

THE ANNUAL 2007

Journal for breeders and producers of plant material

Prophyta

Hoopman



equipment & engineering

Welcome to our new application test centre at Aalten, the Netherlands

In case you can't meet us here, please meet
mr. Jan Willem Hoopman at ISF 2007 at table 37



Equipment:
Coating
Drying
Sorting
Integrated Coating / Drying



address Akkermateweg 5A
7122 LG Aalten
The Netherlands

phone +31 (0)543 470 496
fax +31 (0)543 479 072
e-mail info@hoopman-equipment.nl
internet www.hoopman-equipment.nl

Prophyta – The Annual

A publication of the Prophyta
Foundation in co-operation
with Blue Bird Publishers.

EDITORIAL ADVISORY BOARD Theo
Ruys, John van Ruiten, Cees
Moerman and Jan Timmerman.

PUBLISHER/CHIEF EDITOR
Monique Krinkels

CONTRIBUTING EDITORS Wilbert
Hettterscheid, Florentine Jagers
op Akkerhuis, Geert-Jan de
Klerk, Peter Lentjes, Theo
Léone, ArndJan van Wijk

SUB EDITOR Ray Vale

GRAPHIC DESIGN Marcel Bakker,
De Ontwerperij

PRODUCTION MANAGER Hajo Strik

PRINTED BY Global Printing

ADDRESSES Blue Bird Publishers
VOF, Jan Kostelijklaan 16,
1981 CG Velsen-Zuid, the
Netherlands,

PHONE +31 (0)255 521 852,

FAX +31 (0)847 510 694,

info@bluebirdpublishers.com

www.bluebirdpublishers.com.

PROPHYTA FOUNDATION

P.O. BOX 40, 2370 AA

Roelofarendsveen,

the Netherlands,

PHONE +31 (0)713 326 161,

FAX +31 (0)713 326 364,

EMAIL info@prophyta.nl,

WEBSITE www.prophyta.nl

© 2007 All rights reserved.

No portion of contents may
be reproduced in any form
without written permission
from the publisher.

The publisher and authors
declare that they have compiled
this publication carefully and
to the best of their knowledge.
However, no warranty or
representation is made to the
accuracy or completeness of
information contained in the
articles. The publisher and
authors assume no liability
whatsoever for any damage
resulting from the use of this
publication or its contents.

Prophyta THE ANNUAL 2007

Contents

4

In Short

5

Editorial

9

Prophyta Foundation



10 David Melhuish

New Zealand is a desirable destination

12 New Zealand

A kiwi country with grassy slopes

16 European Union 50 Years On

Environmental movement
dominates celebrating Europe

18 The Case of Amethyst and Melanie

German court clarifies cascade principle

22 Facts And Fiction on Plant
Breeder's Rights

Protected or not, that is the question

24 Grass Breeding

Multipurpose crop demands
broadly-based approach

28 The Battle Against The
Diamondback Moth

Gained knowledge put to beneficial use

30 Stress In Tissue Culture

Tackling variation, hyperhydricity
and recalcitrance

34 Plant Breeder's Rights Project in China

Quality and efficiency of procedures tackled

36

Richard Visser at Wageningen UR

New plant breeding group has
lowered its threshold

38

For Seeds Only

Specialised computer programme
increases production control



40

Carolus Linnaeus May 23,

1707-January 10, 1778

A hard act to follow (sometimes)

42

Variety Tracer

DNA-analysis adds valuable
identification tool

44

Hoopman equipment & engineering

Novel drying systems beat traditional ones

46

Twinning Projects

New EU-countries assisted to
improve inspections

48

UPOV Keeps Expanding

The planet turns greener rapidly

Cover photograph: Barenbrug

Continuous box system optimises drying

Agratechniek has developed a system for drying seed after a washing treatment and priming. It is ideal for drying large amounts of seed

