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INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

Geneva

TECHNICAL WORKING PARTY FOR AGRICULTURAL CROPS

Forty-Third Session
Mar del Plata, Argentina, November 17 to 21, 2014

REPORTS ON DEVELOPMENTS IN PLANT VARIETY PROTECTION
FROM MEMBERS AND OBSERVERS

Document prepared by the Office of the Union

1. The Technical Committee (TC), at its forty-seventh session held in Geneva, from April 4 to 6, 2011, agreed to request the Office of the Union to invite experts to submit written reports to the Office of the Union in advance of the Technical Working Party (TWP) sessions in order that a document containing those reports could be prepared by the Office of the Union. The TC noted that TWP experts would be invited to make a brief oral summary of their written report at the session and would also be encouraged to make reports under the agenda item "Experiences with new types and species", as appropriate. The TC also noted that TWP experts would have an opportunity to raise questions concerning matters of interest (see document TC/47/26 "Report on the Conclusions", paragraphs 9 and 10).

2. Written reports were requested by the Office of the Union in Circular E14/088. The following reports were received (in alphabetical order):

Members of the Union: Annexes I to XII: Argentina, Brazil, Denmark, European Union, Germany, Japan, Kenya, Netherlands, New Zealand, Republic of Korea, South Africa, United Kingdom

Observer: Annex XIII: United Republic of Tanzania

Organization: Annex XIV: European Seed Association

[Annexes follow]

ANNEX I

ARGENTINA

TECHNICAL WORKING PARTY FOR AGRICULTURAL CROPS

Forty-Third Session

Mar del Plata, Argentina, November 17 to 21, 2014

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Experiences with new types and species

Botanical name: Cyamopsis tetragonoloba (L.) Taub.

Common names: Guar (Spanish); Cluster-bean (English)

Origin: India and Pakistan

Family: Fabaceae

Experiences with new types and species

- Annual Legume.
- Spring-Summer cycle.
- Grows well in arid to semiarid areas.
- Lives in symbiosis with nitrogen-fixing bacteria.
- Growth habit: Upright.
- Flowers: in clusters, white to bluish color.
- Pods: flat and slim containing 5 to 12 small oval seeds.
- Breeding system: mainly inbreeding and outbreeding low.
- From sowing to harvest: 110 days or 160.
- Soil requirements: sandy soils, well-drained.
- Susceptible to frost.

Experiences with new types and species

Producing countries: India, Pakistan and the USA

Uses:

- **Food Industry**: extract gums from seed endosperms, which are the Polysaccharides, mostly used in juices, ice-creams, mayonnaise, cheese and sauces as:

  - Water-soluble thickeners,
  - Gelling-agent,
  - Stabilizers and,
  - Physical crosslinkers.

- **Pharmaceutical Industry**: as cholesterol and weight reducer.

- **Others**.

Experiences with new types and species

- Literature research.

- UPOV database search.

- There weren´t Test Guidelines for GUAR DUS.

- The USA Plant Variety Protection Office was the Authority with Practical Experience in GUAR.

- The USA sent us the registration form, that they use.

- Asked the applicant to send us all the information about the variety they have. (Our office works under the breeder system).

- Visited the places where they have the crops.

- Currently the application for these two varieties are pending.

Experiences with new types and species

Experiences with new types and species

Experiences with new types and species

Thank you

María Lilia Losada
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REPUBLICA ARGENTINA

[Annex II follows]

ANNEX II

BRAZIL

Plant Variety Protection – Legal Aspects

1. New proposals on Law 9.456/1997
    a. Draft Law nr. 2325/2007 and amendments, Dep. Keiko Ota (PSB/SP), that:
        i. extends breeders´ rights to harvested material (plants or parts of plants),
        ii. changes on the paragraphs 8th, 9th and 10th, Section III – Right to Protection, Chapter I - Protection, and
        iii. changes the title of “Chapter IV – Penalties” to “Chapter IV – Judicial Protection” and establishes penalties to misuse and breeders´ rights infingements.

Plant Variety Protection – Administrative Aspects

1. New proposal to update plant variety protection fees
    a. To be elaborated in cooperation with the economic financial área in the Ministry of Agriculture, Livesock and Food Supply

Plant Variety Protection – Technician Aspects

1. Use of Simple Sequence Repeats (SSR) molecular markers on examination of misuse on legal litigations (eucalyptus, apple and strawberry)
2. Plant Variety Protection enhancement throughout:
    a. 2014/2015 Mercosul Regional Trials to estabilish soybean and wheat example varieties to be presented to UPOV. Countries envolved: Argentina, Bolivia, Brazil, Chile, Paraguay and Uruguay.
    b. Lectures at:
        i. University of Passo Fundo (RS)
        ii. Brazilian Agricultural Reseach Enterprise – EMBRAPA (DF)
        iii. Santa Catarina Agricultural Reasearch and Rural Technical Assistance – EPAGRI (SC)
        iv. Pará Emilio Goeldi Research Institute (PA)

[Annex III follows]

ANNEX III

DENMARK

The past year has been an eventful one for the AgriFish Agency, Department of variety Testing. In the spring 2014 the Department had audit from the CPVO Quality Audit unit. The DUS testing of all our major agriculture species were examined and our Department received accreditation with no non-conformities.

Throughout the summer we have been working on a draft on the new Quinoa guideline. With a pause of 5 years we again have a new Danish Quinoa variety in DUS testing. In the year 2015 we will add another candidate which we are going to test on behalf of Germany.

In July 2014 the Minister of Food, Agriculture and Fisheries decided to change the organization of the Department of Variety Testing. Until now the Department of Variety Testing has been a department in The Danish AgriFish Agency, which is again a part of the Danish Ministry of Food, Agriculture and Fisheries. In the future a Fund for Variety Testing will be established by this Governmental decision and its instrument of foundation will ensure the impartiality of testing and recommendation of new varieties. The AgriFish Agency will continue to perform the tasks that count as official duties such as approval of new varieties. The Agency will monitor the operation of the fund on regular basis. The CPVO will be consulted on maintaining the accreditation that Tystofte has for a number of agriculture species. This is obvious high priority, but is not foreseen to create any difficulties. The indecency from the constraints of public finance will ensure a sound and dynamic development of variety testing and related activities at Tystofte. The DUS, VCU and Post control will continue at the premises at Tystofte together with the same personal. The new organization is scheduled to be in place the 1th of July 2015.

[Annex IV follows]

ANNEX IV

EUROPEAN UNION

Report on activities of the Community Plant Variety Office (CPVO) of the European Union (EU)

In 2013, Croatia joined the EU and hence the Community rights have become valid on the territory of 28 Member States.

