work in terms of research and improvement.

5 http://eur-lex.europa.eu/LexUriServ/site/es/com/2007/com2007_0354es01.pdf

In order to have the best varieties we need to trust and invest in technology. There are two ways of doing this: either we provide funding for programs run by third parties, or we invest in our own programs.

As cooperatives, we have a duty to blaze a trail in this regard. Bearing in mind that the markets are our objective, we should never lose sight of the growing phase and this means that we have an obligation to back plant improvement.

Working from Spain, we are trying to create synergies between grower cooperatives and breeders, with the aim of fostering a much closer relationship between innovation and cooperatives. As to supporting domestic programmes, we have initiatives such as Agrovegetal, which, after barely more than 10 years developing varieties of durum wheat, has now become a reference point for farmers. Cooperatives are also making significant progress in terms of fruit crops, with large-scale investment in their own programmes.

In general, for many years now, cooperatives have been demonstrating the importance of backing and committing to new plant varieties: Limagrain, Lantmännen, Maïsadour, etc. Those groups opted to develop varieties for their members and are now world-famous in this field, offering not just new and improved varieties but also a high level of added value to their growers.

The use of Plant variety Protection to add Value for Farmers in Brazil

Mr. Oscar Stroschon,
Sementes Produtiva (Brazil)

Good morning, Ladies and Gentlemen. As a Brazilian farmer, I am aware of the importance of this occasion and I feel very honored to be able to take part in this Symposium. I would like to tell you a little bit about my life and my experiences working in the agri-business sector in Brazil.

I was born into a family of small farmers in the south of Brazil. I used to help my parents by working in the fields, cultivating the land, and I remember my mother always used to say "Go and study, or get busy with the mattock!" I decided to study and graduated in Agronomy in 1983. All of this was thanks to the money my mother made from producing and selling milk, eggs, cheese and vegetables in the city.

However, before graduating from university, I did work experience in the central west region of Brazil, where land was cheap, there were more opportunities and there was an influx of farmers from the south of Brazil to the region, including my own family. Within a short time we were living on an 88-hectare property. In 1985, my brother and I leased a 50-hectare plot from a neighbor and began to work with equipment and machines lent to us by our father. This was the beginning of 27 years of hard work, during which we created and invested in the inspired dreams that we are currently turning into reality in that promising region.

I feel privileged to be living at what I consider to be an amazing time since I have seen the transition from subsistence agriculture, with the earth being ploughed using animals in my childhood, to large-scale production involving the use of highly-productive varieties, agricultural machinery and equipment, technology and biotechnological progress to grow economically-viable crops.

Sementes Produtiva's production area currently consists of three farms in the Mid-West of Brazil, located in the Provinces of Tocantins, Distrito Federal and Minas Gerais. We plant 15,000 hectares of soya bean, maize, cotton, beans, sorghum and rice and we process around 40,000 tons of soya bean.

The main production unit is the Barro Branco farm, where we have a soya bean processing facility and where we work in cooperation with public and private breeders. We have center pivot irrigation systems at both the Barro Branco and the Grains and Citrus farm, which allow us to have up to three harvests per year (soya bean, maize, beans); all of this is thanks to the new types of technologies on the market. Furthermore, we produce cotton on this property. We can get two harvests a year on our farm located in Tocantins Province: one of rice using flood irrigation and the other of soya using the sub-irrigation method for the year.

Thanks to developments in terms of agriculture, Brazilian farmers now have a range of possibilities when selecting varieties. With regard to the crops available on the market, I believe that there are a number of factors which must be taken into account when selecting crops, the following four being the main ones: PRODUCTIVITY - EASE OF HUSBANDRY – GROWING CYCLE – DISEASE RESISTANCE.

Productivity, which I first of all consider to be directly linked to the impact of the 1997 Brazilian Law on the Protection of Crops (LPC), and the recognition of intellectual property. This event encouraged breeders to increase the range of new varieties on offer. For example, on average, there was a 50 per cent increase in soya bean productivity, rising from 2,200 kilos per hectare (kg/ha) to 3,300 kg/ha, again owing to the availability of greater quantities of more productive crops adapted to the environmental conditions.

Secondly, there is EASE OF HUSBANDRY: direct sowing onto straw and the development of new genetically modified varieties served as effective tools in the process, making possible a considerable increase in the scale of production and maintaining the national cultivated area at a stable level.

A third factor which is vital when selecting a good crop is the GROWING CYCLE. There is currently a wide range of soya bean varieties on offer, with different cycles: short, medium and long. Short-cycle crops are much in demand because, in some cases, in the same year, farmers have produced more than 4,000 kg/ha of soya bean and then planted another crop, of maize for example, producing over 9,000 kg/ha of that crop. This is fantastic! Thirty years ago in the central west of Brazil, working independently it was possible to bring in one harvest a year and produce around 2,000 kg/ha of soya bean. By working in cooperation with breeders and managing resources sensibly, producers can achieve an increase in production of up to 30 per cent in the Brazilian savannah region, offering consumers more quality food products. In the photo we can see that harvesting and planting take place almost simultaneously and that is incredible (slide 11)!

The fourth factor, DISEASE RESISTANCE. In 1996, there was an outbreak of “Stem Rust”; and 90 per cent of the planted area of the savannahs had been given over to a single variety susceptible to that disease. It was a disaster! Huge losses all along the chain. All the public and private development programs made a huge effort to produce and offer new varieties resistant to the disease.

Faced with this situation, in 1997 the LPC was approved. Public and private companies were immediately encouraged to invest and multinational companies even bought up some private firms and brought in technologies within the regulatory framework guaranteeing remuneration for the use of technology. As we can see from the graph, over the last 15 years the area under cultivation has grown by 25 per cent and productivity has doubled in the same period (slide 12).

As for soya bean, in particular in the wake of the LPC, there was a significant increase in the number of protected crops on offer. Now, with the competition between breeders, we have over 700 varieties of soya bean with which to meet market demand and productivity recently increased from a little more than 2,200 kg/ha to just over 3,300 kg/ha.

Horse-Racing as an Example

I would like to draw everyone’s attention to the main factors involved in the food production process: PRODUCERS AND BREEDERS! Let’s take horse-racing as an example. In order to win a race, we need to be careful what we feed the horses and, of course, we need a strong horse and a good jockey. In order to breed a good variety, we need to concentrate on three things: good management of the environment (nutrition); good germplasm (the horse), and; biotechnology (the jockey). We need to continue to develop all three in order to carry on breeding better and better varieties.

Brazilian farmers are achieving great results on their farms thanks to all the technology now available to them. We have good varieties and farming practices which translate into good productivity. However, off the farms, Brazil still faces a number of challenges that it must overcome in order to become competitive in the global market:

1. **the issue of farm credit,** which is often insufficient, scarce and very expensive;
2. **infrastructure,** which leaves much to be desired, for example transportation of produce to ports is still carried out using trucks that travel along roads that are in a poor state. The ports themselves are overwhelmed and monopolized. (Here you can see a photo of a 70 km-long traffic jam made up of heavy trucks in one of Brazil's ports);
3. **labor issues,** the applicability of urban legislation in the rural context, given that in the countryside it is the plants, climate and the state of the crop, rather than legislation, that determine work issues;
4. **environmental protection issues,** generally defined by ideologies, contrary to and to the detriment of technical points.

Other particular challenges faced by producers and businessmen include business and production management and their relationship with workforce training.

Finally, I would like to thank you again for the opportunity to be here today, celebrating the great progress made in terms of agriculture. Farmers, breeders and all of those involved in the production chain have a mission to feed the world! Together, over the coming years, we face the challenge of increasing production by another 50 per cent, while using scientific and natural resources skillfully in order to ensure a sustainable planet!

Delivering High Performance Varieties To Subsistence/Small-Holder Farmers[6]

Mr. Vuyisile Phehane,
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 meet the UPOV requirements. The Act was amended in 1996 to comply with the 1991 Act of the UPOV Convention but South Africa has not yet acceded to the 1991 Convention. In South Africa plant variety protection is afforded through Act 15 of 1976 (the "Act") as amended and is administered by the Department of Agriculture Forestry and Fisheries. The Act provides for a system through which Plant Breeders' Rights (PBRs) may be obtained for varieties of prescribed plants.

Process for application for Plant Breeders' Rights in South Africa
Any person may apply for a plant breeders' right for a new variety in South Africa, provided that the kind of plant has been declared in terms of the Plant Breeders' Rights Act. All applications for Plant Breeders' Rights must be submitted to the Department of Agriculture, Forestry and Fisheries (Directorate Genetic Resources) in Pretoria.

South Africa uses a dual testing system for the registration of Plant Breeders' Rights. Upon completion of the evaluation process, a certificate is issued to the owner of the variety. Upon expiry of the right, the certificate must be returned to the Directorate: Genetic Resources by the holder of the Right. This is to stop anyone from misusing the certificate and claiming royalties for a variety which no longer has a Plant Breeder's Right. As soon as the Right has expired, the variety becomes public property and may then be utilized by anybody without paying royalties.

Plant Breeders' Rights are granted for periods that vary from 25 years for trees and vines and 20 years for all other crops. The period of the Right is determined by the Act and cannot be extended once it has expired. However, during the first 5 years, which is the sole right period, the holder of the right may refuse to issue a license to anyone wishing to carry out any of the acts listed in Article 14 of the Convention, and may utilize the variety for their own purposes only. During the remaining 15 to 20 years anyone may seek authorization from the breeder to carry out any of these acts. If such authorization is not granted it is possible to apply to the Registrar for a compulsory license.

All the information concerning applications, rejections, approvals, deletions granting of PBR, expiry of PBR, and other information 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. The implementation of PBR 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.

An analysis of the current (2011) PBR register shows that, of the 2,424 PBR's registered, 332 belong to the Agricultural Research Council (ARC), indicating a 14% contribution by the ARC alone. Table 1 below shows the different classes of PBR registered by the ARC, and the contribution by the ARC to each.

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Table 1: Proportion of ARC-owned PBR registered in South Africa as at January 2012

Cultivar group/class	Total	ARC	% ARC
Allium cepa L. (Onion)	36	4	11
Arachis L. (Groundnut)	3	3	100
Avena L. (Oats)	9	2	22
Citrus L. (Sweet Orange, Lemon, Grapefruit, Loose Skin Citrus types, other Citrus (Bitter Seville, Lime Kumquat)	37	12	32
Eragrostis tef (Zucc.) Trotter (Teff.Tefgras)	6	6	100
Festuca arundinacea Schreber (Tall Fescue)	6	4	67
Glycine max (L.) Merrill (Soya Bean)	32	7	22
Gossypium hirsutum L. (Cotton)	6	2	33
Helianthus annuus L. (Sunflower)	34	6	18
Hordeum L. (Barley)	7	1	14
Ipomoea batatas (L.) Lam. (Sweet Potato)	16	16	100
Leucadendron R. Br. (Conebush, Yellowbush)	12	9	75
Leucospermum R. Br. Pincushion)	6	6	100
Lolium x boucheanum (Hybrid Ryegrass)	6	1	17
Lolium multiflorum Lam. (Italian & Westerwolds Rye Grass)	31	20	65
Lolium perenne L. (Perennial Ryegrass)	9	1	11
Lupinus L. (Lupin)	4	3	75
Malus Mill. (Apple)	55	5	9
Musa acumineata Colla (Banana)	1	1	100
Nicotiana tabacum L. Tobacco)	8	4	50
Olea L. (Olive)	4	1	25
Ornithogalum L. Chincherinchee)	9	9	100
Phasolus coccineus L. (Kidney Bean)	1	1	100
Phaseolus vulgaris L. (Bean)	42	12	29
Protea (Protea, Sugarbush)	12	7	58
Prunus armeniaca L. (Apricot)	11	2	18
Prunus persica (L.) Batsch (Peach)	60	34	57
Prunus persica (L.) Batsch var nucipersica Schneid. (Necatrine)	83	25	30
Prunus salicina Lindl. (Japanese Plum)	41	19	46
Psidium guajava L. Guava)	1	1	100
Pyrus L. (Pear)	24	13	54
Raphanus sativus L. var **oleiformis** Pers. (Fodder Radish)	6	6	100
Secale cereale L. (Rye)	12	9	75
Solanum tuberosum L. (Potato)	77	18	23
Sorghum bicolor (L.) Moench (Grain Sorghum)	18	2	11
Trifolium repens L. (White Clover)	3	2	67
X Triticosecale Witt. (**Triticum** x **Secale**) (Triticale)	9	2	22
Triticum L. (Wheat)	60	15	25
Vigna unguiculata (L.) Walp. [including **V. sinensis** (L.) Savi ex Hausk, **Dolichos biflorus** L.] (Cowpea)	1	1	100
Vitis L. (Grape)	63	27	43
TOTALS	**876**	**332**	**38**

Notes: only cultivar groups or classes where the ARC has registered PBR has been used

The management of ARC-owned Intellectual Assets

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 is for a social, economic, military or any other benefit.

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 as well as for the management of the commercialization process.

As a public entity in South Africa, the 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, the 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 giving the agriculture sector a competitive advantage. Licensing of the transfer of varieties to smallholder 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 (SMME) incubators.

Licenses issued for agricultural development to smallholder farmers 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 agribusiness. This royalty-free period would be carefully managed, ensuring the recipient understands their contractual obligations (for example 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 PBR holder (the ARC) to revoke the license where contractual arrangements are not being fulfilled. The aim of such a specific approach is to prepare the aspiring entrepreneur for a competitive commercial environment through successful performance.