with minimum coating or film coating and for seed pills. The system consists of a steel construction in which the boxes are placed. Behind the construction is an air distribution system with a blow out vent. These vents connect to the ventilation pallet of the boxes. For static drying, the vents are provided with a sliding door which has a servomotor to open automatically when the box is placed. For fluid drying each vent is provided with a centrifugal ventilator. When the box is placed a relative humidity (RH) sensor is also automatically attached above the box. This way the RH of every box is measured and controlled until the desired value is reached. The desired RH corresponds with the value of the balance moisture content of the seed. When the desired RH of the outgoing air is reached, the air flow will reduce proportionally so that the RH stays at the desired value. A signalling light will turn on when the seeds are dry. With the continuous box dryer every box is dried individually. Using this method the boxes can be placed in and removed from the dryer independently. The drying can therefore start the moment the box is filled. The desired drying can be programmed for each individual box. The drying will stop at the moment the desired moisture content is reached.

Fleuroselect announces gold medal winners



The Fleuroselect judges have awarded six varieties with the gold medal 2008. Especially the achievement of Kieft Seeds is remarkable as this company bred three of the six gold medal winners. The Delphinium consolida 'Sydney Light Blue' (1) is the third gold medal winner in the Sydney series. The judges praised its gorgeous new colour. The Lavendula angustifolia 'Ellagance Purple' (2) is also a new colour in a series. It equals the earliness, uniformity and floridity of 'Ellagance Sky', which won a gold medal in 2006. The third medal winner of Kieft Seeds is the 'Bergamo' (3), a Monarda x hybrida. It stunned

the judges by its earliness and its magnificent new colour. Syngenta Seeds received a gold medal for the Begonia semperflorens 'Volumia Rose bicolor' (4) caught the judges' eyes with its excellent garden performance throughout the season and its dramatic splashes of summer colour. Rudbeckia hirta 'Cappuccino' (5) of Clause Tézier received enthusiastic reviews from the judges. Besides being semi/tall and uniform, this variety is strong, vigorous and has good basal branching. The Salvia farinacea 'Fairy Queen' (6) of Ernst Benary has multiple spikes of bicolour blue and white flowers on dark distinctive flower stems.

Cooperation Unilever and Nunhems

Unilever has signed an agreement with Nunhems to co-develop tomato varieties for taste, nutrition and health. The agreement includes the formation of a shared research, development and business platform for innovative tomato varieties as well as the acquisition of Unilever's tomato seed business by Nunhems. "The tomato breeding technologies that we will co-develop with Nunhems will allow us to provide tasty and healthy products for consumers around the world", says Emmo Meijer, senior vice president Unilever Foods R&D. Unilever's mission is to add vitality to life. The company meets everyday needs for nutrition,

hygiene and personal care with brands that help people feel good, look good and get more out of life. It is one of the world's leading suppliers of fast moving consumer goods with strong local roots in more than 100 countries across the globe. Its portfolio includes some of the world's best known brands, including 12 one billion euro brands and global leadership in many categories in which the company operates. "With Unilever's R&D and consumer insights, and Nunhems expertise in vegetable seed genetics, this partnership is a win-win for both parties", Dr. Orlando de Ponti, Nunhems' Director of Research & Development commented. "We look forward to the growth that this agreement will offer to our global tomato portfolio."



New module for breeding software

Verdi, a software programme for vegetable and ornamental breeding, has a new module, named Earth Remote Module. With it, breeders can access the Verdi database on every location of the company all over the world. The outcome of flowering trials and inspections can be added and the information gathered in the database can be consulted using a protected internet connection.

Verdi is one of the three programmes the Distel Software has developed to support breeders, youngplant- and production growers in the horticultural industry. It replaces the self made software and spreadsheet programmes often used by breeders, giving them fast and easy access to information on for instance parental lines, breeding goals, test results, photographs and phenotypical characteristics. It contains historical information, but is also able to advise whether a certain parent is available at a given moment. Besides it generates management information. One of the first companies to acquire the Earth Remote Module was the market leader in the field of lily breeding: Vletter & Den Haan from the Netherlands. The process of improving, breeding, growing and forcing of lilies is extensively tested in their laboratory and greenhouses. The lily varieties are also tested by flower-forcing companies in the Netherlands, Italy, Japan, France and the USA. The combination of Verdi and the Earth Remote Module makes it possible for their employees to consult and enter the database from anywhere in the world. They can easily input data results into the main database located in the Netherlands, concerning their crop, parent plants, varieties from any location. According to Vletter & Den Haan the advantage of Verdi is that no knowledge gets lost over time and that the registration of data is done in a uniform way, ensuring the information is available to all the breeders and cannot be misinterpreted.