The year 2013 was the record year in terms of the number of applications for the Community plant variety rights (CPVR). The Community Plant Variety Office (CPVO) of the European Union (EU) received 3 297 applications, which represented an increase of 15% compared to the previous year. A part of the strong increase observed in 2013 could be attributed to lowered application fee from EUR 900 to EUR 650 applicable as from the 1st January 2013. In 2013, the CPVO granted 2 706 titles for Community protection which represents the highest number ever granted within a calendar year. By the end of 2013, there were 21 576 Community plant variety rights in force. In 2013, a record number of 800 applications in the agricultural sector was achieved, which was in itself a slight (2.5%) increase on the previous year's figures; the most important crops were as usual maize and wheat. The first three quarters of 2014 shows figures which are about 4% less than the record year 2013 for the overall applications but slightly more applications in the agricultural sector in 2014.

Variety Finder: The centralized database of variety denominations "CPVO Variety Finder" contained in 2013 over 850,000 denominations from national listing, plant variety rights registers and some unofficial registers. The database is available on the public website with a registration system, a login and password is delivered upon request. Over 83,000 tests were launched in the database in 2013; this represents an increase of 20% compared to 2012.

IT developments: As regards the online filling launched in 2010, the share of applications filed through this means has reached some 80% recently. The pilot project on sharing the online application tool with EU Member States has advanced significantly. Since April 2014, the CPVO has been serving the certificates of Community PBR titles only in the electronic version. The pilot project 'Exchange platform' was launched last year and more and more documents are exchanged electronically with examination offices via this platform.

CPVO Agricultural experts' meeting of 2014: The meeting with agricultural experts in 2014 took place in October. The meeting was attended by representatives of the CPVO's entrusted examination offices for agricultural crops, the European Seed Association and representatives of countries participating in the Multi-Beneficiary Programme for candidate countries to the EU. Discussions focused on: New characteristics in barley; reduction of seed amounts for a parent line in oilseed rape; the relation between the re-submission threshold and refusals; technical verification of protected varieties for which no seeds are available for the reference collections; greater cooperation between entrusted examination offices; agricultural species covered by EU seed directives but without a CPVO protocol and on-going R&D projects in grasses, potato and maize and a potential new R&D project in oilseed rape.

[Annex V follows]

ANNEX V

GERMANY

In 2014, DUS tests in Germany comprised 2750 candidate varieties within 173 species. 60 % of candidates were tested on the basis of national applications for plant breeder´s rights or national listing, 40 % of tests were carried out on behalf of other authorities, mainly for the Community Plant Variety Office. The candidate varieties include 64 % agricultural crops, 26 % ornamentals, 10 % vegetables and 10 % fruits. The main crops are maize, wheat barley oilseed rape and sugar beet each with > 100 new varieties every year, rose with about 100, petunia and pelargonium with about 50 new varieties/year.

The BSA (Bundessortenamt - Federal Plant Variety Office) started a process of reorganization which will be concluded by the end of 2015. The main consequence will be a reduction of testing stations from 12 to 7. All DUS tests for agricultural species will be concentrated in 4 stations. Each one of the other 3 stations will carry out the DUS tests for ornamentals, fruits and vegetables, respectively. The scope of DUS activities in total will not change significantly by the reorganization. With regard to VCU testing, BSA has a close national cooperation with many public organizations and breeders since decades. The reduction of own testing facilities of BSA will be compensated by increasing the ratio of VCU tests to be performed by public and private partners under supervision of BSA.

In the framework of the "National Program for Maintenance and sustainable Use of Plant Genetic Resources in agricultural and horticultural Crops", the Ministry of Food and Agriculture commissioned new tasks to the BSA recently. National coordinator for Plant Genetic Resources and biodiversity is the Federal Office for Agriculture and Food. The BSA cooperates in the maintenance of gene bank collections in several fruit and ornamental species.

[Annex VI follows]

ANNEX VI

JAPAN

1. Number of applications and grants in 2013

(1) Number of applications

Year	Number	(2013/2012)	Agricultural Crops	(2013/2012)
2012 2013	1,110 1,054	(95%)	74 80	(108%)
1978 to 2013	29,029	-	2,099	-

Top 5 agricultural crops in 2013

Rice:28 Corn:10 Potato:4 Tea:4 Italian ryegrass:3 Wheat:3 TOTAL:80

(2) Number of grants

Year	Number	(2013/2012)	Agricultural crops	(2013/2012)
2012 2013	881 752	(85%)	89 57	(64%)
1978 to 2012	22,919	-	1,805	-

Top 5 agricultural crops in 2013

Corn:11 Rice:11 Buckwheat:4 Soybean:4 Adlay:3 Rosemary:3 Sugar Beet:3 TOTAL:57

2. Average examination duration (from application to registration)

2012	2013	2014 (target)
2.34 year	2.48 year	2.3 year

3. Japanese Test Guidelines harmonized with UPOV TG (in 2013)

Genera and Species
Berberis, Buddleja, Echinacea, Gladiolus, Heuchera, Oncidium, Phalaenopsis

Web-site: http://www.hinsyu.maff.go.jp/en/en_top.html

[Annex VII follows]

ANNEX VII

KENYA

1. PLANT VARIETY PROTECTION

1.1. Situation in the Legislative field

The National Plant Variety Protection in Kenya is provided under the Seeds and Plant Varieties Act (CAP 326) of 1972, which became operational in 1975 and was revised in 1991. Official regulations to guide the implementation of PVP service were put in place in 1994 and the office to administer the PVP was established in 1997 and has functioned under Kenya Plant Health Inspectorate Service (KEPHIS) since 1998. Kenya acceded to UPOV under the 1978 Convention on 13th May 1999. The Seeds and Plant Varieties Act (CAP 326) has been amended to conform to the 1991 Act of the UPOV convention and Kenya has initiated the process of acceding to the 1991 Act of the UPOV Convention.

1.2. Extension of protection to further genera and species

Kenya extends Plant Variety Protection to all plant genera and species, other than algae and bacteria. At the moment, a total of sixty one (61) taxons of selected plant species have been registered for protection in the country.

1.3. Case law

Under the Kenyan Seeds and Plant Varieties Act (Plant Breeders Rights) applications for Plant Breeders Rights are required to be published in the Kenya gazette, to allow those opposing any applications or grant of rights, to make the objections and make representations to the Authorized Officer – KEPHIS. The Authorized Officer determine the hearing of such representations but any applicant aggrieved by the decision of the Authorized Officer may appeal to the Seeds and Plants Tribunal and if further aggrieved by the decision of the Tribunal, final appeal to the High Court.
From the time of inception of the PVP service in Kenya, a total of forty eight (48) applications for PBRs have been contested. Out of these, cases for thirty one (31) applications have been heard and determined by the Authorised Officer. Hearing of representations for the remaining cases for seventeen (17) applications is on-going. So far there has been no case that has been challenged through the Tribunal.