The ARC's parliamentary grant funding allocation trend is shown in Figure 1 below, and indicates that this allocation decreased over the 2005/06 to 2007/08 period, whilst royalties increased over this period (Figure 2). A steady increase in parliamentary grant funding is observed from 2007/08 onwards, whilst royalties peaked in 2008/09, and declined thereafter, until 2010/11, after which it has increased.

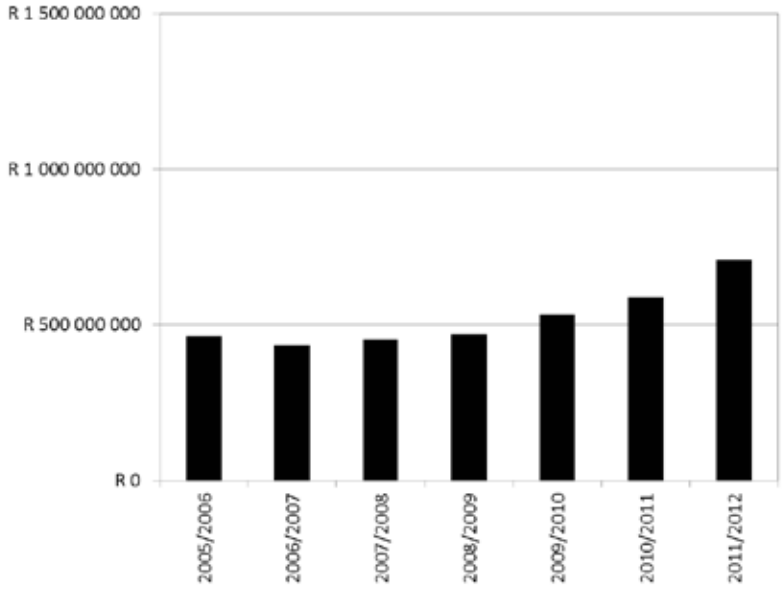


Figure 1 ARC Parliamentary Grant funding, 2005/06-2011/12

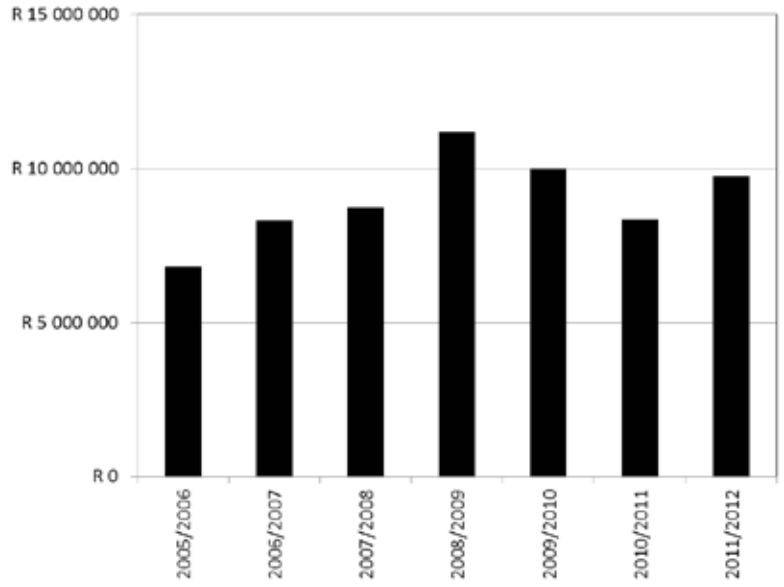


Figure 2 ARC royalty income, 2005/06-2011/12

A study of the ARC's royalty income as a percentage of its R&D spend was conducted by Deloitte South Africa. A number of observations were observed, as shown in Figure 3, namely; (i) the ARC licensing income as a percentage of R&D spend is comparable to, and also surpasses that of other country and regional averages in a number of benchmarks; (ii) the ARC ranked third out of the eight case studies that were examined by Deloitte South Africa; (iii) the ARC outperformed its local peers. These observations are illustrated below in Figure 3.

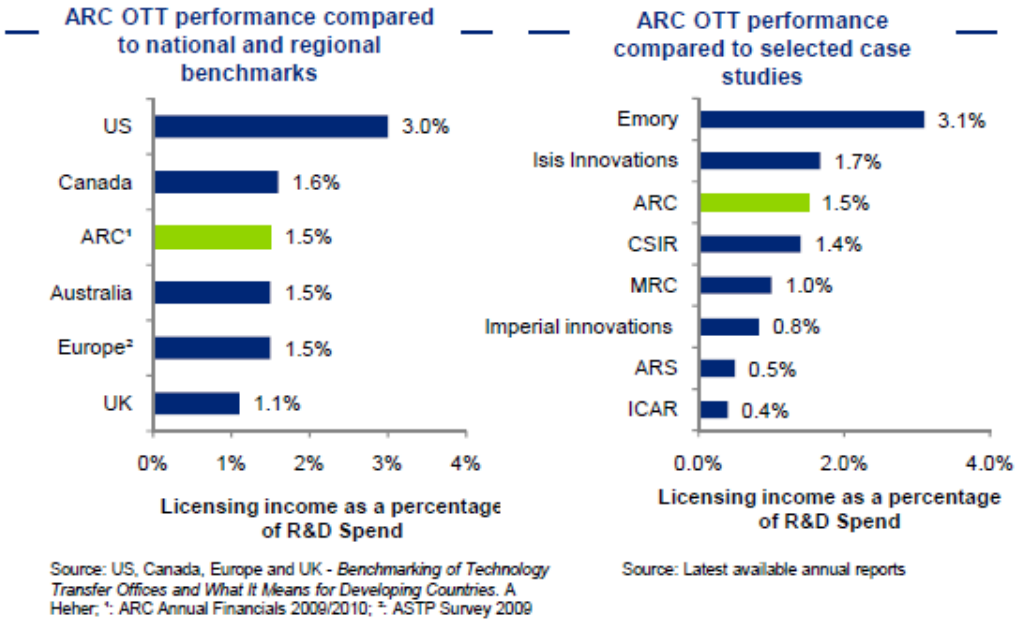


Figure 3 ARC trends of licensing income as a percentage of R&DS spend, compared to other similar organizations (Deloitte South Africa)

Smallholder farmer definition in South Africa

In delivering its high-value varieties to smallholder farmers, it is important that the ARC is able to define its client well. This permits the ARC to develop appropriate and sustainable interventions. To this end, the DAFF released the Integrated Growth and Development Plan, 2011-2031 which assigned the following characteristics to smallholder farming[7]:

Sector consists of 300,000-400,000 farmers

- Collectively farm an estimated 14 million ha of agricultural land
- Are concentrated principally in the former homeland areas of the country, and are thus marginalized into regions of poor productive land, with little or no infrastructural support, and water resources;
- Generally have low levels of production efficiency;
- Production inefficiency is linked primarily to poor farm management skills e.g. natural resource management, production and infrastructural management etc.; this is exacerbated by poor and uncoordinated support services directed at smallholder farmers e.g. financial services, technical support, access to transport and other support infrastructure;
- The nature of existing value chains and 'value chain governance' locks smallholder farmers out of markets;
- There is poor coordination among smallholder farmers in accessing services, exacerbated by input and output markets;
- Information and data regarding the smallholder sector is insufficient

In understanding this definition, and to support the government's intention to grow the baseline of smallholder farmer by 25% by 2014, the ARC sought to develop models through which the delivery of high-value varieties to smallholder farmers could be realized. These models include the delivery of training interventions, as well as enterprise and incubator development.

7 South African Intergrated growth and Development Plan 2011-2031

Training and information dissemination

ARC-developed training programmes are accredited through the AgriSETA (Agricultural Sector Education Training Authority), an agricultural training intervention certification body, prior to delivery. The actual training is delivered by ARC scientists and trained extension officers.

Enterprise and incubator development

By promoting technology incubation, the ARC would be meeting the objectives of: (i) ensuring the transfer of its developed technologies to individuals organized within entities and would seek to exploit this technology for their social and/or economic benefit. Such entities might be SMMEs, established to be self-sustainable eventually and commercially viable; (ii) promoting technology commercialization, a key deliverable of the ARC, entrenched in its mandate; (iii) diversifying the agricultural sector through increasing the number of options available to emerging farmers and their agribusinesses as they strive to play significant roles in the agriculture value chain.

To achieve one or more of the above-mentioned objectives, the ARC engages in the activity of business incubation, which seeks to provide a nurturing, enabling and supportive environment for small agribusinesses. The role of the ARC in established incubators or SMMEs is to provide support on a number of fronts. This includes the introduction of new technology offerings to these established incubators or SMMEs, so that they are able to offer more than one product and realize benefit from the penetration of more than one market. For this to be successful the ARC's Commercialization Unit scouts for new market niches, based on these new technology offerings emanating from the ARC's R&D output. Additional services include establishing the competitiveness of current incubators and making a call on their capacity to offer more than their current offerings in terms of products. The reason for these detailed studies is to ensure that technologies spun-out into incubators have the best possible prospects for success, based on commercial principles. The Commercialization Unit will (based on the outcome of this due diligence) be able to deliver appropriately staffed and managed and registered incubators, based on ARC technologies, which will be selling products into known markets.

Once an agribusiness is fully engaged, the ARC will then exit from the operation and allow the agribusiness to stand on its own. It is envisaged that agribusinesses will become successful entities. These entities will need to procure goods (new varieties, or process technology packages) and services as their business activities, needs and customer demands become more sophisticated and expansion is inevitable. It is envisaged that the ARC will be the first port of call for such goods and services, for a nominal fee, escalating based on the profitability of the agribusiness.

The success of such initiatives is heavily dependent on the appropriate partnerships formed by the ARC with other entities that have similar objectives. These include banks, trade and industry entities, standards bodies, retail stores, as well as agricultural marketing bodies, all of whom play a role in the development of value chains for meaningful participation by smallholder farmers.

Examples and models of the delivery of high-performance varieties to smallholder farmers

Collaboration with rural-based universities for the delivery of sweet potato cultivars

The ARC has entered into collaboration with four rural-based universities for the establishment of nurseries for the provision of sweet potato cultivar cuttings to community projects. These varieties are both open and protected varieties, developed specifically for their high β-carotene content. The funding for this initiative was provided by the South African Department of Science and Technology.

In the case of the initiative with the University of Limpopo, based in the northern regions of South Africa, a locally based community (Tshiombo) approached the ARC for assistance with production training. This request was taken further and developed into an opportunity for production and marketing of produce into retail stores. The approach taken was to provide training in production processes and this was identified as the primary need. This was conducted successfully by the ARC. During the training provision efforts were made to understand the barriers of entry into the market. The main ones were identified as: (i) the establishment of a formal entity with which supply contracts could be negotiated with retail stores; (ii) the standard, consistency, reliability of supply and quality of produce demanded by the retail stores; and (iii) the establishment of a packing facility.

An entity has now been established and formally registered as a co-operative, where the members understand their obligations and have been organized into a management structure. The PPECB (Perishable Products Export Control Board) will be engaged to offer product quality and grading training as well as introductory modules on food safety, good agricultural practice and responsible use of pesticides to facilitate market access. Pre-audits against certain certification standards to prepare the farmers for the actual audit, culminating in certification to supply produce to any retailer, will be conducted. Currently, the co-operative sells its improved produce into local markets only. Demand for superior product has been created.

The NAMC (National Agricultural Marketing Council) has been brought into the initiative to provide support to emerging farmers in market access, knowledge acquisition, training, and mentorship. This will be achieved through the following interventions:

a. Development schemes - for the improvement of the producers in the agricultural sector and to encourage their integration into the commercial mainstream, by providing incentives to the market to increase the quality of production from the emerging sector and increase procurement from these producers.
b. Promotions - to support the new agribusinesses in their endeavours to export their produce
c. Training - the facilitation of structured training workshops that are tailor-made for the new agribusinesses, for marketing and managerial capacity development.

The initial steps towards the establishment of the pack-house facility were achieved through a collaborative effort between the local provincial department of agriculture and the European Union facilitated by NovaAfrica, a non-governmental organization (NGO). Only the erection of the packhouse facility was achieved with the EU funding. No equipment such as washing stations, drying facilities or packaging equipment was installed. This was the responsibility of the local provincial department of agriculture, which was not fulfilled. The LandBank will be approached for funding on favorable terms to install the required equipment into the packhouse. The standing MoU (Memorandum of Understanding) signed between the ARC, NAMC and LandBank will allow for these discussions to take place. The MoU has been made effective to facilitate this pilot project which will be rolled-out into other areas of South Africa once the model has been successfully implemented. The aim of this project is to develop and promote collective production processes, promote the clustering approach around existing shared resources such as irrigation schemes and to prepare smallholder farmers for contract farming.

The development of floriculture-based rural enterprises in South Africa

South Africa's rich floral diversity has been exploited by many breeders over hundreds of years, with very little benefit flowing back to the country. The ARC is involved in the development of different flower bulb genera and products for commercialization which are currently available in the genera Lachenalia, Ornithogalum and Eucomis in order partially to address this unfortunate situation. The required cultivation technology was developed through research, but sustainable commercialization of the products is still a challenge, although this has been commenced through the establishment of a community-based project, in partnership with the local Northern Cape Department of Agriculture.

The production of bulbs has been demonstrated to be an excellent opportunity for the involvement of community based projects. Bulbs are being produced locally and exported abroard where the end product (pot plants and cut flowers) can be produced to enter a large market.

The ARC and the Department of Agriculture of the Northern Cape Province established a successful flower bulb production unit in the Northern Cape at Nieuwoudtville. This community-based project successfully produces superior Lachenalia bulbs and exports between 3 and 500,000 bulbs per annum. A further 100,000 bulbs are marketed locally per annum.