No resting on one's laurels

It still happens far too often: a breeder comes up with a new variety that will beat the competition by a mile, but the company does not fully benefit from his endeavour as others start to produce the plants as well. And not only because infringers lay a hand on the new variety. The times that a promising new plant is not as well protected as it should have been are numerous, according to the specialists in this field. It might be a mistake, a misinterpretation of the legislation, an underestimation of the requirements or a simple oversight, fact remains that far too many people know far too little of how a plant variety should be protected. In this issue of PropHYTA a number of these misconceptions are explained. Plant breeder's rights might seem to be a straightforward business, in the daily practice it has many pitfalls. One of the difficulties is which of the UPOV Acts apply in a country and in which way is it implemented in the country's legislation. Simple differences in wording or definitions can cause a huge difference in the outcome when a judge has to base his decree on it. Take for instance the calluna arrest where the definition of what are harvested products and what are not played a vital role. Luckily in this case the supreme court decided in favour of the claimant, a breeder who had his variety well protected. And when a variety has proven to be well protected, companies should take serious measures against infringers. There is no resting on one's laurels when a variety is at stake.

Just letting them pay the normal licence fee will not stop them for trying to do the same next year. Letting infringers bleed a little for what is in fact theft is not overly vindictive. It might well help to straighten these people up. Last year the European Community announced it had taken important legislative initiatives which will give breeders effective tools to enforce their rights. A number of member states are well under way to implement these into civil law and penal provisions. Hopefully many countries inside and outside Europe will follow this initiative to give breeders an effective judicial environment to deal with infringement cases.

Monique Krinkels



Our services, your match



The main focus of Rijk Zwaan is on breeding top vegetable varieties with perfect quality, an appealing appearance and a very good flavour. That is why we have a strong relationship with professional growers all over the world. With this network, as well as with our chain management, point-of-sale checks and innovative products, we can create new vegetable concepts which perfectly match the demands of all our customers.

Innovation in Seeds & Services



In Short

NTO-prize for collaboration

Tissue culture company SBW International, inspection service Naktuinbouw and gerbera breeder JHL has been rewarded a Dutch entrepreneur prize NTO for their collaboration in the pioneering project on temporary immersion bioreactors (TIB). The project is aimed at an innovative system to bring high quality, safe and bacterially tested source material onto the market. The jury was impressed by the fact that this young collaborative venture has built up so much success in a short period of time. Also, the three parties concerned are willing to share the expertise gained through this project. SBW International is the project leader and has developed the technology for the TIB system. JHL has developed the automated planting of the cuttings from the TIB reactor into the so called phytotrons and later the substrate slabs. Naktuinbouw participates in the project by developing a testing procedure to ensure the cuttings remain free of bacteria. The TIB system will be further developed in the next few years. So far the bioreactors used contain 4.5 litres, while the final reactors will contain 50 litres.



Snack veg coming on

At Fruit Logistica in Berlin an overwhelming amount of the so-called snack vegetables were shown. The new trend of mini vegetables, which started in the Netherlands, has become international. At the world's largest international trade fair for fruit and vegetable marketing Salanova of Rijk Zwaan was declared the best innovation of the year. It was already one of the innovations nominated by a jury of professional experts, but the public also voted Salanova to be the most appealing new product. Salanova is the brand name Rijk Zwaan uses for those of its lettuce types which are quick and easy to prepare. Ten years ago the breeders at Rijk Zwaan developed the concept of lettuce varieties that fitted within the convenience market. Simply by cutting off the stem, the lettuce falls apart into numerous ready-to-use small leaves ('One cut...ready!'). These decorative leaves are uniform in size, have a crunchy texture with a good flavour and keep well. The sec-

ond generation are the multileaf varieties, which have two to four times as many small leaves. Salanova was not only popular in Berlin. In the USA the launch of the multileaf Sweet Butter helped Fresh Express to capture the top spot in supermarket sales last year. According to IRI, the leading global provider of consumer, shopper, and retail market intelligence, it outperformed major branded consumer products from companies such as Pepsico, Cambell Soup, Kraft Food and Procter & Gamble. Salanova is grown worldwide on several hundred hectares. The main production countries are Australia, the USA, Spain, Germany and Switzerland.