2. Cooperation in Examination

As per UPOV Article 32 on Special Agreements, The PVP office in Kenya has entered into international cooperation with other UPOV Member States and Intergovernmental Organizations in the utilization of the existing DUS examination reports notably,

- European Union – Community Plant Variety Office
- RaadVoorPlantrassen (Board for Plant Varieties) – Netherlands
- The Plant Breeders' Rights Council – Israel
- Commissioner of Plant Variety Rights - New Zealand
- The registrar, National Department of Agriculture – South Africa
- Bundessortenamt - Germany

3. Situation in the Administrative fields

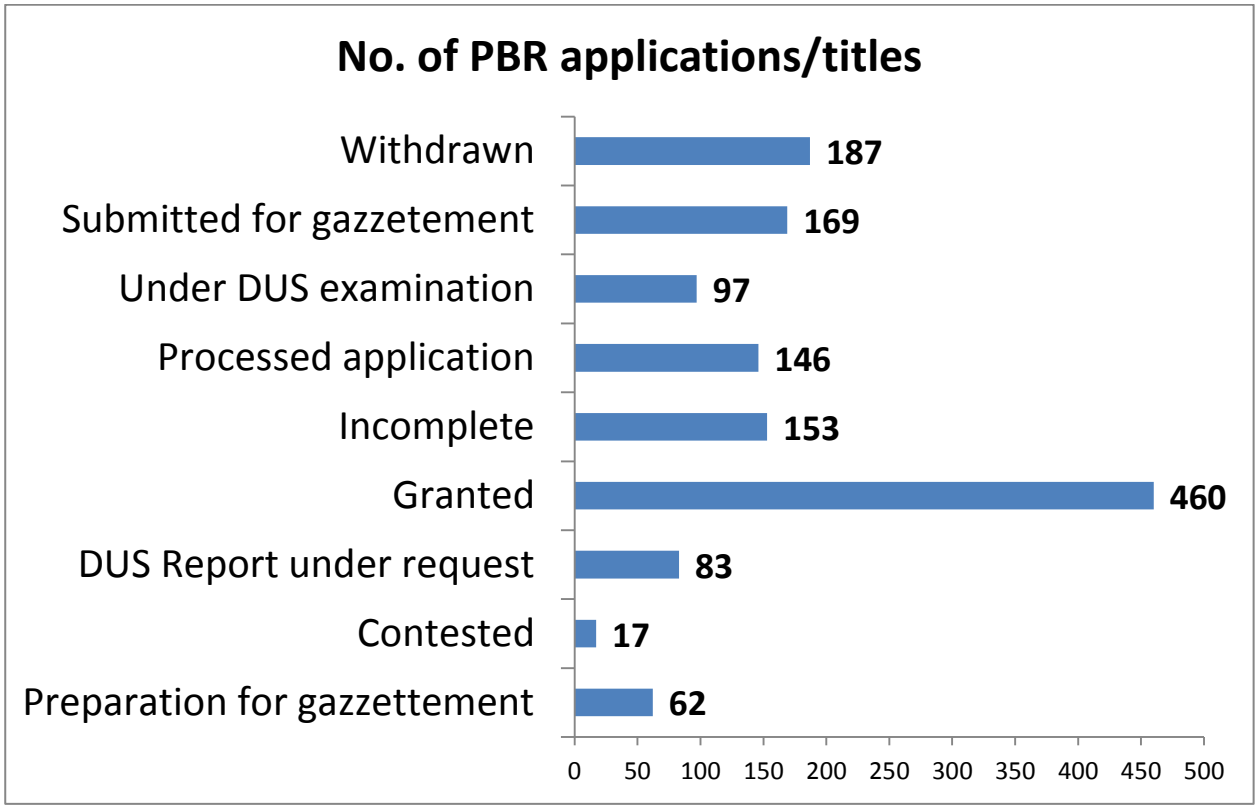
The administrative structure, office procedures and systems within the PVP office in Kenya remains the same. All correspondences need to be addressed to:

The Managing Director
Kenya Plant health Inspectorate Service
Headquarters, Oloolua Ridge, Karen
P. O. Box 49592-00100, Nairobi
Tel. +254 20 3597201 or +254 20 3597203
Cell: +254 723 786 779 or +254 733 874 141
e-mail: director@kephis.org
website: www.kephis.org

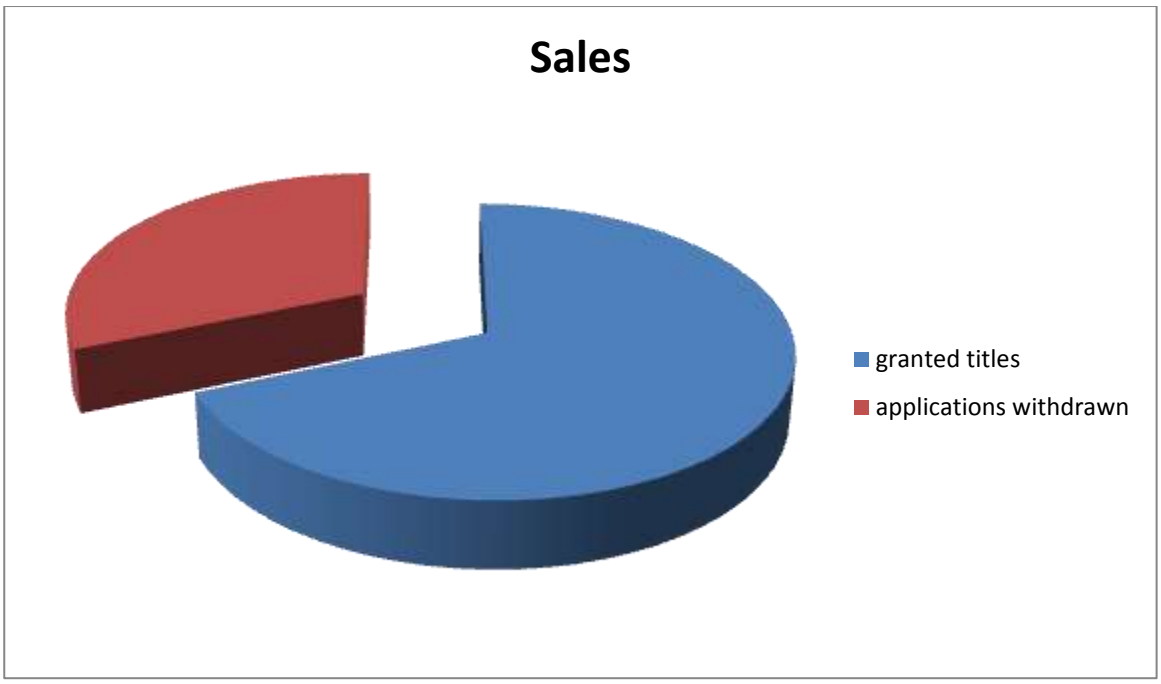
4. Situation in the Technical field

a. Application and Grant of Plant Breeders' Rights

Since the inception of the PVP office in Kenya, a total of 1379 applications for Plant Breeders' Rights have been received. Figure.1.1. below shows the status of such applications.