The ARC-developed products can be utilized to expand the community based initiative, namely the Nieuwoudtville project based in in the Northern Cape. Currently there are 5 Lachenalia varieties in the market. These varieties are marketed through an existing value chain. The existing production and marketing chain includes the ARC as the sole supplier of disease-free mother material, Afriflowers, an SMME nursery that bulks up plant material, Nieuwoudtville, the rural community-based market bulb producer and a pot plant grower based in the Netherlands. Revenue and employment are generated by the entity, which utilizes ARC intellectual property (IP); however, this is sub-optimal. The plan with this initiative is to diversify product offering, in order to manage the inherent risk of marketing a single product. Furthermore, negotiations around the establishment of an ARC-owned IP management company to manage the value chain, similar to the citrus industry, are underway.

The ARC's contribution to the development of smallholder farmer citrus producers

The ARC has entered into a local licensing agreement with Citrogold Pty Ltd for the commercialization of some of the ARC's citrus varieties. One of the obligations of Citrogold Pty Ltd is to ensure the participation of smallholder citrus producers in the commercialization value-chain. In partnership with the Citrus Growers' Association and Citrogold Pty Ltd, the ARC recommended that smallholder farmers be introduced to ARC varieties. This was facilitated through a meeting of smallholder farmers and IP management companies at a Citrus Growers' Day function. Approximately 60 people attended the meeting with inexperienced growers from the Fort Beaufort, Sundays River Valley and Patensie production regions in attendance. Strong interest in the ARC's varieties was expressed by these inexperienced farmers and Citrogold Pty Ltd has undertaken to meet more directly with these smallholder farmers in implementing a plan developed for providing access to smallholder citrus farmers to ARC cultivars.

The provision of access of ARC-bred wheat cultivars to smallholder producers

Wheat is the second most important grain crop produced in South Africa. It contributes approximately 3% to the gross value of agricultural production and is used primarily for the production of bread. Despite these seemingly large production efforts, the total annual production of wheat is less than the domestic consumption requirements, necessitating importation from other countries. The largest producers of wheat, accounting for 84% of total production, are based in the Western Cape, Free State and Northern Cape of South Africa. These farmers comprise inexperienced farmers who occupy a significantly large area of land but use it unproductively due to lack of knowledge on farming, funding for inputs and poor-quality farm machinery. Increase in wheat production can be attained through training of these inexperienced farmers and extension officers on all aspects of wheat production in the wheat producing areas and provision of funds to purchase production inputs as well as farm machinery.

The ARC, through its Small Grain Institute (SGI), has embarked on training and advisory programmes to assist inexperienced farmers to farm profitably through increased productivity. These interventions include: (i) the identification of varieties suitable for production in resource limited agricultural areas (through the set-up and management of on-farm trials); (ii) the characterization of varieties in terms of yield potential and yield stability in selected resource- limited areas under dryland and irrigated conditions; (iii) the comparison of agronomic characteristics and quality parameters of these varieties in different environments; (iv) the assistance of smallholder wheat producers with reliable recommendations that are based on applicable scientific research; and (v) the provision of relevant technology to smallholder farmers through production guidelines, farmers' days marketing events and technology demonstrations.

One of the objectives set is the identification of new communities and individual producers with potential to produce small grains on a commercial basis. This type of intervention inevitably contributes to an improvement in the standard of living for inexperienced small grain producers.

In the 2011/2012 season, the following activities (see Table 2 below) were conducted in several regions of South Africa where wheat is grown and are shown here for illustrative purposes.

Table 2: Wheat production training activities in different provinces of South Africa, 2011/2012

Province	Community/Organisation	Activity
Eastern Cape	Matatiele	On-Farm trial
	Ncora	Wheat production course, soil sampling
	Qamata	Wheat production course, soil sampling
Free State	Glen	On-Farm trials, Farmers' Day
	Kestell	On-Farm trial
	Kaallaagte	On-Farm trial, soil sampling
	Fouriesburg	On-Farm trial
	Harrismith	On-Farm trial, soil sampling
	Ficksburg	On-Farm trial
	Qwa-Qwa	On-Farm trial, Wheat production course
	Theunissen	On-Farm trial
	Hopstad	On-Farm trial
Mpumalanga	Carolina	On-Farm trial
Limpopo	University of Limpopo	On-Farm trial
	Groblersdal	On-Farm trials, Farmers' Day, Wheat production courses, soil sampling
KwaZulu-Natal	Colenso	Wheat production course and soil sampling

For such interventions to be successful, the ARC has entered into formal agreements which include MoUs, SLAs (Service Level Agreements), and Co-operation agreements. The different role players in the example of wheat production are listed below in Table 3, and a description of their role is provided.

Table 3: An example of the extensive stakeholder network required for the delivery of wheat production interventions to smallholder farmers

Stakeholder	Role
Department of Agriculture: Free State, Eastern Cape, Limpopo, North West, Kwazulu-Natal and Mpumalanga	Identification of farmer's problems, linking farmers with SGI, collaborating with ARC-SGI on technology transfer activities.
GrainSA	Provide extension service to the farmers
OVK, AFGRI and VKB	Supply production inputs and extend credit facilities
ARC-Central Office	Coordinating ARC-SGI with other organizations at strategic level
Financial Institution: FNB	Training on writing business proposals and assist farmers in building creditability for farm loans
Land Bank	Land transfer to emerging farmers

The process of introducing new technologies is initiated by extension officers who contact the ARC-SGI requesting meetings and expressing a need for intervention. Meetings are arranged with producers, extension officers and researchers where they are informed on how the ARC's support programmes are implemented. Alternative solutions are formulated and the most appropriate solutions are selected and adopted. The most common needs of the aspiring producers are demonstrations of how wheat is grown and gaining access to suitable varieties.

Varieties used are planted under dryland and irrigation conditions and include the ARC's own protected varieties.

Training of producers and Extension Officers on all aspects of wheat production
Several training courses are organized at community level. Researchers from the ARC-SGI run training sessions covering all aspects of wheat production from seed-bed preparation to marketing of the produce. Each course occurs over three days involving theory and practical modules.

Similar training interventions with smallholder farmers have been made in the promotion of cotton as an additional or alternative crop, in partnership with Cotton South Africa, for the production of GM cotton[8], as these farmers often have limited experience with cotton or cotton production. The ARC's initial intervention prepares the smallholder farmers for attendance and comprehension of the AgriSETA/PAETA (Primary Agriculture Education and Training Authority) modular training programme on the principles of cotton production and farm management.

The ARC's role in the development of groundnut varieties for dryland and irrigation areas

The ARC-GCI (Grain Crops Institute) has managed a groundnut breeding programme to address the need for higher yielding groundnut varieties with resistance to foliar and other diseases affecting the quality of genotypes as well as a higher oleic acid content of the kernels to improve shelf life. The ARC-GCI has received Plant Breeder's Rights and Variety Listing for three new varieties addressing these needs. One of these new varieties, ARC-Opal1, has a higher and more reliable yield than a previous ARC variety and can be planted under dryland conditions.

The ARC's contribution to a feasibility study for the establishment of rice production in South Africa

The ARC is making a concerted effort toward fighting hunger and malnutrition in the rural areas through the diversification of crops grown in those areas. Researchers from the ARC-SGI) completed feasibility studies at Josini and Phala-Borwa in the KwaZulu-Natal and Limpopo Provinces, respectively, to determine the potential of these areas for rice production. The feasibility study suggested that rice had been grown under irrigation in South Africa at different places and times in the past and substantial yields had been realized. The feasibility studies were submitted to a private company for implementation. If approved, the private company will commence preliminary research work on rice with the ARC, which will provide baseline information and new production practices to smallholder farmers that are engaged in rice production.

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.

8 The varieties used are owned by Monsanto

Examples are given below on the impact of ARC varieties on income and job creation for famers in a selection of commodities.

Wheat industry: based on royalties received, and an average of 9.5% royalty rate for a few of the ARC's wheat varieties, the estimated revenue accrued to wheat farmers who have licenses for the ARC's varieties was R 36.7 million in 2011/12.
Deciduous fruit industry: using a single ARC cultivar, the Cheeky® Pear variety, the income accruable to licensees of this cultivar from a potential of 1,000 ha is estimated at R 138 million per annum, with the potential to create 1,260 farm worker jobs.
Vegetable industry: access to the ARC's varieties has resulted in a profit of R 130,000 per harvest per smallholder farmer from sales of orange-fleshed sweet potato on the informal market only. The potential for sales is greater as the ARC concludes supply contracts with retail stores and significant players such as Walmart.

Acknowledgements
Contributions by ARC researchers to the development of this paper
UPOV

SESSION II: The Role of PVP in Enabling Farmers and Growers to Become Breeders

Encouraging the development of new varieties of plants

Mr. Peter Button,
Vice Secretary-General, UPOV

Introduction

The purpose of this paper is to explain the ways in which the UPOV system encourages the development of new varieties of plants by farmers and growers and to provide an introduction to Session II: The Role of PVP in Enabling Farmers and Growers to Become Breeders. The paper will focus on the following aspects:

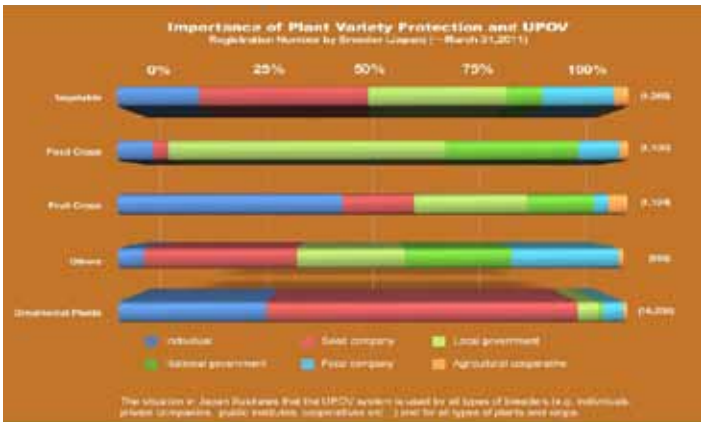
- Farmers as breeders
- Facilitating breeding and protection of varieties by farmers and growers
- Benefits of breeding and plant variety protection for farmers and growers

Farmers as Breeders

The "Introduction to UPOV" (www.upov.int/overview/en/breeder.html) clarifies that there are no restrictions on who can be considered to be a breeder under the UPOV system: a breeder might be an individual, a farmer, a researcher, a public institute, a private company etc. Furthermore, a breeder could be an individual or could be an entity, such as a farmers' cooperative.

The Introduction to UPOV also provides a graphic profile of plant breeders' rights applicants in Japan, a copy of which is reproduced in Figure 1. The profile illustrates that individuals, including individual farmers and growers, and agricultural cooperatives, use plant variety protection.

Figure 1



The UPOV Report on the Impact of Plant Variety Protection (Impact Study) (www.upov.int/export/sites/upov/about/en/pdf/353_upov_report.pdf) also provides information on the diversity in types of breeders that develop new varieties where the UPOV system of plant variety protection is in place.

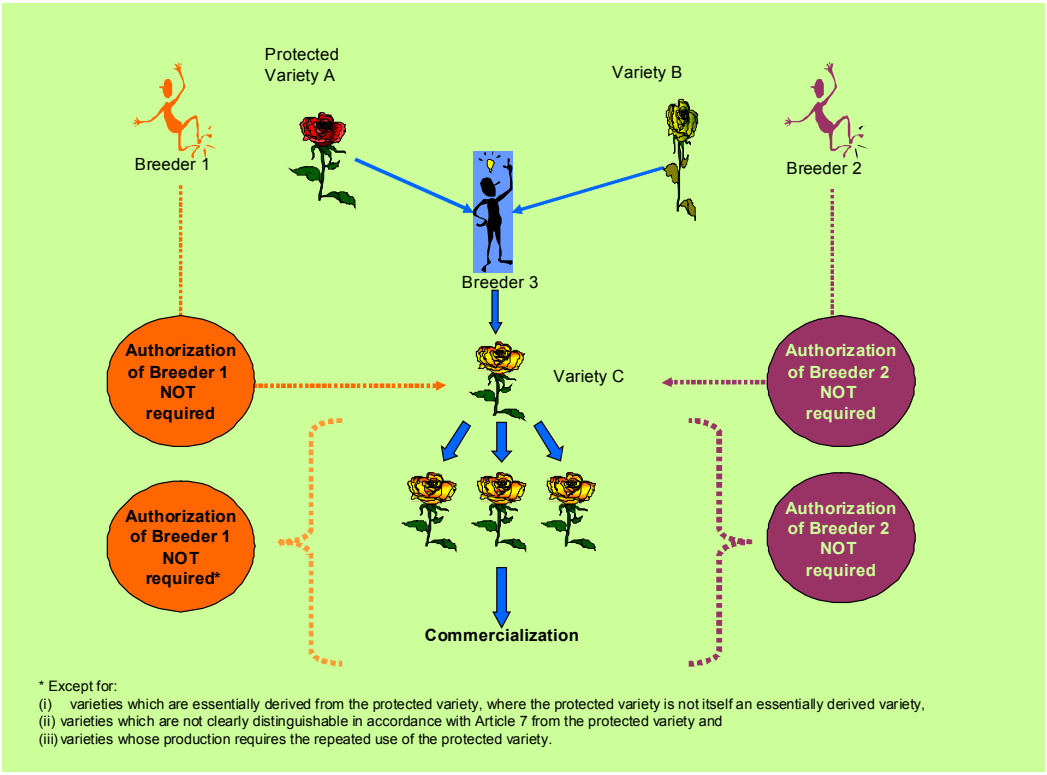
Facilitating Breeding and Protection of Varieties by Farmers and Growers

Facilitating Breeding: the Breeder's Exemption

For a farmer or grower wishing to breed new varieties, one of the most important features of the UPOV system is the "breeder's exemption", which means that farmers and growers can use protected varieties as a starting point for their breeding work.