Micro-veg

Other innovative products at Fruit Logistica were Broccocress and Broccospouts of Koppert Cress. It is a new supply in the range of micro-vegetables. They have a mild broccoli-taste, with a little spicy radishes

bite. The product has a high concentration of sulforaphane glucosinolate, an indirect cancer preventing anti-oxidant, which is naturally present in brassicas. Agrisemen showed its Red Flame, the first red pointed cabbage variety to be grown for the commercial market. The variety has an attractive red colour, even after cooking, as well as a sweet taste and excellent flavour characteristics. Another eye catcher was the purple carrot BetaSweet, bred by Leonard Pike, director of the Vegetable Improvement Centre at Texas A&M University. It contains 50 percent more beta-carotene than orange carrots. Its curious colour comes from anthocyanin, another antioxidant that preliminary studies show effectively fights disease-causing bacteria in humans. The purple carrot's crispiness more closely resembles the chewable texture of celery or an apple than the crunchiness of an orange carrot. Seminis developed a new pack-

aging concept to promote its mini vegetables on the market. The assortment consists among others of the pepper Pepolino, which because of its small size, surprising bright colours and sweetness is a very attractive snack. It is sold in boxes that resemble a packet of sweets. Another Seminis product was the small watermelon Bambolino to be eaten for one or two portions. The latter is packed as a bowling ball. Hazera Genetics introduced the brand Lifestyle at Fruit Logistica, a new line of seed varieties that satisfy consumer desires for taste, health and convenience. Under the health category Hazera launched the new Vitalis line of products which include several varieties of lycopene tomatoes with more than twice the content of regular commercial varieties, as well as a range of small vitamin peppers with the extra nutritional benefits of a two to three times higher content of the vitamins A, C and E.

Quality in Horticulture



Naktuinbouw (The Netherlands Inspection Service for Horticulture) monitors and promotes the quality of products and processes related to the production of propagating material for the horticultural sector.

Professional skills are important for companies in the propagating material sector. Naktuinbouw provides training services, which are directly related to Naktuinbouw's own operations.

Inspections
Certification
Quality Control

- Naktuinbouw Elite®
- Naktuinbouw Select Plant®
- Certificates
- Sampling
- Consultancy

Laboratories
R&D
Seed Analyses
Plant & Seed Health Tests

- ISTA
- ELISA / Plating / IF / PCR
- Virus Free Nuclear Stock
- Naktuinbouw Diagnoster®
- Naktuinbouw Accredited Laboratory (NAL)

Varieties & Trials
Tests for Listing and PBR (Plant Breeders' Rights)
Variety Registration

- Plantscope®
- Field Trials
- DNA-fingerprints
- Naktuinbouw Variety Tracer®
- Reference Garden for Perennial Plants

Prophyta Foundation

Support our initiative

The Prophyta Foundation is an independent non-profit organisation, aiming at informing interested parties worldwide about developments in e.g. plant breeder's rights, breeding techniques, genetics, biodiversity, technology, regulations, phytosanitary matters and more. Our communication methods include at present our Prophyta Annual and our website www.prophyta.nl. The Foundation primarily works with volunteers, but in order to recover costs for these activities we need advertisers for our annual magazine and/or direct financial support to the Prophyta Foundation.

We greatly acknowledge the companies mentioned underneath for supporting Prophyta, by either advertising or donating.