Reasons for withdrawn applications by the breeders include reduced interest in a variety by consumers and availability of better varieties to the breeder. Those applications either not meeting the novelty requirement and / or fail the DUS testing are withdrawn by the authorized officer – KEPHIS. The incomplete applications are either due to missing supportive documents that must accompany the application or due to non-payment of the application fee by the applicant. Applications approved for granting of PBR titles are those DUS examination report has been finalized and confirmed to be positive but awaits payment of grant for PBR certificate fee by the applicant. The date of payment of this fee becomes the official commencement date of protection of that variety in Kenya. To date the total number of PBR Grants awarded is 415. Fig. 1.2 shows the status of such granted titles.



b. DUS testing

The Office is conducting DUS for Lucerne *Dolichos* and a number of traditional vegetables for the first time. National test guidelines for these crops are under preparation. For Lucerne, the UPOV guideline is being customized to cover testing under tropical conditions.

5. Activities for the promotion of Plant Variety Protection

The PVP office in Kenya has been actively involved in a number of activities for the promotion of Plant Variety Protection in the Country and within the Africa region. Some of these promotional activities includes:-

- Dissemination seminars on awareness creation on PVP services in the country. These seminars targets National Agricultural research institutions, Universities, policy makers, Agricultural extension staff as well as the larger farming communities.
- The office is working with other sectors in agriculture to ensure that operating regulations are in conformity with the Seed and Plant Varieties Act and by extension the UPOV Convention.
- Within the region, the Office has been instrumental in development of the ARIPO PVP framework.
- The Office has also been involved in exposing delegations from Ethiopia and Tanzania to the Kenyan PVP system.
- The office is also taking lead in the harmonization of variety testing within the East Africa cooperation.

[Annex VIII follows]

ANNEX VIII

NETHERLANDS

Number of applications received

In 2013 1904 applications were received for testing for the first year for national listing and national and European Plant breeders rights. (In brackets the difference with 2012):

Ornamentals	972	(+11%)
Agriculture	144	(+10%)
Vegetables	788	(+20%)
Total	1904	(+15%)

This is an important increase and an all-time record high number of applications. The number of applications received in 2014 up till now, still shows a further increase, except for Ornamentals.

Registration

- The online version of the Netherlands Register of plant varieties (NRR) was included in the thoroughly revised website of the Dutch Board for Plant Varieties RvP (www.raadvoorplantenrassen.nl).
- The use of the i-portal for DUS-applications at Naktuinbouw has increased. Also the electronic exchange of application forms and reports with CPVO vice versa has been started in the beginning of 2014.
- Variety Denominations
  In 2013 the CPVO published a new version of the explanatory notes for the checking of the suitability of variety denominations. The CPVO has explained the contents of these notes in a meeting with the Dutch breeding companies. The contacts between CPVO and Dutch Board for Plant Varieties/Naktuinbouw are strengthened in the field of exchanging visions on the suitability of variety denominations.
- Registration of fruit varieties
  In the framework of the new Fruit species directive of the European Union, Naktuinbouw made an inventory of those fruit varieties that are being marketed in the Netherlands. As foreseen in the directive a distinction has been made in those varieties that were tested on the DUS principles for Plant Breeders' Rights, and can thus be certified, and other varieties. In 2014 descriptions of more than 1200 fruit varieties will have to be finished. We try to cooperate with other European (fruit) partners to exchange information.
  For membership of the TWF, Gerard Bolscher (who will retire in May 2014) has been replaced by his successor Marco Hoffman.
- Developments in VCU
  VCU testing of agricultural crops has been collectively financed by breeders and farmers in The Netherlands for a long time already. Due to reorganization of some public institutions there is no collective farmer's contribution anymore. From 2014 onwards VCU will be 100% financed by the breeders only.

Quality System

- The second CPVO-audit according to the standards for CPVO entrustment of all ca. 950 species was carried out in 2013. The renewed entrustment was formalized by the decision of the CPVO Administrative Council in March 2014.
- Updating common knowledge Vegetables. In 2013 Naktuinbouw started a project to update information of disease resistance characteristics from varieties of common knowledge. Another project is ongoing in cooperation with GEVES. In tomato, pea and lettuce GEVES and Naktuinbouw developed combined databases.

Training in DUS related activities

The sharing of knowledge is important in order to work on a global, harmonized and strong Plant Breeders Right system for the benefit of society. Naktuinbouw contributes to this principle on different levels.

- Naktuinbouw is involved in bilateral projects to exchange knowledge and to train staff of countries that are working in or on Plant Breeders Rights systems. Besides ongoing projects in China and India in 2013 the following projects started :
- In Ghana, where the Ghanaean authorities asked assistance in the setting up of a system now the PBR law was accepted by UPOV,
- in Rwanda**,** where advise was given on the agricultural policy including the necessity to provide for a good system of variety protection to promote in influx of better varieties,
- in Ukraine.
- in the United Republic of Tanzania where an adjusted form of the Wageningen PVP course will be given on location in the framework of capacity building in this new UPOV member.

- Annually, Naktuinbouw, with the help of UPOV and CPVO, is organising the PVP course in Wageningen, under coordination and supervision of Mrs. Laura Pinan Gonzales. In 2013 31 participants from 19 countries participated in this two week training.
- Four colleagues will follow in 2014 the tutor-education of the new UPOV distance learning course DL-305 “Examination of Applications for Plant Breeders’ Rights” (a joint effort of UPOV, Naktuinbouw and experts of other UPOV countries)**.**
- In 2013 Naktuinbouw, in the framework of the internship programme received again 4 colleagues from the UPOV office (1), Zimbabwe (1) and the Republic of Korea (2). The colleagues work together with Naktuinbouw colleagues and thus learn the details of the DUS test work as it is performed in the Netherlands. The use of the Naktuinbouw helpdesk stabilised. Colleagues from all over the world find this opportunity to ask DUS related questions.
- Recently Naktuinbouw published a book; “framework for the Introduction of Plant Breeders’ Rights”. This book, written by Arnold van Wijk and Niels Louwaars is a guidance for practical implementation of a Plant Breeders’ Rights system in a country. We hope with this book, that contains lots of explanations and examples, to offer support to those colleagues who work in countries that recently started, or will start a (UPOV based) Plant Breeders’ Rights system.