The exception under Article 15(1)(iii) of the 1991 Act of the UPOV Convention 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.". 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. The breeder's exemption is illustrated in Figure 2.

Figure 2 Illustration of the Breeder's Exemption



Examples of the use of the breeder's exemption in the Republic of Korea are provided in Figures 3 and 4.

Figure 3

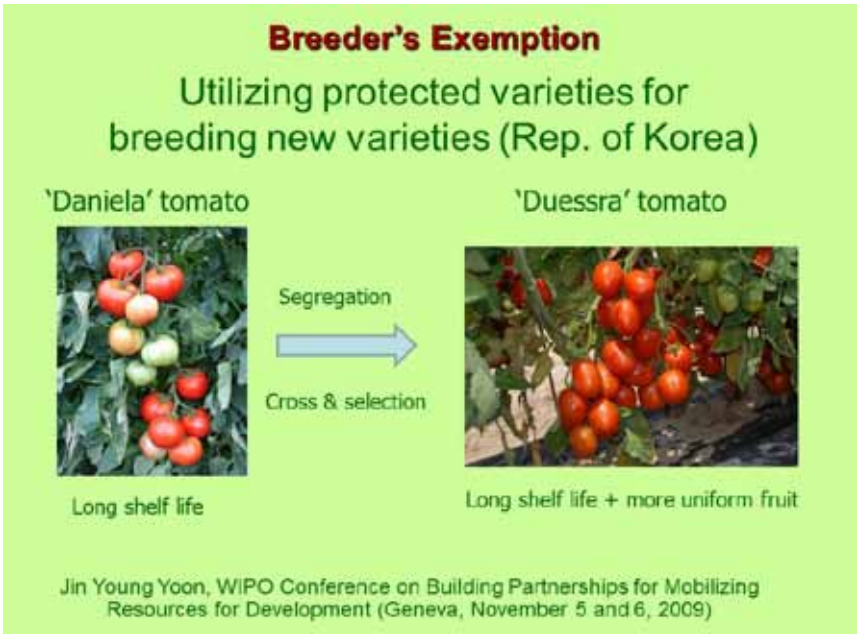
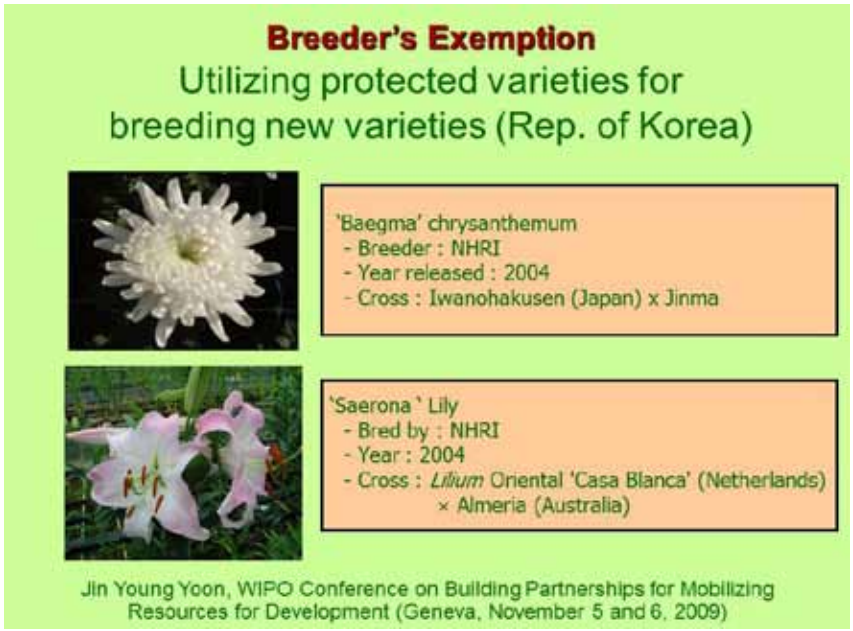
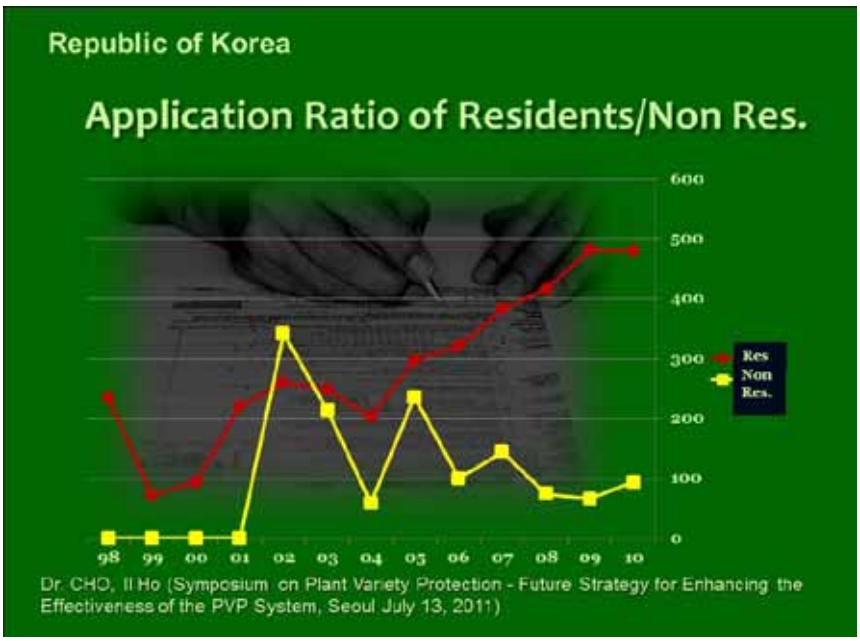


Figure 4



As explained in the Impact Study and the Session I paper "The Role of Plant Variety Protection in Improving Incomes for Farmers and Growers", the UPOV system can remove barriers to trade in varieties, thereby providing breeders with access to a broader range of new, improved varieties for use in their breeding programs. Figure 5 illustrates how domestic breeding (applications by residents) in the Republic of Korea responded to the increased availability of varieties developed by foreign breeders (applications by non-residents) after UPOV membership (2002).

Figure 5



Facilitating Protection

UPOV has developed an internationally harmonized, transparent system that facilitates applications by breeders, whether they are individuals or large organizations.

Under the UPOV Convention, the breeder's right is only granted where the variety is new, distinct, uniform and stable and has a suitable denomination. The following sections explain how UPOV has sought to assist breeders in meeting those requirements.

Examination of Distinctness, Uniformity and Stability ("DUS")

UPOV provides extensive guidance for harmonized examination (testing) of distinctness, uniformity and stability ("DUS")[9] and has developed crop-specific Guidelines for the Conduct of Tests for Distinctness, Uniformity and Stability (Test Guidelines: www.upov.int/test_guidelines/en/) that are estimated to cover approximately 90% of all applications.

Cooperation with regard to DUS testing is an important benefit of the UPOV system that is made possible by the harmonized approach within UPOV. The UPOV Convention allows for members of the Union to accept DUS reports for varieties already examined by another member of the Union. Such an approach is encouraged as an important means of minimizing the time for DUS examination and minimizing the cost of DUS examination by reducing duplication.

Variety denominations

UPOV publishes a freely accessible database of plant varieties (PLUTO: www.upov.int/pluto/en/), which provides denomination information on plant varieties from contributing UPOV members and the Organization for Economic Co-operation and Development (OECD).

In addition to the particular guidance above, UPOV has developed an extensive range of guidance on the UPOV system in the form of a "UPOV Collection" (www.upov.int/upov_collection/en/).

9 see document TG/1/3 "General Introduction to the Examination of Distinctness, Uniformity and Stability and the Development of Harmonized Descriptions of New Varieties of Plants" and TGP documents (www.upov.int/upov_collection/en/)

Benefits of Breeding and Plant Variety Protection for Farmers and Growers

The following papers illustrate some of the benefits of breeding and plant variety protection for farmers and growers:

Mr. Young-Hae Kim (Republic of Korea)
"A farmer-breeder experience in the Republic of Korea"

Mr. Kim explains how the government in Republic of Korea has encouraged farmer breeding as a growth engine for the seed industry. Individual breeders have produced a large number of varieties in the last 10 years, which has resulted in improved income for farmers. Farmer breeders have used plant variety protection to profit from their varieties in various ways, such as by licensing through contracts with rice processing complexes or agricultural cooperatives. Mr. Kim provides three examples, including 'Geumsung', a high quality, disease resistant rice variety he bred himself for use in organic farming systems.

Mr. Guy Kastler, Coordinator, Via Campesina (France)
"The role of plant variety protection in supporting the development of improved varieties"

Mr. Kastler considers "What protection is there in place for plant varieties in order to provide sustainable support for the development of 'improved' varieties?"

Mr. Yoshiteru Kudo (Japan)
"The Ashiro Rindo Story"

Mr. Kudo explains how a group of smallholder farmers developed a project with the Ashiro town agriculture cooperative to start breeding new varieties of gentian (Rindo) in order to improve the market for their flower production. Using plant breeders' rights and trademarks, Ashiro Rindo has developed a multimillion dollar international business that provides a year-round supply of cut flowers to the European Union and the United States of America through licensed production in New Zealand and Chile.

Mr. Derk Gesink (Netherlands)
"The importance of plant variety protection for farmer-breeders of potato"

Mr. Gesink reviews the history of potato variety development by "hobby breeders". He explains that the genetic progress made possible by those pioneers demonstrated the potential of breeding crops for welfare of the people and laid the basis for PVP in the Netherlands and the United States of America. Mr. Gesink concludes by emphasizing that the UPOV system is not just a system for breeding companies in developed countries. Anyone can start a breeding company by crossing old, local varieties with the latest varieties from countries with the most advanced breeding techniques, to produce the best locally-adapted varieties.

A farmer-breeder experience in the Republic of Korea

Mr. Young-Hae Kim
(Republic of Korea)

The Government takes the leading role in the rice industry in Korea. Breeding is mainly carried out by the public sector and no royalty is charged for government-bred varieties. The price of this seed is also cheaper than that of privately-bred seed varieties because the government subsidizes rice seed production. A PVP system has been in force in the Republic of Korea from 1998. The Government has encouraged individual breeders as the future growth engine of the Republic of Korea seed industry and has given a lot of advantages to individual breeders since 1998. Potential individual breeders have been encouraged and a lot of varieties developed during the last 14 years. The objectives of private breeders are different from those of government institutes.

Rice variety “Geumsung” is characterized by early maturity and blast resistance. It was developed by farmer-breeder Younghae KIM. An application for PVP for “Guemsung” rice was made in 2000 and was granted in 2002. “Guemsung” rice has become popular among farmers of Yeoju County which specializes in tasty rice production using an organic farming system. The growing area and total production is estimated to be 300ha and 1,800 tons respectively this year. The breeder was awarded the top variety awards in the Republic of Korea by the Minister of Ministry for Food, Agriculture, Forestry and Fisheries (MIFAFF) in 2007. Rice variety “Jinsang” is characterized by good taste. It was developed by Dr. Yoo-hyun CHO who operates a small scale seed company. Jinsang rice is delicious and is low in amylose (Toyo tester 76). An application for PVP for Jinsang rice was made in 2011 and it is currently undergoing DUS examination. The breeder has made exclusive licensing agreements with 4 RPCs (rice processing complexes). RPCs must pay a royalty of 1.6% of the gross profit from commercialization of Jinsang rice. The breeder estimates that market size of Jinsang is $6.5 million this year. Rice variety Seonong 6 is characterized by a big embryo and functional material GABA (gamma-aminobutyric acid). It was developed by Professor Dr. Hee-jong KOH . Seonong 6 rice is much higher in GABA content than other varieties. GABA is well known as an inhibitory neurotransmitter that prevents over-firing of the nerve cells. The breeder has also made an exclusive licensing agreement with the agricultural corporation Shinjiwon. Shinjiwon pays a royalty of 1% of the gross profit from commercialization of “Seonong 6” rice.

Rice varieties developed by individual breeders who have specialized breeding targets such as functional quality are widely cultivated and are very profitable for farmers. Breeders have found a number of ways to make a profit from their own varieties. Contracts with RPCs or agricultural corporations through exclusive licensing have been used successfully in the Republic of Korea. But the price of rice seed produced by the government should be equal that of seed from private breeders to ensure the competitiveness of the rice seed industry in the Republic of Korea.

The role of plant variety protection in supporting the development of improved varieties

Mr. Guy Kastler,
Coordinator, Via Campesina (France)

The UPOV Convention defines a plant variety by its "morphological or physiological" "relevant characteristics", which distinguish it from other varieties. These characteristics must be "sufficiently uniform" and "stable", that is to say "unchanged after repeated propagation or, in the case of a particular cycle of propagation, at the end of each such cycle".

Regardless of whether they are "morphological or physiological", phenotypic characteristics are a sign of the adaptation of the genotype to its environment. They vary out of necessity (to a greater or lesser extent, depending on the species) when the same plant (the same genotype) is cultivated in different environments. As propagation is repeated, hereditary epigenetic or genetic variations appear. As a result, a variety propagated in varied and variable growing conditions cannot remain uniform and stable.