Agratechniek	Anna Paulowna, the Netherlands	www.agratechniek.nl	Air conditioning systems
Agro Business Solutions	Grootebroek, the Netherlands	www.agrosolutions.nl	Computer software
Anton Verbeek Roses	Amstelveen, the Netherlands	www.verbeek-rozen.nl	Rose plants
Bejo Seeds	Warmenhuizen, the Netherlands	www.bejo.nl	Vegetable seeds
Blue Bird Publishers	Velsen-Zuid, the Netherlands	www.bluebirdpublishers.com	Agricultural communications
Dekker Chrysanten	Hensbroek, the Netherlands	www.dekkerchrysanten.nl	Chrysanthemum cuttings
Deliflor Chrysanten	Maasdijk, the Netherlands	www.deliflor.nl	Chrysanthemum cuttings
De Ruiter Seeds	Bergschenhoek, the Netherlands	www.deruiterseeds.com	Vegetable seeds
Distel Software	Leiderdorp, the Netherlands	www.distel.nl	Computer software
Germain's Technology Group	King's Lynn, Great Britain	www.germains.com	Seed enhancement technology
Grow Group	Baarlo, the Netherlands	www.growgroup.com	Vegetable plants
Holland Select	Andijk, the Netherlands	www.holland-select.nl	Vegetable seeds
Hoopman equipment & engineering	Aalten, the Netherlands	www.hoopman-equipment.nl	Machinery
Meddens Agriculture	Haelen, the Netherlands	www.meddens-agriculture.nl	Agricultural seeds
Moerheim New Plants	Leimuïden, the Netherlands	www.moerheim.com	Annual plants
Moerheim Roses and Trading	Leimuïden, the Netherlands	www.moerheim.com	Roses, bedding plants
Naktuinbouw	Roelofarendsveen, the Netherlands	www.naktuinbouw.nl	Inspection, varieties, testing
Plantum NL	Gouda, the Netherlands	www.plantum.nl	Seed association
Royalty Administration International	's-Gravenzande, the Netherlands	www.rai-worldwide.com	Breeder's rights
Rijk Zwaan	De Lier, the Netherlands	www.rijkszwaan.nl	Vegetable seeds
K. Sahin Zaden	Alphen aan den Rijn, the Netherlands	www.sahin.nl	Flower seeds
SBW	Roelofarendsveen, the Netherlands	www.stbw.nl	Tissue culture
Sande	't-Zand, the Netherlands	www.sandegroup.nl	Zantedeschia
Seed Processing Holland	Enkhuizen, the Netherlands	www.seedprocessing.nl	Seed processing equipment
Takii Europe	De Kwakel, the Netherlands	www.takii.nl	Vegetable and flower seeds
Van de Bilt Zaden en Vlas	Sluiskil, the Netherlands	www.vandebiltzadenvlas.com	Agricultural seeds

Please feel free to contact our secretariat (p.o. Box 40, 2370 AA Roelofarendsveen, the Netherlands, email: info@prophyta.nl) to join membership of our distinguished group of agricultural and horticultural companies, both for further information or for donations.

Monique Krinkels

IO After exactly twenty years the New Zealand Grain and Seed Trade Association has again organised an ISF World Congress. NZGSTA-president David Melhuish expects over 800 participants. He is delighted that so many people from all over the world will visit his country. “Our goal is to promote New Zealand as a desirable place to visit.”

New Zealand is a desirable destination

Organising an event such as the annual congress of the ISF is no sinecure. With so many participants and a rigid, well filled agenda the event needs to be thoroughly planned. “We started about five years ago, selecting a location within New Zealand”, says David Melhuish. “This in itself created some debate within the New Zealand seed industry but in the end we selected Christchurch because of the world-class Convention Centre facilities and because of the local conference organisers who have been very professional in their approach to the planning of this event.” For many participants travelling to New Zealand is a long trip. From Europe it takes over 24 hours as the distance is nearly 20,000 kilometres. “We have tried to target more attendance from Asian countries as New Zealand does have a strong influence in seed in that region. We always hoped that 800 people would be the minimum attendance numbers and at February 23 this year 711 people had already registered. It looks likely that we shall exceed 800 and perhaps even more than 900 participants. Looking back, I would say that it was not too difficult to organise because of the meticulous planning that has gone into it. Along with this, our national organising committee has comprised a number of people who have previously attended many ISF congresses in the past. You could say that our approach was not to make the mistakes that perhaps other ISF’s had encountered.”