Research projects (highlights).

- Handhelds-project: The description for the DUS tests made in field conditions was made on paper for ornamental and vegetable crops in the past. In 2013 Naktuinbouw changed this procedure and now uses handhelds for this purpose. In 2014 the project continues in order to be able to also use handhelds for the comparison between applications and comparing varieties in the field trials.
- Harmonization of disease resistance tests within the EU. In 2013 several tests were carried on within this CPVO project. Results are expected in 2014.
- Ongoing projects: 1-project on change of crop management (from outdoor to indoor) for DUS in Helleborus, together with CPVO; 2-origin of chimera-like structures in Lily and a number of projects to study the possible effect on the DUS work of a change in growing media from soil to artificial media.

Other:

- CIOPORA has contacted CPVO and Naktuinbouw about the setup of a new DNA-project in Rose together with BSA and NIAB. Discussion about a draft will be continued in 2014.

International Cooperation

With GEVES:

The on-going cooperation with GEVES was evaluated in the beginning of 2014. Activities will be intensified in joint data bases of vegetable varieties, joint resistance tests, dbases for photographs and descriptions of ornamental varieties (GEMMA), standardized color description techniques (AIM).

Projects in the CPVO R&D system

Naktuinbouw participates in a number of CPVO co-funded projects:

- The Harmores project; harmonization of disease resistance testing between a number of Examination Offices
- The potato Ringtest project to harmonize the testing of potato between the European Examination Offices
- Development of a European Potato database (containing molecular and morphological data) as a centralized collection of varieties of common knowledge.
- A project to study the possible effect of seed treatment on the DUS test in vegetables

Infringement cases

The use of the DUS sample and DNA data of the DUS samples for infringement purposes is under discussion in the Netherlands between the authorities and the industry. Also the question on ownership of the DUS sample itself plays a role in this discussion.

Miscellaneous

- The oldest part of our greenhouses was renewed and enlarged are ready for use since March 2014.

[Annex IX follows]

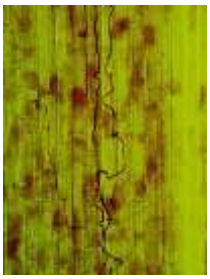
MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HIKINA WHAKATUTUKI

Fungal Endophyte

A presentation by the New Zealand Plant Variety Rights Office
To the Technical Working Party for Agriculture 2014

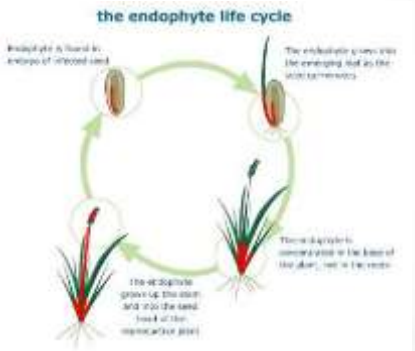
Presentation contents

- Short history on endophyte
- Discovery & Development
- Fungal Endophyte DUS testing
  - Testing protocols
  - Characteristics
  - Testing provider
- Statistics – NZ and global
- Future and questions to ponder



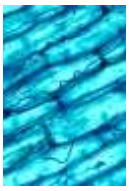
Fungal Endophyte

- Fungal endophyte are fungi that live in the tissues of varied groups of plants, including many grasses
- Fungal endophyte grow within plants via mycelial infection and is asexual



F. Endophyte are host specific

- Botanical nomenclature currently applied:
  - Ryegrass: N*eotyphodium lolii* & *N.occultans*
  - Tall fescue: *N.coenophialum*
  - Meadow fescue: *N. uncinatum* & *N.seigelii*

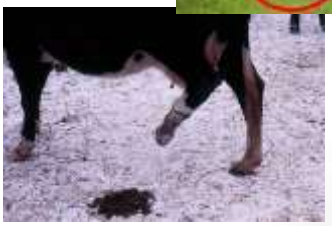


Symbiotic relationship

- Fungal endophytes frequently increase plant biomass, confer drought tolerance, and produce chemicals that are toxic to animals and decrease herbivory
- They have shown to be critical for plants' protection against insect pests

F. Endophyte alkaloids

- Lolitrem B – Ryegrass staggers
- Peramine – Australian stem weevil and mealy bug control
- Ergovaline – Black beetle and root aphid control, heat stress in ruminants
- Janthitrem – Wide spectrum control
- Lolines – meadow fescue specific, wide spectrum of insect control



Industry Interest

- Initially discovered in the late 1800's
- Interest in their benefits and deficits to agriculture was not discovered and researched until the 1970's
  - Now estimated to contribute $200million annually to NZ economy

- The Endosafe strain (AR5) of N. lolii was identified in 1982 and commercialised in several grass cultivars by AgResearch NZ, others soon followed

Fungal endophytes & pasture varieties

- The majority of pasture varieties are sold commercially containing endophyte.
- The impact on plant morphology due to the presence of endophytes is not well understood. There is a general view that the presence of endophyte may alter morphological characteristics.
- For this reason all grass variety DUS testing use seed that is free of endophyte (<5%)

This is a Risk Management Strategy

- Some breeders have questioned this strategy
  - The endophyte variety and the grass variety are commercialised as a package

Discovery & Development

- Grass germplasm is collected and screened for endophyte and promising strains are selected out
- Thousands of strains are found on a regular basis but there is interest in few only – alkaloid profile significant

Discovery & Development

Isolation and multiplication

Inoculation and multiplication in the lab

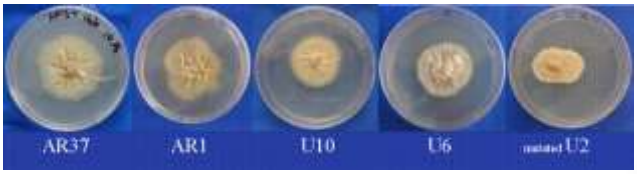
Agronomic qualities assessed in field trials

Inoculation and multiplication by pair crossing

Fungal Endophyte DUS Testing

Early History

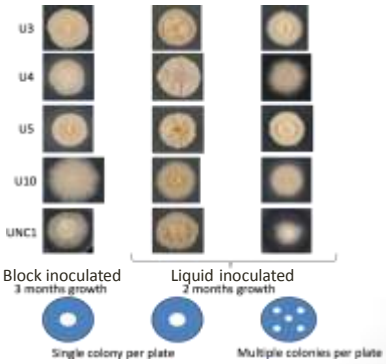
- The first application for fungal endophyte was made in New Zealand in 1994
- Discussion began on how to DUS test endophyte
  - There was very little known about morphology
  - Breeders were mainly knowledgeable about metabolite expression



Fungal Endophyte DUS Testing

Testing Protocols Developed

- Growth conditions & media alter appearance
- Growing media and testing methodology are standardised for all varieties
- The media used is standard media for growing in-vitro fungal endophyte



Testing Protocol for Fungal Endophyte

Please note that these protocols are for testing the colony morphology only.