Farmers' selections, which gave rise to the diverse range of cultivated crops available today, are, first and foremost, based on "repeated propagation" through open pollination and/or mass selection at the same geographical location. Such propagation encourages local adaptation, as well as the standardization of the characteristics associated with this adaptation and occurs alongside regular exchanges between farmers of seeds, seedlings, selections consisting of spontaneous or controlled crosses, or natural mutations, designed to renew and increase the intra-variety diversity and variability vital to adaptation to changing climatic conditions and new human needs. Thus, farmers' varieties are only "sufficiently" and not completely "uniform and stable". Reproduction of such varieties is carried out under agricultural growing conditions and they do not have a "specific end of cycle".

For half a century now, the production of seeds and seedlings has gradually been moving out of the cultivated fields and into the testing facilities and laboratories. The purpose of such industrial selections is directly to modify the genotype of seedlings through controlled crosses and, henceforth, through the use of evermore sophisticated genetic technologies. The standardization of the propagation conditions for these varieties, above all through the intensive use of fertilizers and pesticides, produces highly-uniform seeds. These seeds remain extremely dependent on inputs. Their uniformity is, however, lost once they are cultivated in farmers' fields; mainly because farmers cannot offer the same favorable conditions of the "particular cycle of propagation" defined by the breeder. Consequently, farmers who use farm-saved seeds originating from industrial varieties tend to do so for only one or two propagations.

These two seed systems, farmer- and industrial-based, are complementary. Over the first few thousand years of the history of agriculture, the farmer-based system produced the immense range of genetic resources vital to our diet. The industrial system drew on this diversity, within a few years reducing it down to the main characteristics of adaptation to the standardization of growing conditions through mechanization and the use of chemical fertilizers and pesticides. The use, on a massive scale, of fossil fuels in the production of these inputs has left millions of small-scale farmers landless and jobless. This "Green revolution" made it possible to increase production and led to the disappearance of the majority of farmers' seeds, which were collected and then locked away in off-site gene banks where they no longer renew themselves. This revolution has also simplified and rendered fragile agricultural systems, owing to their growing dependence on inputs. We are now faced with new challenges: the task of placing agricultural production back in the hands of the millions of landless farmers who most need it in order to feed themselves; the need to reduce inputs; dwindling fossil fuel reserves; the erosion of cultivated biodiversity, and increasing climate change. Farmers' seed systems represent the only way to encourage the local adaptation of new varieties and to renew resource diversity in situ, thereby addressing the aforementioned challenges.

The protection of plant varieties in accordance with the 1991 Act of the UPOV Convention has not led to this complementarity being called into question. With a few rare exceptions, open access for industry to the farmers' seeds collected together in gene banks has guaranteed farmers open access to their farm-saved seeds. The breeder's exemption made possible the development of a significant network of small and medium-sized enterprises offering an impressive and relatively diverse range of seeds.

In the 1980s, this balance was upset by genetic engineering. Molecular markers provided breeders with a glimpse of the possibility, in the not-too-distant future, of being able quickly, and for a modest sum, to detect traces of the use of their varieties in those of their competitors or in farm-saved seeds. Nowadays, that possibility has become a reality, with patents able effectively to prohibit breeders and farmers from exercising their rights to re-use a protected variety. Rather than categorically rejecting patents, the new 1991 Act of the UPOV Convention critically examined the rights of breeders and farmers, in order to bring the Plant Variety Certificate (PVC) more into line with patents: this led to the extension of protection to essentially derived varieties and farm-saved seeds.

The 1991 Act of the Convention defines a variety as "the characteristics resulting from a given genotype or combination of genotypes". This definition excludes farmers' open-pollinated varieties, the characteristics of which result from "variable combinations of several genotypes". These varieties are not deemed to be such under the Convention and, therefore, can no longer be protected by a PVC, nor, under the Convention, do they constitute varieties that are a matter of common knowledge and, consequently, bio-piracy cannot be opposed in their regard. Most of the countries that ratified the 1991 Act of the Convention used the same definition to set out conditions governing the addition of varieties to catalogues, or the certification of seeds. This exclusion of farmers' seeds from any possible access to the market only serves to speed up their disappearance.

The 1991 Convention thus established a sort of "reverse benefit-sharing". The farmers who, free of charge, provided industry with all of the phytogenetic resources with which it produced its new varieties, henceforth no longer have access to their own seeds, or must pay royalties in order to re-use them.

Since the signing of the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) of the World Trade Organization (WTO), PVCs have been joined by patents for genes or for breeding processes as means of protecting the same plants. The breeder's exemption is disappearing, leading to an increase in the number of actions brought against farm-saved seeds and the rapid concentration of the seed industry in the hands of those companies holding the largest portfolios of patents. Renewal of cultivated biodiversity is now little more than a matter of a few patented genes re-combined in different ways in ten or so species, which are invading agricultural land everywhere.

Farm-saved and farmers' seeds are every bit as important as the new breeds when it comes to addressing today's challenges, in particular in terms of encouraging the local adaptation of cultivated plants. The false promises of synthetic biology will never replace the store of living farmers' seeds vital to the new selections our children will require in order to feed themselves. PVCs will be unable to resist the rise of patents simply by imitating them through the prohibition of farm-saved seeds and the breeder's exemption. By contrast, La Via Campesina believes that plant breeders must, as a matter of urgency, join with farmers in order to prevent the appearance of any form of patent on the reproduction of living material and to return to the first UPOV Convention, in order to ensure that the rights of farmers to use, exchange and protect their seeds are fully recognized, along with the rights of breeders to access all genetic diversity.

The Ashiro Rindo Story

Mr. Yoshiteru Kudo
(Japan)

1. Facts about Gentian Flower Cultivation in Hachimantai City

1. Data of Gentian Flower cultivation for 2011

a. Number of growers: 186
b. Total sales: 1.156 billion Yen
c. Total number of flowers (plants) sold: 26,190,000
d. Unit sales price per plant: 44Yen
e. Percentage of original varieties in total production: 93%

(These data show that Hachimantai City leads all categories of gentian flower production in Japan except for unit sales price per stem.)

2. History of the Development of New Varieties of Gentian Flowers

1971:	19 young farmers start gentian cultivation.
1981:	The growers agreed to pay compensation of 1.00 Yen per stem when the price falls below an agreed minimum.
1986:	A project led by the Flower Production Group of the Ashiro Town Agriculture Cooperative was started to breed new varieties of gentian (Rindo) flowers in response to the increasingly intense competition among flower production regions in Japan. The fund built up from the above compensation payments was used for the breeding program.
1992:	The Ashiro Town Floriculture Development Center was established.
1996:	The variety ”Ashiro-no-Aki”, which was first bred by the project, was registered. Ashiro Town Floriculture Development Center became a public research center funded by the Ashiro municipal government.
September 2005:	The name of the center was changed to Hachimantai Floricultural Research & Development Center as a result of the merger of Ashiro with neighboring municipalities to form Hachimantai City.

3. Establishment of the Ashiro Rindo Develoment Ltd.

The Ashiro Rindo Development Limited was established in April 2004 by the growers of gentian (Rindo) flowers in Ashiro Town on the occasion of the merger of Ashiro Town and neighboring municipalities to form Hachimantai City. The new corporation succeeded the Ashiro Town Floriculture Association as Ashiro Town’s partner in the joint project for breeding new gentian varieties.

Ashiro Rindo Development Ltd. and Ashiro Town signed several contracts, including the “Joint Development Contract” and the “Exclusive Rights for the Utilization of New Varieties of Gentian Developed by Ashiro Town.”
These contracts have remained in effect even after the merger of Ashiro and neighboring towns to form Hachimantai City on September 1st, 2005.

4. Relationship between Hachimantai City and Ashiro Rindo Development Ltd.

The two parties have signed two contracts: a Joint Breeding Contract and an Exclusive Utilization Contract.

New gentian varieties are jointly bred by the growers and the Hachimantai municipal government. Funding for breeding activities is provided by both parties. Ashiro Rindo Development collects 2% of Sales

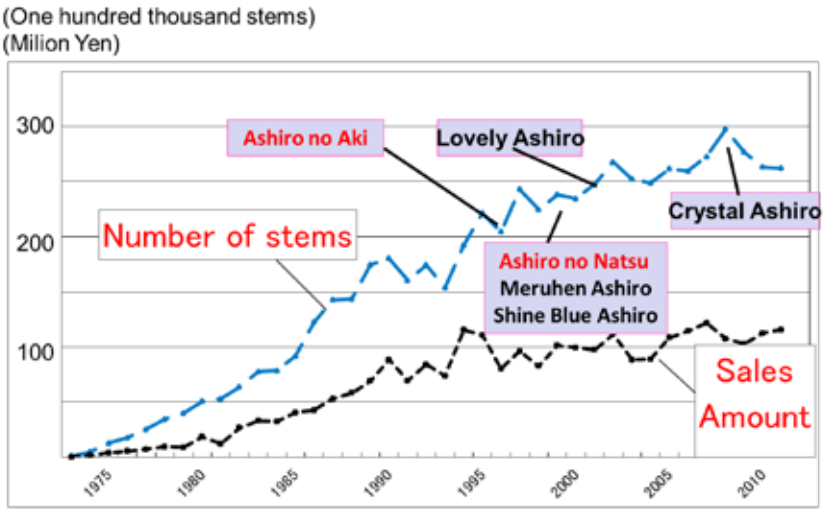
The owner of all varieties developed by the joint breeding is the Hachimantai municipal government. Ashiro Rindo Development Ltd. has the exclusive right of sales in Japan.

5. Major varieties of summer and autumn

"Ashiro no Natsu"

"Ashiro no Aki"

6. Transition of Ashiro Rindo Sales Amount



7. Licensed cultivation in the Southern Hemisphere and supply to the world market

a. Cultivation in NZ (1995 ~) Hachimantai City entered into License contract with Green Harvest Pacific Holdings (GHPH) of New Zealand for exclusive cultivation of gentian varieties. GHPH is in charge of selecting growers, handling contract matters, sales of seedlings, providing cultivation guidance, exportation and collection of royalties.
b. Cultivation in Chile (2003 ~)

8. Challenge for the exportation of gentian cut flowers (2002)

Strategic goals
a. To make ASHIRO RINDO a leading world brand and to develop new markets for it
b. To provide a year-round global supply of ASHIRO RINDO by growing it in both the Northern and Southern Hemispheres.

9. Measures to Protect Intellectual Property Rights in EU

a. Plant Breeder's Right (PBR) registration
b. Trademark registration
c. Clock registration?
d. DNA analysis

10. Establishment of a Joint Venture Company with NZ for Breeding

Rindo International Ltd. was established in 2005.

a. The investors are Hachimantai municipal government, Ashiro Rindo Develoment Ltd., Mr. John Moffatt and Plant & Food Research Institute.
b. One executive is selected from each investor.
c. The owner of new Rindo varieties developed jointly is Rindo International Ltd.
d. The holders of sales rights are Ashiro Rindo Development Ltd. on the Japanese side and Mr. John Moffatt on the NZ side.

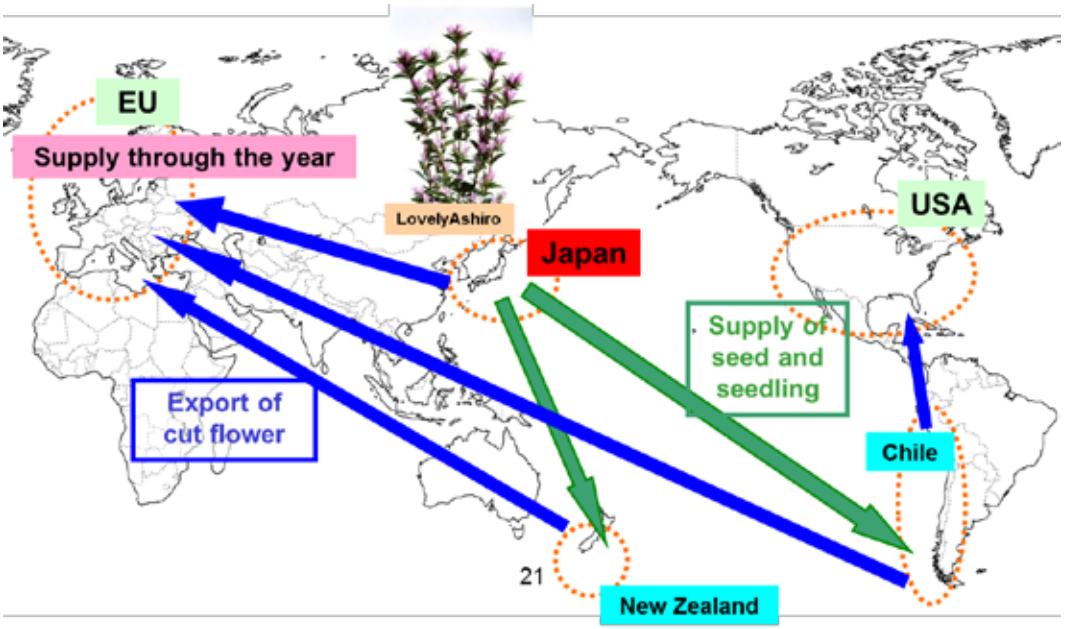
11. Summary of the Strategy for the Intellectual Property of Floriculture

a. Ashiro Rindo Development Ltd., a grower of new varieties of Rindo (gentian) in Hachimantai City, can independently exercise the right of sales by jointly breeding new varieties with the municipality.
b. New varieties (protected by PBR) are supplied to the world market and the royalties collected from the sales are used for the further development of new varieties and for training growers to maintain competitiveness.
c. Growers in Hachimantai City have exclusive rights to cultivate and sell in Japan new varieties of Rindo developed by joint breeding with foreign partners and the varieties introduced by the foreign partners. This has created a win-win relationship between the city and its foreign partners.