Large company

David Melhuish has attended many ISF congresses himself. He has been involved in the seed industry for over forty years, working that whole period for the same company which through various merg-

ers and acquisitions is now named PGG Wrightson Seeds. It is owned by PGG Wrightson, New Zealand’s largest – and only nationwide – provider to the agricultural sector. PGG Wrightson has a product range that incorporates all inputs to the agricultural sector and has been in business since 1841. “PGG Wrightson Seeds was formed in October 2005 through the mergers of the seed business of Pyne Gould Guinness Limited, Wrightson Seeds Limited and Agricom. The company has business units operating in New Zealand, Australia and Uruguay and exports forage, multiplication and turf seed all around the world. Today it is one of the largest proprietary seed businesses in the southern hemisphere. “PGG Wrightson Seeds draws on the knowledge and expertise of 270 staff.”

Strict biosecurity rules

For travellers to New Zealand it is a bad idea to bring seeds along. The country has stringent biosecurity regulations and the fines are high. Its government is convinced that New Zealand is threatened by hundreds of thousands of exotic species that could cause harm. “Introduced pests are the biggest single threat to the native species and habitats; they also impact upon recreational, Maori, cultural and health values, plus agricultural production and hydroelectric power”, according to the Ministry of Agriculture. Import health standards include phytosanitary measures that must be addressed to by the exporting country, during transit and during importation and quarantine before biosecurity clearance can be given. Restrictions on seeds vary depending on the type and species. Some may be allowed in, providing they are free of insect pests, others are totally prohibited



‘There is no doubt that land use is the single biggest topic for the agricultural world and indeed global seed businesses’, says David Melhuish

or may require specific treatment. This is because of the risk of introducing foreign diseases or the seeds becoming a weed. The latter is taken very seriously. The Department of Conservation has found for instance eleven species of freshwater plants that were originally traded

as ornamentals to have serious weed potential. “New Zealand has a zero tolerance to any new organisms. This makes it very difficult to import new species of breeding material. The seed industry however, does have a very good working relationship with Biosecurity New Zealand, which is the Ministry of Agriculture’s business group that looks after border security. As a seed industry we have to work within the biosecurity rules. They may seem strict, but they are not too tough as long as you follow the correct protocols for seed importation. In some cases, this may mean that crops grown offshore are inspected during growing seasons to comply with New Zealand’s regulations.”

Wary of GMOs

The zero tolerance also implies that genetically modified crops are not allowed to enter the country. Genetic engineering in New Zealand is strictly controlled through the Environmental Risk Management Authority (ERMA). Until October 2003 the country had a moratorium on imports of GMOs. Since then the government has approved

some GMOs on a case-by-case basis, mainly in the fields of medicinal and therapeutic GMOs. “There has been much debate around this policy, as the seed industry generally believes that the legislation is too rigid. As for changes in the future, this is very much both a political and a public debate. I personally believe that tolerance to GMO crops in many countries depends very much on the global food industry’s acceptance of GMO seed and this does not seem likely to happen in the near future.”

Land use

David Melhuish believes that many will take the opportunity in Christchurch to discuss the problems of land use. “There is no doubt that that is the single biggest topic for the agricultural world and indeed global seed businesses. In New Zealand land use and the productivity per hectare is among the highest in the world. We have lost good arable land to lifestyle blocks around the cities, to vineyard expansion and to the dairy industry.” The next big shift in global land use could be caused by the biofuels industry. All over the world people are looking for alternatives to fossil fuels and nuclear energy. This will have a significant influence on the farmer’s choice of crops he wants to produce. In the USA maize and soybean production is increasing, the popularity of flax and rapeseed is growing in Europe, in Brazil more farmers produce sugar cane and in South-East Asia more oil palm plantation can be found. “This could also have a significant effect on the global dairy industry, with countries such as New Zealand supplying more dairy produce from its pastoral based suppliers.”