Sterilization and germination of seeds:
50 seeds from each sample (5 seeds per plate) are to be surface sterilised and germinated using the following procedure:

The seeds were surface sterilized as follows:

1. Into 50% sulphuric acid (15-30 mins) with occasional agitation.
2. Wash 3 times in tap water.
3. Then in laminar flow 20-30% household bleach (15-30 minutes).
4. Wash 3 times in sterile water.
5. Place seed on sterile filter paper for 30 mins.
6. Plate onto 4% water agar (5 seeds per plate on one edge of plate).
7. Incubate on edge in dark. Check after two days and daily thereafter and cut out any contaminated seed.
8. After ca.7 days cut leaf into small sections and plate only PDA.
9. Each leaf blade should be severed several mm above the ligule. The blade should be then cut into segments with the first segment at either end being discarded.
10. Every 2nd segment should be plated with 3 segments plated from each germinated seed.

Testing Protocol continued

Plating:
Colonies will be grown on potato dextrose agar (PDA) at 20º C in the dark (Christensen et al. 1993). Five plates of each variety will be grown using the following procedure:

1. A total of 9 segments should be plated onto each PDA plate with 8 segments spaced evenly around the perimeter of the plate and one piece plated centrally. Plates should be grown in the dark and checked regularly for contamination which was cut out.
2. After about two months sub-cultures should be taken of a selection of the original endophyte cultures which had grown out. For these five pieces are to be plated onto each PDA plate with four pieces spaced evenly around the perimeter of the plate and one piece plated centrally. Sub-cultures should be obtained from the margin of the colonies.
3. At 4-5 weeks of growth these subcultures are to be used to obtain plugs for the final test plates. Again sub-culture plugs are to be obtained from the margin of the colonies.

Testing:
1. Five plates of each variety are to be grown on PDA only and for each concentration for the benomyl trial (1,5,10,50,100ppm) with an additional set of control plates including acetone for the benomyl trial also included.
2. One 5mm plug is to be plated onto each PDA plate centrally.
3. Plugs are to be plated colony "down" so there was an equal chance of even growth.
4. Plates are to be grown in the dark in a temperature controlled cabinet at 20 ºC.

Fungal Endophyte DUS Testing

Characters Developed

- 8 morphological characters
  - (5+ characters dropped due to lack of consistency)
- 7 metabolite characters (not used routinely)
  - One has been used for a grant decision

    - **Colony:** rate of growth, sporulation, immersion of margin in agar
    - **Conidia:** length, width, shape
    - **Aerial mycelium:** type, density

Fungal Endophyte DUS Testing

Characters still developing

Code	Replicated colony appearance [1]	Colony appearance - above	Colony appearance - underside	Conidia [1]	Colony description
CDE1					Colony raised above agar surface. Irregular, non-symmetrical colony margin. Waxy and fibrous in appearance. Ivory white to brown in colour. Very little hyphae submerged in agar.
CDE2					Colony raised above agar surface. Irregular, non-symmetrical colony margin. Waxy and fibrous in appearance. Ivory white to brown in colour. Very little hyphae submerged in agar. Similar to above except more fluffy in appearance.
CDE3					Colony raised above agar surface. Irregular, non-symmetrical colony margin. Waxy with very irregular margins submerged in agar.

Fungal Endophyte DUS Testing

Testing Provider

- 1st trial in 1995
- 2nd trial in 1996

- 3rd trial in 2008
- 4th trial in 2009

- 5th trial in 2014

Fungal Endophyte DUS Testing

Difficulty in finding a Testing Provider

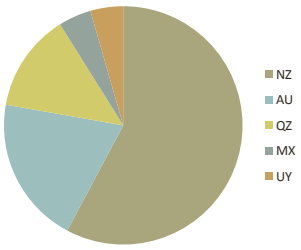
- Conflict of interest
  - AgResearch is an endophyte breeder
    - Coding system for confidentiality
- Expensive
- Specialised Equipment
- Metabolite testing

NZ PVRO endophyte statistics

- 21 varieties have been granted PVR using the current and earlier testing protocol
  - One required use of a physiological character for distinctness
- No refusals
- 25 varieties of common knowledge

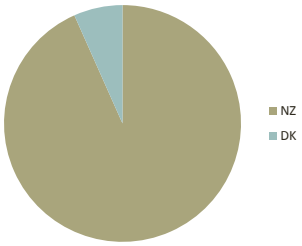
Global PVR Statistics

Applications made in:



NZ	27
AU	9
QZ	6
MX	2
UY	2
Total	46

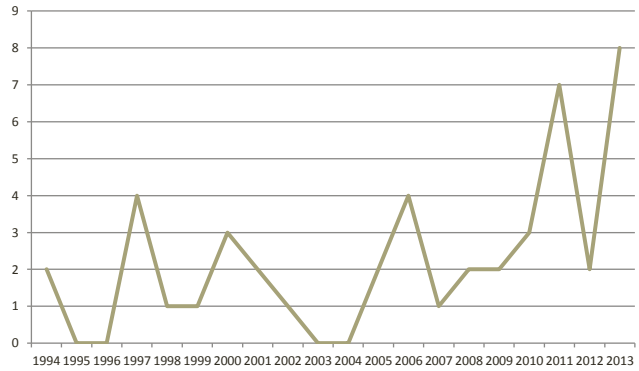
Origin of Applicant:



NZ	43
DK	3

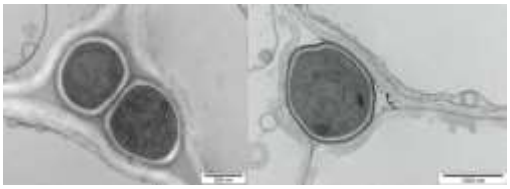
The 46 applications are comprised of 28 varieties

Increasing global applications



Future of DUS testing for f.endophyte…

- National guideline to be revised
  - Is there a need for a UPOV guideline?
  - The door is open for the use of current or new physiological characteristics on a routine basis
  - Identification of additional morphological characteristics
- There is potential for use of DNA markers for metabolite expression in accordance with current UPOV guidance on the use of markers
- Possibility for characters based on morphological expression in standardised hosts



DUS testing in the future

- Breeders are interested in new fungal endophyte genera
- Currently endophyte are tested in a totally controlled environment
  - Opportunity for global testing centre?