12. Cut flowers produced in New Zealand (NZ) and Chile are exported to the European Union (EU) and the United States of America (US) markets to achieve year-round supply of Ashiro brands

The Ashiro Rindo is harvested from summer to fall in Japan, Europe and the United States of America, and in New Zealand (and Chile located in the Southern hemisphere), the harvest time is from winter to spring of Japan.

The reason why the Ashiro Rindo are produced in New Zealand and Chile, is not only to be consumed domestically in those countries, but also to supply the market "all year round" as a result of production in Japan. The cut flowers are exported to Japan and Europe and the exportation to the United Stats of America is currently under consideration.


EU
Supply through the year
LovelyAshiro
Japan
USA
Supply of seed and seedling
Export of cut flower
Chile
21
New Zealand

The importance of plant variety protection for farmer-breeders of potato

Mr. Derk Gesink
(Netherlands)

Potato is the fourth most important feed crop in the world after maize, rice and wheat. Production of potato needs 2 times less water than pasta and 3 times less water than rice. It's a rich carbohydrate source with high nutrition value.

The breeding of potatoes started in the 19th century. A virus infection in the tubers caused severe yield drops. Men discovered that this virus was not transferred through true seed. Plants emerging from true seeds were free of virus and stayed free of virus during the first years, so they had much better yields. Some old farmers, schoolteachers and public benefactors such as Mr. Burbank started selecting amongst these seedlings. They were called hobby breeders. The first successful varieties were created by these people. Like the famous "Bintje", named after a student of Mr. Klaas de Vries and Russet Burbank, created by Mr. John Burbank. The genetic progress made possible by these pioneers was not unnoticed by the governments of the Netherlands and the United States of America . They saw the potential of breeding crops for welfare of the people and laid the basis for plant variety protection (PVP). After the second world war, Europe laid in ruins and feeding the population became a priority. The Dutch government started to invest in pre-breeding programs and fundamental research for several crops including potatoes. This created the golden triangle: the university and different institutes provided seed and seedlings to the hobby breeders. These hobby breeders made selections and the best clones were tested by the Dutch potato companies all over the world. This system brought the best together: research, practical knowledge and market introduction. I believe it's the base of today's success of the potato in Europe and north Africa. In the 1990s this system became a victim of its own success. There was food in abundance, resulting in low prices and the idea that agriculture was not important anymore. The land could better be used for improving the environment. The breeding programs at the institutes stopped or were taken over by commercial potato companies.

How different is the situation today? We are in the middle of a food crisis and in 2025 we will have to feed a billion people more. The development of new varieties takes about 12 years, so when we start today to breed a new variety, this new variety will be introduced in a world of 8 billion people.

There are some very interesting developments in the breeding of new varieties. For some years we have had access to molecular breeding methods which can make breeding more efficient. At the seedling stage you can already determine whether a clone is disease resistant or not. This not only saves time, but also a lot of work because you can discard all the non-resistant clones and focus on the resistant ones. Another development is Biometrics. Biometrics is the science and technology of measuring and analyzing biological data. All the field data combined with DNA data of the clones will give you much better information for breeding new varieties. The development of these techniques requires a lot of research and money. These investments have to be paid for by the royalties of present and future varieties.

Breeding potatoes brought us more resistant varieties, needing less inputs and giving higher yields. To make a comparison with cell phones: You can make phone calls with them, but the latest generations can do so much more and better.

The importance of PVP for agriculture is evident. It starts, however, for a farmer/grower with a fair price for the food he produces. When a farmer can make a profit he will invest in better varieties. This demand for better varieties will stimulate breeders to invest more in their breeding programs resulting in even better varieties. It's basic economics.

Potatoes need PVP. Growers can relatively easily reproduce potatoes. In the past, after 2 years of multiplication, quality and yield would deteriorate and growers had to buy new seed potatoes. Now with in-vitro techniques they can start with material free of diseases and produce seed potatoes themselves. This opens new markets, markets that would normally be too far away for exporting seed potatoes or markets that do not allow seed potatoes to be imported. A good example is Argentina. We can't export seed potatoes to Argentina because of very strict phytosanitary demands. But instead a small amount of in-vitro material was sent. Nowadays seed potatoes are produced locally in Argentina. Argentina pays royalties for using these varieties. Without PVP this would not have been possible, because the breeder would not have been prepared to send in-vitro material to Argentina. Argentina has now a variety that is 15% more efficient than the old varieties, and the breeder receives his royalties, giving a better return on investment

It is naive to think that everybody would pay royalties for using protected varieties. The coming internet generation is used to get things for free, like movies, e-books and music. Why should they pay for using protected varieties? The present patent war is also a bad example for them. Intellectual property is clearly on the move. Record labels asked too much for their CD's and were too late to change their business models. The present patent war shows the imperfections in the system of patents. Instead of using it for Innovation it is used for market protection. Steve Wozniak, co-founder of Apple says about the verdict of the Apple-Samsung case: "I don't agree with it. Very small things I don't really call that innovative. I wish everybody would just agree to exchange all the patents and everybody can build the best forms they want to use everybody's technologies."

The UPOV system of PVP is not just a system to favour western breeding companies. Anyone can start a breeding company without fearing patents. You can cross your own old local varieties with the latest western varieties, getting the best locally adapted varieties. The only thing you need to have are some basic tools and basic knowledge of breeding.

If we look at what the co-founder of Apple says, would it be better that the system of patents should look a bit more like the PVP system? Building the best varieties by using each other's varieties.

Discussions Transcriptions

Mr. Thor Gunnar Kofoed

The importance of new plant varieties for farmers and growers

Mr. Luis Fernando Rosales Lozada, First Secretary, Permanent Mission of the Bolivia (Plurinational State of), Geneva**:** I would like to thank the presenter for this excellent presentation. I would like to hear what he thinks about something which I think is particularly important for my country, that is the relationship between biodiversity and what we might call uniformity. In other words, Bolivia has more than 1200 varieties of potato and we want to continually improve the standards of our seed stock, and to do that we tend to concentrate on certain better varieties. This, however, could have an adverse effect because it might mean that we lose diversity. That seems to be a downside risk at least. I would like to know what Mr. Kofoed thinks about this. There seems to be this apparent dichotomy here. Thank you.

Mr. Thor Gunnar Kofoed (speaker)**:** Biodiversity is a very hot issue in Europe as well. But I do not believe that because we are developing new and better varieties that it changes diversity. The only thing is that we always need competition between breeders. If you have this competition between breeders then it is not only one breeder who will dominate the market. I do not know how many breeders we have in Europe in how many varieties, but I have heard that the Community Plant Variety Rights Office (CPVO) is adding about 1700 varieties to their list each year, so we still have a very big range of diversity in the different crops in Europe. I do not think this has changed. The most important thing is that you are not excluding anybody. If all have the same possibilities then you will still have competition.

Mr. Macoumba Diouf, Director General, The Senegalese Agricultural Research Institute (ISRA), Senegal**:** Might I start by congratulating Mr. Kofoed for that very good presentation. I have two questions: could he say a little more about this notion of modernizing the certification system? We know that in some countries, such as my own, this is a way to create employment because this is private or is being privatized. He spoke about modernization here and cost reduction. Could he say something about how he sees that could happen? Could he expand a bit on this whole area of modernization in that area? My second question is about establishing an independent assessment system for new varieties. Could you tell us what you have in mind on that? What do you think that system would involve?

Mr. Thor Gunnar Kofoed (speaker)**:** It is difficult to answer very shortly on those two questions since they cover a large topic. About the certification system – first of all I do not think you can change it to a completely private basis. We need to have a kind of official control of certification because if you do it only at a private level, then we cannot gain customer trust in it in the future – I don't believe it is possible, but maybe I am wrong. If you look at the certification system – there are different systems in different parts of the world and, indeed, the certification system in Denmark differs from those in other parts of Europe. We have tried to make it easier in Denmark, and I know some years ago they also did this in the Netherlands. The most important thing is that with modern technology, we know today that we should try to use it in a way that makes the system cheaper. A lot of these regulations are built on technology which was available in the 1950s, with a lot of manual work and human control – we need to find a more modern way of carrying out these procedures. The changes we are making to our procedures in Europe, however, perhaps wouldn't be the way forward in Africa, for example, because you have a different culture and tradition. The most important thing is to find a way whereby we are not putting money into the administrative costs of certification instead of the most effective methodology. Finally, an independent testing system – this is a big issue. I know how we do it in Denmark and it is rather expensive. A good way to seek to improve this, in my opinion, would be to look at the value for cultivation and use (VCU) and official tests to see how we could make use of the same information for both of these – this might be the most cost effective way of operating – but it will take about 10 years in Europe to find aa agreed way of doing this. But the most important thing is to have an independent testing system.

Mr. Stephen Mbithi (given by Mr. Simon Maina)

The experience of small-holder flower growers in Kenya

Mr. Riad Baazia, Independent Consultant, Switzerland**:** It is very interesting to learn from the case of Kenya, but do you have any statistics on agricultural production, particularly vegetables and fruits and flowers.

Mr. Simon Maina (speaker)**:** I do have some statistics, but I did not go into this in detail in my presentation. Of the 1 billion USD of exports, the breakdown is about 50/50 for flowers and vegetables/fruits. From my information, we are doing better in vegetable/fruits for small holders – they are actually more involved in vegetables and fruits perhaps by virtue of the fact that they are easier to produce than flowers.

Mr. Stephen Smith

Investing to deliver the varieties that farmers and growers need

Mr. Choi Keun-Jin, Director of Variety Testing Division, Korea Seed & Variety Service (KSVS), Republic of Korea**:** I would like to thank you for your excellent presentation. As indicated in your presentation, in the case of hybrid varieties of maize, you do not use the plant variety protection system, even though the inbred lines may be protected under the plant variety protection system or the patent system – so please could you explain the use of PBR systems for inbred lines.

Mr. Stephen Smith (speaker)**:** Well I mentioned soya bean as well as that is a self-pollinating crop so PVP is very important there. With regard to a self-pollinating crop, it is important to a plant breeding company that there is a royalty system in place. We have seen examples in Europe where there is a royalty system in place and perhaps it is no surprise that, in fact, the rate of gain in wheat production we saw earlier this morning is higher than that of the United States of America – perhaps that is related to the fact that there are royalties coming back to the breeders and encouraging more wheat breeding in a self-pollinated crop. We tend to use every form of intellectual property that is available to be quite honest. So we use PVP on corn inbreds, maize inbreds, and in the United States of America we can use patents on varieties per se, so we do. There are genetically modified traits in soybean and maize in the United States of America, they have patents on them also. It is very important also to use trade secrets and contracts where appropriate – so there are a whole range of things available to the breeder. We will use everything that is reasonable to have as much protection as we can achieve to allow us the best opportunity to produce what the farmers wants and to enable us to get returns from sales to reinvest in further breeding. So PVP is important because it provides a basic essential form of intellectual property (IP) that is globally available. Countries can adopt a PVP system, they don't have to reinvent the wheel with the UPOV PVP system and the UPOV system is flexible. The 1991 Act of the UPOV Convention (UPOV 1991) was an important development to help accommodate the affects of biotechnology where you could put one gene in an existing variety and make a distinct variety. Without UPOV 1991 and its provision for essentially derived varieties, then effectively if you put one gene in you could pirate that previous variety, which is unacceptable because it then takes away the incentives to breed the base germplasm. So, although we use many forms of protection, and indeed hybridity is one, PVP is an essential part of the whole IP portfolio.

Mr. Eduardo Baamonde

Adding value for grower cooperatives

Mr. Philippe Toulemonde (speaker)**:** You spoke about cooperative policy with the objective of respecting intellectual property in Spain. Could you elaborate on that?

Mr. Baamonde (speaker)**:** We are totally in favor of enforcing intellectual property and the rights of breeders, of course, and, together with the breeders, we participate in plant variety protection – this is very important to our organization. It does not mean that there are farmers and members of cooperatives who are not in agreement with this strategy, but as an organization that represents the interests of 4000 cooperatives and almost a million producers, we are convinced that the only way of working in the long term that favors our interest is by respecting the interests of breeders.

Mr. Oscar Stroschon

The use of plant variety protection to add value for farmers in Brazil

Mr. Riad Baazia, Independent Consultant, Switzerland**:** You spoke about plant resistance to disease –what do you do in Brazil on that score? What do you do in terms of upping plant resistance?

Mr. Oscar Stroschon (speaker)**:** I think our farmers have been very aware of this issue. Not only do we have disease problems, but also particularly with our soybean, we have had good results in increasing its resistance to those diseases. We have been able to offer new varieties which have a higher resistance to these diseases. We have had problems with asian pests, for example, and we need those varieties which are resistant to those pests.

Mr. Helcio Campos Botelho, Director, Department of Intellectual Property and Agricultural Technology, Secretariat of Agricultural Development and Cooperativism, Ministério da Agricultura, Livestock and Food Supply, Brazil**:** Could I just make the following point. On behalf of the Brazilian delegation I would like to congratulate you for the contribution made to the farmers of Brazil. Our farmers are always trying to get support from research so that they can boost their yields. In Brazil, intellectual property is something that arises from research and it helps farmers reduce risks, both at sowing and at harvest time. Therefore, we are very pleased that a lot of work has been done and we are very grateful to you for organizing this forum for us to exchange ideas.