Other questions


Wheat

- Denominations
  - What class should fungal endophyte be in?
    - Does it make sense to have a ryegrass called 'Fred' and an endophyte called 'Fred' sold in the same bag?
    - What about for other genera?
- Infringements and farm save seed
  - Fungal endophytes are sold within a plant host variety. What are the implications for management and use of endophyte varieties and the breeders ability to control the variety?

[Annex X follows]

ANNEX X

REPUBLIC OF KOREA

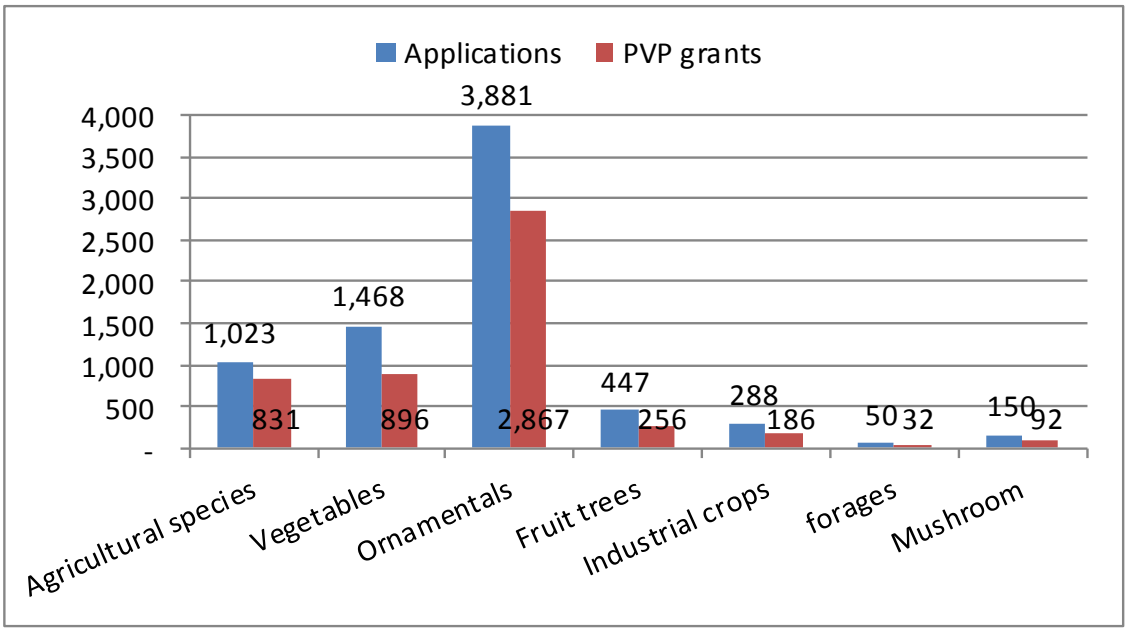
In the Republic of Korea, PVP system was introduced in 1998 and covered by Seed Industry Law. Initially this law covered not only PVP but also national listing, seed marketing. Therefore, it could bring about some confusion to stakeholders in seed industry. To prevent confusion and make the law conform with the objectives of each sector in Seed Industry Law, Original law was divided into two laws resulting in Seed Industry Law and PVP law. PVP section was deleted in original Seed Industry Law. Instead, Independent PVP law was newly established and has been effect since June 2013.

Headquarters of Korea Seed & Variety Service which operate PVP system moved to local area, Kimcheon city located in southeast area in Korean peninsula from capital area near the Seoul. It takes about two and half hours from Seoul by car. In addition, we had organizational restructuring of headquarter. Initially There were two divisions responsible for PVP in Headquarter. One is PVP division, the other is Variety Testing Division. Through restructuring, two division was merged PVP division. However, there was no downsizing in PVP work. As a first hosting of TWP meeting after relocation and reorganization of KSVS, KSVS held UPOV BMT meeting from 9 to 13 November in Seoul.

Regarding PVP statistics, In 2013, Korea Seed & Variety Service received 639 applications which is a decrease of 2% compared to that of 2012. Among 639 application, Ornamental sector has 300 applications representing 48% of all applications in 2013 and Vegetable sector represent 25% with 157 applications followed by agricultural species with 11% of the applications.

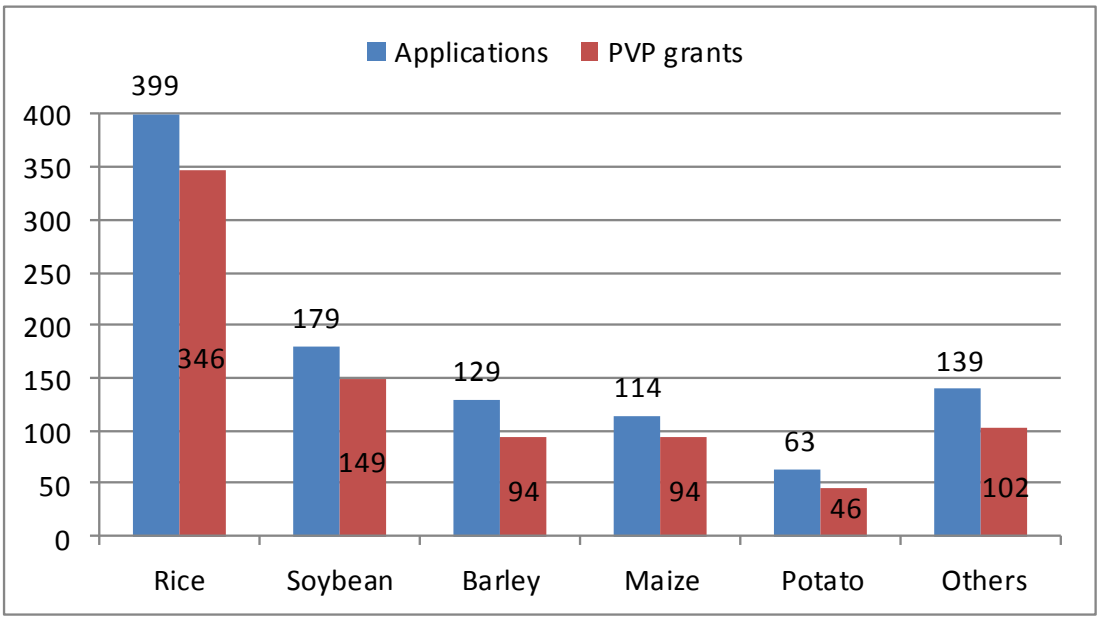
As for cumulative PVP statistics, total number of applications has been reached 7,307 as of 30 September and among 7,307, Korea Seed & Variety Service granted 5,160 PVP titles. In terms of number of applications and PVP grants per crop sector, Ornamentals is ranked first representing 53% of all applications followed by vegetables and agricultural species with 20%, 14% respectively. Graph 1 shows the number of applications and PVP grants per crop sector for the last 17 years.