Mr. Young-Hae Kim

A farmer-breeder experience in the Republic of Korea

Marcel Bruins, Secretary General, International Seed Federation (ISF)**:** This morning, before the start of the seminar, we were discussing farmer-breeders and we were wondering how in all crops you deal with disease pressure? Because some diseases return each year to your fields and you can easily select for those, but some diseases do not come every year, they come every four or five years or even less frequently. How do you deal with those diseases? Do you artificially innoculate or do you just wait for natural infection?

Mr. Young-Hae Kim (speaker)**:** My rice is really resistant to rice blast, a kind of disease, and I grow my rice at very low temperatures, so that I am sure that my rice will always be resistant to this disease. In case of any emergency or problems, I deposit my seeds in three different gene banks so I can deal with this eventuality.

Mr. Guy Kastler

The role of plant variety protection in supporting the development of improved varieties

Mr. Riad Baazia, Independent Consultant, Switzerland**:** I would like to ask about the organization that you represent. It is well know internationally, particularly as part of international trade negotiations. How is it that plant varieties could also be something which would not be subject to the rules of globalization, that is to say the removal of customs tariffs and border barriers?

Mr. Guy Kastler (speaker)**:** I don't think that UPOV, as an international Convention, really has jurisdiction over customs tariffs. However, we are lucky enough in most countries today, that we have in place a national system which of course is covered in national legislation. There are areas in the world, such as Europe where we have European law which basically holds sway. In national legislation or regional legislation on seeds, every country may take a number of measures. At the World Trade Organization (WTO), they have less power today, I think things are happening much more in bilateral free trade agreements. That is where the work is taking place. A system such as the UPOV 1978 Act or another sui generis system which is facing up to this threat of patents. If there are enough countries behind that, that is something that could certainly be used at WTO or in these bilateral agreements.

Mr. Yoshiteru Kudo

The Ashiro Rindo Story

Mr. Takashi Ueki, Director, Plant Variety Protection Office, Japan**:** Thank you very much for your kind explanation about the famous Ashiro Rindo story. I want to add that his family currently grows 380,000 flowers. Mr. Kudo mentioned the importance of obtaining a plant breeder's right and also the trademark. I want to ask you a simple question. Do you think that the trademark plays an important role, as well as the plant breeder's right?

Mr. Yoshiteru Kudo (speaker)**:** I think yes.

Mr. Derk Gesink

The importance of plant variety protection for farmer-breeders of potato

Ms. Kitisri Sukhapinda (Moderator)**:** I have a question concerning the potato characteristics that you are looking at for French fries. What are the characteristics that will produce a good French fry.

Mr. Derk Gesink (speaker)**:** Nobody wants to have black French fries. Some countries like to have white French fries, others prefer yellow ones and also, it is important that the texture is good. When you pick up a French fry, it should remain horizontal and not droop.

Mr. Michael Roth, Intellectual Property Consultant, United States of America**:** You mentioned the problem you had with your children (downloading music from the internet) in that they don't see why they should have to pay for intellectual property and it seems to me that, whether it is the case of farmers or in the case teenagers downloading music, it is difficult to see the long-term effects of individual choices: they don't see that the number of musicians has declined some reports say 42% over the last 20 years because they are not making any money selling recordings anymore. Likewise, how can farmers or seed companies understand the effects on innovation by individual choices not to grant intellectual property.

Mr. Derk Gesink (speaker)**:** I think your answer has been given by the first speaker this morning – he said we have to explain to the farmers how the income from royalties is vital to ensure future investment in the breeding of new and improved varieties. We have to explain better.

Luis Fernando Rosales Lozada, Primer Secretario, Misión Permanente de Bolivia (Estado Plurinacional de)**:** I would like to thank you for that presentation. It is always good to hear of such experience – it is very much of an eye opener to see what the experience of farmers actually is. Things differ between countries, sometimes it is difficult to take the experience of farmers in one country and move that experience into other countries where circumstances are very different. Could I ask whether the Dutch State plays a role? Is it involved in promoting the work that you yourself have been doing? Do you get any support from the Government to launch the company or is this something that you have paid for out of your own equity.

Mr. Derk Gesink (speaker)**:** I am not an expert on this, I am just a farmer, but in my own experience, before 1990, the Government was much more helpful for us as breeders than they are today. It is very important that you are united as breeders together with a big Dutch potato company, otherwise it is very difficult to promote your varieties. It is a combination of the breeder and the Dutch potato company, we work together. So there is hardly any government involvement.

Mr. Thorsteinn Tómasson, Director, Agricultural Research Institute, Ministry of Fisheries and Agriculture, Iceland**:** I come from Iceland where we do not breed any potatos yet, but potato has always been very interesting in many ways. The one thing that is particular about potatos is disease pressure. There are an enormous amount of diseases,. How do you deal with that particular problem when you concentrate on just one particular characteristic, such as the French fries quality.

Mr. Derk Gesink (speaker)**:** Today, we have possibilities to use genetic markers and then it is much easier to deal with multiple traits without losing sight of the fact that, in the end, this potato has to make a good French fry. That's why we are very happy that we are able to have access to these new techniques. I think for the future it will still take 12 years or more to develop a successful new variety, but with these techniques we can breed even better varieties.

Mr. Riad Baazia, Independent Consultant, Switzerland: In every part of the world we can have various varieties of potatoes – these are obtained naturally without breeding. In Brazil, it is well known that there are various types of bananas without breeding. Do you really think that breeders' varieties are really used for the commercialization?

Mr. Derk Gesink (speaker)**:** Where I live I produce mostly for the Western European markets: they want to have a potato that is easy to peel, so the shape of the potato is very important. When they cook it, they want to have one kind of color on the table, not four or five. So that is why it is important to do the breeding well, to give the customers what they want.

Round table discussions (all speakers present)

Ms. Jung-ui Sul, TansFarm Africa, Sidley Austin LLP, Belgium**:** How costly and difficult can it be for a farmer-breeder to register for PVP in a particular country – because hobby breeders, I assume, are not familiar usually with the PVP registration process in the same way that a large seed company or a more institutional breeder might be familiar with the PVP process. So I wonder if some of the speakers can speak about how it was for them to go through the PVP registration process.

Ms. Enriqueta Molina Macías, Directora General, Servicio Nacional de Inspección y Certificación de Semillas (SNICS), Mexico**:** It is not really that complicated. Clearly for farmers, when we are talking about small businesses, it seems complex, but they are more worried about the actual idea of it than the actual practicalities. They might think that it is going to be difficult to register, but the actual procedures are relatively simple. Our experience in Mexico is that when there are farmers who have got an innovation, they go to some public body and they can then help them with registration and with the characterization. It isn't that easy, but I think what they first have to do is perhaps overcome their fear of approaching the authorities; in any case they don't need to have the services of a lawyer. They put in an application and in many countries you can do that on-line, there might also be a single format for this, so there are many ways in which we have been able to simplify and streamline the process. That is certainly a way in which we are able to approach the smaller enterprises and individuals to get them to register.

Mr. Kees van Ettekoven (Netherlands), Head of Variety Testing Department, Naktuinbouw NL**:** What we see with small applicants is that we speak a different language than they do, and it is not always easy for them to understand the jargon that we have introduced in the UPOV System. So we try to get them to approach us and then we explain, for example, the technical questionnaiere that they have to complete, and what is important for our DUS test to avoid any unnecessary complications. There is no special fee for small breeders; Pioneer would pay exactly the same fee as for someone like Mr. Gesink when he applies for a PBR for a potato. For some individual breeders that is a hurdle in the system because if you have a running system with annual applications, fees are a different kind of thing than when you only have an application once every few years. However, when we explain the procedures carefully and maintain good contact we hope to keep them in the system because I think it is a valuable addition to the breeding society that also the small breeders take part.

Mr. Doug Waterhouse, Chief, Plant Breeder's Rights Office, IP Australia**:** I can support the comments from my colleagues from Mexico and in the Netherlands. In Australia, 35% of applications are from small-scale breeders and at least half of those each year are from new small scale breeders. So we have a lot of experience of dealing with first time applicants. The same applies – we don't have any special fee for them, but what we do offer is a large amount of explanations and assistance throughout the process. There are many times where farmer-breeders who have almost no experience at all, but do have a good variety, seek protection and we help them through the process. If they feel that they can't complete the process themselves then there is no need to involve a legal representative or a lawyer, we offer some technical people who can help them through that as well.

Mr. Riad Baazia, Independent Consultant, Switzerland**:** Mr. Kim is the only speaker who mentioned rural development and I appreciate that. There is an international day for rural women. In Switzerland there are many banks and there are also rural development banks, agriculture credit banks. How can plant variety protection be a tool for rural development?

Mr. Vuyisile Phehane (speaker)**:** In the case of South Africa, what we have realized in particular is that these partnerships are very important. Originally, when the Land Bank was started, it became apparent that the banking fees and cost of capital from the land bank, proved to be high for smallholder farmers. So partnership with the Agricultural Research Council (ARC), and entering into a Memorandum of Understanding with them, where we would avail ourselves as the RC to assist the bank to basically mitigate this risk, when it is lending to small holder farmers. What that does is provide confidence to the Land Bank and similar banks such as the Development Bank of South Africa, to fund smallholder farmers and spread the risk more by having the backing of the ARC with the decision to make that financial investment – what that does is lower the interest rate for smallholder farmers, which is to their benefit .

Mr. Riad Baazia, Independent Consultant, Switzerland: How can the UPOV Convention be used as a tool for rural development?

Mr. Simon Maina, Kenya Plant Health Inspectorate Service (KEPHIS), Kenya**:** I think as I had indicated when talking about rural development, in Kenya is that the issue of plant variety protection is more in the private sector which is more commercially based. Of course we have public breeding which is part of the Government, but we already have efforts whereby, in the rural areas, we have non-governmental organizations who are active in helping farmers work on their traditional varieties. Once farmers get into a semi-formal system of seed production using varieties which we say are abandoned, there is a lot of potential in them and we are able to develop some varieties from them.

Mr. Peter Button, UPOV (speaker)**:** First of all, I would like to refer you to the UPOV Report on the Impact of Plant Variety Protection, which UPOV published back in 2005. You will see in the foreword of that publication the conclusion, that plant variety protection had proven to be a key driver for rural development. I think you have already seen some very convincing evidence of that today, even though that is not the focus of today's Symposium. For example, we have seen that rural development from smallholder farmers in the mountainous regions of Japan, to the billion US Dollar cut-flower industry in Kenya – both representing rural development. We have seen the role that it plays for cooperatives; we have seen in the Republic of Korea the support for farmer-breeders. The presentations from farmers have provided clear evidence of the role it plays in rural development.

Mr. Young-Hae Kim (speaker)**:** I think that breeding can help rural development for sure. First of all we can expect a high quality agricultural product through breeding and secondly we can expect an increase of farmers' incomes. Thirdly, it also promotes distribution of the products in many ways and lastly, it can deal with diverse problems due to particular climatic conditions such as typhoons. In the Republic of Korea we have a huge problem with typhoons in certain periods.

Mrs. Susan Bragdon, Executive Director, Association for Plant Breeding for the Benefit of Society (APBREBES)**:** I have a question about biotechnology and the relationship with farmers in terms of granting rights and enforcing rights. Biotechnology is something under discussion at UPOV and also in national forums, in terms of using things such as molecular markers, and I wonder how that will relate to farmers, either in terms of enforcement or in granting rights –given differential types of access to those kinds of technologies. Perhaps this is more directed to Stephen Smith and to other speakers.

Mr. Stephen Smith (speaker)**:** I am not sure I quite understood the question. Clearly molecular markers, at least in some of the major field crops, are becoming a routine and regular tool for plant breeding and I really appreciate your comments on biotechnology. Often, people just think it's a genetically modified organism (GMO), but it is much broader than that and you understand that, by including the use of molecular markers. Clearly, unless you have a molecular marker laboratory, you cannot use molecular markers, but we heard from our potato breeder, Mr. Gesink, that in fact they are making quite a lot of use of molecular markers. In plant breeding courses, surely molecular markers are an integral part of that, and there are laboratories being set up that can provide services using molecular markers. So it will be more and more feasible. But I do understand that if a farmer wants to do some plant breeding and if they are considering using molecular markers and the whole stream of pedigree information too, it might be pretty tough. I would hope that farmers doing plant breeding can bring some additional insights to the subject matter and their intimate knowledge of the germplasm that perhaps we, at a large company, might somehow miss.

Mr. Derk Gesink (speaker)**:** I do not breed on my own, I am breeder for AZPC, which is a company owned by farmers, by the people who work for AZPC and breeders. Together we are a group of about 300-400 people and we can really make the difference because we are such a big group. On an individual basis, I agree that it is nearly impossible. But 100 years ago, farmers already saw that they couldn't do it on their own. In that period, farmers started cooperatives for banks, for potato companies, etc. In the future we will still have to do this. Together we can move more than on an individual basis.

Mr. Thor Gunnar Kofoed (speaker)**:** When we talk about GMO and GM technology, in Europe it has been a very hot political question over the last 12 years and we tried with technical answers to explain that it is not a problem and that most of the population in the world is consuming food from GMO varieties with no ill effects. We can never win that political discussion in Europe. I think that we have to learn from that discussion and all this new technology for breeders that is coming in the future. The question is then should we constantly have to defend our use of GM technology or should we use it as a new breeding technology that we need. I don't think that we should have to put up for discussion every new technology that we have to use in the breeding programs. These do not have to be political questions. Of course the breeders know how to use these technologies and they are making good programs, but we should not have to ask on a political level about the tools they are using in their breeding programs. I think that this is something we should learn from the last 12 years.