Graph 1. Number of applications and PVP grants per crop sector (1998~Sep. 2014)



The five most important agricultural species in terms of the number of both applications and PVP grants since 1998 is rice, soybean, barley, maize, potato. This also reflects the importance of these five crops in the Republic of Korea's agricultural situation and these five crops are also subject of National listing. Graph 2 shows the number of applications and PVP grants for the 5 most important agricultural species for the last 17 years.

Graph 2. Number of applications and PVP grants of the 5 most important agricultural species from 1998 to Sep. 2014



[Annex XI follows]

ANNEX XI

SOUTH AFRICA

With regards to applications and valid Plant Breeders' Rights for 2013 the following is reported:

- An additional 29 taxa have been declared in terms of the Plant Breeders' Rights Act during 2013.
- 309 PBR applications were received of which 30% were for Agricultural crops, 39% for Ornamental crops, 27% for Fruit crops and 4% for Vegetable crops.
- PBR's granted in 2013 only are as follows: Agricultural crops: 101, Ornamental crops: 71, Fruit crops: 66 and Vegetable crops: 16
- As of December 2013, a total of 2607 varieties had valid Plant Breeder's Rights in South Africa, of which 34% were for Agricultural crops, 34% for Ornamental crops, 23% for Fruit crops and 9% for Vegetable crops. The top three Agricultural crops are:

Agricultural Crops:

1). *Solanum tuberosum* L. (93)
2). *Triticum* L. (83)
3). *Zea mays* L. (352) which includes the following:
White CONV (86)
White open pollinated (6)
White GMO (73)
Yellow CONV (69)
Yellow GMO (118)

[Annex XII follows]

ANNEX XII

UNITED KINGDOM

Report on the activity of the UK Plant Varieties and Seeds Office in Cambridge and the examination centres at Cambridge, Edinburgh and Belfast.

As of the 1st October 2014, the Plant Varieties and Seeds Office has transferred from the Food and Environment Research Agency (Fera) to the Animal and Plant Health Agency (APHA), an executive agency of the Department for Environment, Food and Rural Affairs (Defra). Staff and contact details are unchanged but all information will be migrated to the GOV.UK website as of the 30th November 2014.

In 2013/14, PBR applications followed the same pattern as in previous years. The bulk of national applications come from smaller companies that market varieties largely within the United Kingdom or from those that prefer to obtain United Kingdom Rights before submitting applications to the European Union Community Plant Variety Rights Office (CPVO). The number of applications for PBR and for variety registration received in 2013/14 was 500.

Across all species winter oilseed rape continues to be the largest species for application followed by cereals, then herbage and fodder, sugar beet and finally potato and various pulses.

During 2013, Fera [now APHA] was successfully re-audited for DUS testing by the CPVO and, together with its Technically Qualified Bodies NIAB, AFBI and SASA, formally re-entrusted by the CPVO Administrative Council for a further three year period.

Other points of note from 2013/14 are that NIAB will host the UPOV Technical Working Party for Ornamentals Plants in September 2015, on behalf of the United Kingdom Department of Environment, Food and Rural Affairs (Defra).

AFBI are undertaking a trial of grass varieties inoculated with endophyte with France and Germany funded by CPVO and ESA. This is to study how endophytes may or may not change DUS morphological characters.

[Annex XIII follows]

ANNEX XIII

UNITED REPUBLIC OF TANZANIA

United Republic of Tanzania Status of UPOV Membership

United Republic of Tanzania has taken important steps towards a full UPOV membership. Currently United Republic of Tanzania has an observer status. In 2010, the Union Parliament approved the UPOV Convention of 1991 allowing United Republic of Tanzania to meet one of the requirements for UPOV membership.

In November 2012, the Parliament enacted a UPOV 1991 compliant Plant Breeders Rights Act of 2012 for Tanzania mainland to replace the PBR Act of 2002. In March 2013, the new law was approved by the UPOV Council that it is in line with provision of the 1991 Convention.

In January 2014, the House of Representative in Zanzibar enacted a new Plant Breeders Rights Legislation based on the draft law which received a positive decision of UPOV Council in March 2013. In October 2014, Zanzibar PBR law was discussed in UPOV Council and accepted that it meets and comply with UPOV 1991 requirements. Now the United Republic of Tanzania is ready to submit the instrument of accession and become a UPOV member.

[Annex XIV follows]

ANNEX XIV

EUROPEAN SEED ASSOCIATION

The Annual Meeting of ESA took place from October 12 – 15 in Lisbon (PT). A new record of 920 participants attended the congress clearly showing the increased interest in the event.

The central issue during the open part of the Annual Meeting was the implementation of the Nagoya Protocol and its possible effect on the access to genetic resources. During the event Mr Gerard Backx, ESA President, informed the audience that the ESA Board had decided to support the International Treaty for Plant Genetic Resources for Food and Agriculture including a significant voluntary financial contribution to the IT.

The increased use of Farm Saved Seed is a concern in many self-pollinating crops. In the past years however improvements have been made regarding royalty collection on FSS. Systems have been implemented in Belgium and Spain and cover now 17 countries in the EU28. Discussions on royalty collection on FSS are being initiated in Portugal and Romania.

In 2014, a new European Parliament has been elected. At the same time a new Commission was installed chaired by Mr Juncker focusing on better regulation. All legal proposals will be scrutinized on their added value and the need for having regulation on EU level; this will also include proposals regarding Plant Reproductive Material, Plant Health, Official Controls and Organic Production. ESA continues its work on these important issues for the seed sector towards the Commission, the Council and European Parliament.

The next ESA Congress will take place in October 2015 in Vienna (Austria)

[End of Annex XIV and of document]