Mr. Peter Button, UPOV (speaker)**:** I think that you also raised the issue of the use of these techniques in the examination on new varieties. In UPOV we have recently published guidance on the potential use of molecular techniques and what you will see is that examination does not require breeders to have used these techniques in order to be able to meet the requirements of distinctness, uniformity and stability (DUS). They are tools that might be used under some circumstances in the examination, but that does not mean that a breeder needs to have used them in the breeding of their variety. The lack of a molecular biology or a laboratory is not going to be a problem for the DUS testing, because ultimately it will be the same characteristics that are examined for distinctness, uniformity and stability as in the past.

Mr. Guy Kastler (speaker)**:** Could I just say something about molecular markers. For breeders these don't create any problems for us if this is simply a tool for us to track a selection program. However, they are a problem for farmers and I think for breeders as well, because this is a technical system which has changed the relationship between the certificate and patents. The certificate looks at the phenotypes and if you cross the two varieties you cannot prove with the phenotypes that this and this variety has been used. Therefore, the exemption for the breeder comes from what was then established according to the certificate. As I said just now, it is very difficult for a breeder to recognize his variety when it is in a farmer's field. A farmer who is using the farm saved seed only on the basis of the phenotype character, particularly when it is something that is a mixed breed. However, with molecular markers, the patentee of a gene can straight away find the protein or the sequence or the marker, he can then tell very quickly that what is under patent protection is present. Therefore, he can then not allow the right to a competitor. He can either then ask them to discontinue or seek royalties. I heard my colleague talk just now about politics, but intellectual property rights and the effectiveness of them is very political indeed and this is something which is within the power of the politicians and not just the holders of those rights. It is a political issue as well. When you write laws and if the impact of those laws is changed by a technical innovation then you have to look at the impact of those technologies. You have to look at how this law applies to this new technology and I do not think that that impact study has been done yet, that interplay has not yet been properly looked at and I think it was Mr. Button who said this just now – he was talking about molecular markers for specific characteristics, okay. Now it is possible with the very rapid progress that is being made in marker technology, let's think how long it used to take back in the 1990s – and compare with how quickly we can do this today, you can actually sequence a whole plant relatively quickly today. Therefore, if we use these markers to look at the features of a variety which is under protection, I feel that this could well cancel the farmer's privilege. So it is not just a technical debate, but a very political one indeed.

Mr. Peter Button, UPOV (speaker)**:** I would like to clarify that, under the UPOV Convention, we do not differentiate between the techniques that are used in plant breeding, whether they use modern techniques or traditional techniques. As Mr. Kastler explained, some of these techniques enable much more rapid progress in plant breeding and enable farmers and growers to have much better varieties more quickly and therefore, this may be something that is very beneficial for farmers and growers.

Closing Remarks

Kitisri Sukhapinda
President of the Council of UPOV
Geneva, November 2, 2012

SESSION I: THE ROLE OF PVP IN IMPROVING INCOMES FOR FARMERS AND GROWERS

The UPOV System of Plant Variety Protection:

- Encourages the breeding of new varieties - enabling farmers to respond to the environmental and economic challenges confronting agriculture
- Provides farmers and growers with access to the best local and global varieties
- Enables variety choice to be combined with information and delivery of good quality planting material
- Offers a tool for capturing value through farmer cooperation
- Facilitates "win-win" cooperation between farmers and breeders
- Provides business opportunities for small farmers and growers
- Has the potential to be even more effective through improvements in implementation

SESSION II: THE ROLE OF PVP IN ENABLING FARMERS AND GROWERS TO BECOME BREEDERS

The UPOV System of Plant Variety Protection:

- Provides an incentive for farmers and growers to become breeders
- Enables any farmer or grower to use the best available, protected varieties for breeding work
- Offers an effective and transparent system that is easily accessible for small and medium-sized enterprises
- Enables farmers and growers to develop local, national and international businesses
- Empowers farmers and growers in the production chain
- … BUT we need to explain it better

Speaker Biographies

THOR GUNNAR KOFOED

Born in Denmark at Bornholm in 1959.

Agricultural adjuration 1982

A farmer and seed grower since 1986, he is currently farming 175 hectares for crop production. He is working with two other farmers with pig production farms and together they run about 475 hectares in a machinery cooperative. He also farms an organic Dairy farm in Poland with 275 milk cows and 375 hectares.
He farms with the latest new technologies and develop the farms so that they are always able to meet consumer and environmental demands.

Took over the family farm in 1986.
Member of the Board of Danish Seed Growers association since 1993.
Chairman of the Danish Seed Growers association since 1995
Chairman of the Danish Seed Council since 1995
Member of the Danish Agricultural Council since 1995
Chairman of COPA/COGECA Working party on Seed (EU) since 1995
Ecofarma, (Demo organic dairy farm) in Poland since 1994

Other business
Chairman of “Grenessminde” (School for Late developed maladjusted youth) since 1999
Developed a Re-circulated cell production system 1985-1995
Member of city council of Nexø 1994-2001
Member of the County Council of Bornholm 1998-2001
Member of the Danish Parliament, Folketinget, 2001-2005
Member of the Growth Council on Bornholm since 2005
Project development manager BioGasol 2008 - 2011
Manager BornBioFuel 2008 – 2011

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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 plant breeding company in the United Kingdom, on the development of new cereal varieties. Between 1987and 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. in1994. 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 United Kingdom 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 United Kingdom 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.

STEPHEN MBITHI

Chief Executive Officer, Kenya Horticulture Industry Association (FPEAK-Kenya)
Dr Stephen Mbithi Mwikya (43) is the Chief Executive Officer of the Kenya Horticulture Industry association, known as the Fresh produce Exporters Association of Kenya (FPEAK), which brings together about 150 companies involved in production and export of fruits vegetables and flowers from Kenya to the EU (82%) and the rest of the world. Kenya's horticulture exports amount to one billion US$, which has been the largest foreign exchange earner for the last 3 years. 70% of exported fruits and vegetables are produced by smallholders. Horticulture supports the economic livelihood of 4.5 million people in Kenya (11% of the country's population). It is a dynamic sector that is knowledge and technology intensive, and relies on superior cultivars and seed technology (with lots of intellectual property aspects) to enhance productivity and hence sustain global competitiveness.

Dr Stephen Mbithi is a Ph.D graduate from University of Ghent in Belgium; specializing in Standards and postharvest technology. He is also the Coordinating CEO of the Horticulture Council of Africa (HCA), an umbrella body bringing together 13 horticulture industry associations across Africa. He also sits on the GlobalGAP sector committee (standard drafting) on fruits and vegetables, and has extensive knowledge of trade and SPS standards in public-private partnerships especially in horticulture and fisheries.

PHILIPPE TOULEMONDE

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Dr. Smith (B.Sc. University of London), M.Sc. (Conservation of Plant Genetic Resources) and Ph.D. (Evolution of Maize), University of Birmingham (England). Research Fellow at Pioneer Hi-Bred International, employed by Pioneer since 1980. Research interests include genetic diversity, issues related to germplasm access and benefit sharing, use of morphological and molecular data for variety identification, demonstrating the importance of sustainable use of genetic diversity to improve agricultural productivity, pedigree analysis of crop varieties and intellectual property protection (IPP). Responsibilities include managing a technical support group that provides data required to obtain patents and Plant Variety Protection (PVP) and to undertake research to demonstrate the important role of plant genetic resources and IPP in plant breeding and agriculture. Dr. Smith serves on intellectual property committees of the American Seed Trade Association (ASTA), the International Seed Federation (ISF) as Chair, and the Biotechnology Industry Organisation (BIO). He is a Fellow of the Crop Science Society of America and received the 2005 ASTA Chairman's Distinguished Service Award for service to the industry in the field of intellectual property protection. Dr. Smith chaired the C8 (genetic resources) Division and the Sperling lectureship committee of the Crop Science Society of America. He is a member of the Editorial Board of the journal Plant Genetic Resources, Characterization and Utilization. Dr. Smith has served as a Board member of Bioversity International (previously the International Plant Genetic Resources Institute) of the Consultative Group on International Agricultural Research (CGIAR), and currently serves as Board member of the National Council of Commercial Plant Breeders. He has served on a review panel of the CGIAR Generation Challenge Program. He is a member of the advisory council of the Bioethics Program and Iowa State University, and a member of the CropLife International germplasm access and benefit sharing committee. In 2011, Dr. Smith was appointed to a 4 year term on the US National Genetic Resources Advisory Council. He recently represented industry through the International Chamber of Commerce at a technical expert meeting of the Convention on Biological Diversity. He chairs the Pioneer DuPont Genetic Resources Issues Team, a group that was instrumental in securing a $1m contribution to the Global Crop Diversity Trust. He has published around 100 peer reviewed scientific papers including on genetic resources and intellectual property protection.

EDUARDO BAAMONDE NOCHE

Born in Villalba (Lugo), Eduardo Baamonde studied agronomic engineering at the UPM at Madrid, and obtained a Masters degree in European Communities. In 1993 he moved to Brussels and since 1996, he has been Manager in the Brussels office of the Cooperativas Agro-alimentarias of Spain. In this role, he participated as an expert in the European Parliament Economic and Social Committee.

Since 2000 he has been the Director General of Cooperativas Agro-alimentarias of Spain, an organisation for which he has been working since 1992. Eduardo Baamonde has worked actively for the cooperatives, encouraging participation and communication between them, with the aim of the agri-food cooperatives setting high standards for the entire Spanish agricultural sector.

In November 2003, Eduardo Baamonde was elected as President of the General Committee for Agricultural Co-operation in the European Union (COGECA), an organization which represents the agri-food cooperatives at European Level. In this period, he promoted good relations between cooperative companies and consolidated the role of COGECA in the European Institutions. Besides that, he acted as representative of the European farming sector at the summit of the World Trade Organization (WTO) held in Hong Kong in 2005. At present, he is Vice-president of COGECA.

Eduardo Baamonde actively participates in many conferences, seminars and congresses both national and international, and has collaborated in the publication of several books and studies about the sector.

Cooperativas Agro-alimentarias is the representative organization of the agricultural cooperative movement in Spin. It pursues its activities at national, community and international level, and all the forums in which interests in the Spanish cooperatives movement are settled. The number of agricultural cooperatives exceeds 3,900, with more than one million associates and 100,000 direct employees and with a turnover of 18,322 billion euro in 2011.

OSCAR STROSCHON

Short biography: Oscar Stroschon has a major degree in Agronomy, works as a farmer, is 53 years old, married and father of two sons.Helives and works in Formosa, State of Goiás, Brazil.The son of small holder farmers he started his professional activities at the State of Goiás by sowing 50 ha of soybean. He worked hard and took his opportunities and, after 27 years, has consolidated himself as a farmer. He nowadays sows some 15,000 ha with soya beans, maize, cotton, beans and rice, and also processes some 40,000 tones of soya bean seeds in partnership with other farmers and several breeders from both the public and private sector. Mr. Stroschon is a farmer focused on faith and hard work, well known as an entrepreneur with great technical knowledge and successful partnerships.

DR. VUYISILE PHEHANE

Vuyisile Phehane completed his doctoral studies at the University of Cape Town in the Department of Chemical Pathology, studying the inhibition of malarial purine salvage enzymes. His working career started at SA Bioproducts, Durban South Africa, responsible for bioprocess development of amino acid production technologies. He later joined the CSIR, as Process Scientist in the Biocatalysis Group of the Biotechnology Division. His work at the CSIR sparked an interest in technology management, in particular the commercialization of R&D outcomes. His stay at the Innovation Fund as Program Manager, and then Commercialization Manager developed his skills in the evaluation, funding, management and commercialization of technology, which was pursued further at BioPAD (an initiative of the Department of Science and Technology) as Industrial Biotechnology and Bioprocessing Portfolio Manager. Vuyisile is currently the Senior Manager: Commercialization at the Agricultural Research Council of South Africa. He has served on the boards of a number of start-up companies, and has a keen interest in the licensing of technologies as well as the creation of viable spin-outs based on solid R&D outcomes.

YOUNG- HAE KIM

Educational background

2009~	Doctoral course in Pharmacy, Samyook University, Seoul
2005~2009	Master of Health Science & Social Welfare, Samyook University
2003~2005	Bachelor of Medical Food and Health, Korea National Open University

Experience

1974~	Member of National Agricultural Cooperative Federation
1990~	Farmer breeder of rice

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GUY KASTLER

Biography: studied philosophy until 1970, then became an agricultural worker, winemaker, cheesemaker and today, biological agriculturist in the South of France; founding member and representative of Confédération Paysanne on seed subjects and OGMs, general delegate of Réseau Semences Paysannes français, member of the commission for biodiversity of Via Campesina international.

YOSHITERU KUDO

1975	born in Ashiro-town IWATE JAPAN into one of the first gentian growing families
1999	graduate from Tsukuba University department of agriculture
2000~	gentian grower
2010~	Shin-iwate agricultural cooperative Hachimantai flower growers, gentian special director

DERK GESINK

Currently, Derk Gesink (1974) is a Seed potato farmer and breeder in his home-town of Mensingeweer, Netherlands. Derk graduated from the University of Wageningen with a B.Sc. in Plant breeding and statistics (1998). Derk has been chairman of Dutch young farmers in his province (2004) and is now chairman of the trust committee for Grass seed growers in Barenbrug Holland. Derk is married and has 3 children.

Liste des participants
List of Participants
Teilnehmerliste
Lista de participantes

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Thomas Arthur OSBORN — Senior Agricultural Officer Seed Policy, Roma, Italy

Organisation Mondiale de la Propriété Intellectuelle (OMPI) / World Intellectual Property Organization (WIPO) / Weltorganisation für Geistiges Eigentum (WIPO) / Organización Mundial de la Propiedad Intelectual (OMPI)

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