12 Which crop comes up in the mind if one thinks about New Zealand? Is it the grass that covers the cattle filled meadows, the tasty kiwi fruit the New Zealanders introduced into the world, or the apples they export all over the world? An overview of the three most important products.



13

Monique Krinkels

With a population of not even 5 million people, a country that extends to 268,680 square kilometres and an economy that is largely dependent on agriculture, New Zealand is at the forefront of technology development. “Agriculture produces more than half of all export profits”, says Jim Anderson, Minister of Agriculture. “And there is reason for excitement”, he continues. “The productivity of the primary sector grows faster than average in our economy. Last year an increase from 14 to 16 percent of the GNP. The rise is a result of scientific research, new developments and innovation.”

Successful

One of the factors that make New Zealand’s agriculture successful are its breeders and seed producers. They are organised into the New Zealand Grain and Seed Trade Association, NZGSTA, the organiser of this year’s ISF Congress. There are currently over 80 members from sole traders to large corporates with national and international presences. There are not only grain and grass seed producing companies, but also some vegetable companies, notably the vegetable seed multiplying businesses under its membership. “The proprietary seed industry in New Zealand has now been in existence for over 30 years”, explains Ann Harper, executive director of NZGSTA. “In the mid 1970s proprietary breeding began in earnest with a number of Canterbury based organisations.”

The introduction of plant variety rights in the early 1970s probably was the catalyst for investment by commercial interests. Prior to this date almost all breeding was carried out by government institutes such as DSIR, as the New Zealand Pastoral Agriculture Research Institute Limited was named at the time. “In contrast to today’s proliferation of varieties, new releases were made very infrequently and options were understandably limited. The first commercially released products from private breeding emerged in the 1980s with the perennial ryegrass ‘Ellet’, the Italian ryegrass ‘Concord’ and ‘Grasslands Kopu’, a white clover, being amongst the forerunners in their respective categories.”

Grass

By far the most important crops in New Zealand are forage and turf seeds. In 2006 about 60 million New Zealand dollars (32.5 million euro) of seeds were exported, with Australia as the major buyer. And of these, ryegrass seed plays a leading part, followed by white clover. Not amazing if one considers the huge dairy farms the country is renowned for. A dairy farm with 4,000 cattle is not all that exceptional in New Zealand. The main breed is a Holstein-Jersey mix, which makes for compact healthy cows. They are raised in herds of 700 animals, grazing freely in the pasture, producing an enormous amount of milk. Not that New Zealanders are overly fond of milk products. Most of it, about

96 percent is exported as milk powder and used elsewhere. The farmers are very particular when it comes to grass varieties to feed their livestock. From the 1880s ryegrass was imported from England to improve the meadows and the quality of the herds. The focus on quality has not changed since then. Only the best ryegrasses meet their high standards. Over the past 30 years there have been many varieties released. Whilst much of the breeding has been carried out in New Zealand, many companies have looked to international markets either breeding in these markets or testing New Zealand bred varieties for local adaptation. “In early days breeding selection traits were very limited and concentrated around simple dry-matter production but as breeders considered the requirements of the end-user many other traits or breeding criteria have been introduced such as forage quality, palatability, digestibility, seasonal production and disease tolerance. Over the years it has become apparent that local adaptability, given the diversity of the New Zealand farming landscape, has been critical to delivering robust products. In many cases very strong performing cultivars in other countries have failed to perform in the Australasian environment”, explains Ann Harper. One of the key reasons for this has been the implications of the endophyte of both perennial ryegrass and tall fescue. “New Zealand leads the world in this area of research and it was the discovery of the link between wild endophyte and ryegrass staggers

in the early 1980s by AgResearch scientist Lester Fletcher that provided plant breeders with another challenge of how to best utilise the range of novel endophytes for species like tall fescue and ryegrass.” The most well known of these endophytes is ARI, which now accounts for the majority of perennial ryegrass sown in New Zealand. MaxP tall fescue endophyte has been commercialised in the USA market, which in contrast to New Zealand utilises tall fescue as its main forage species. “In short New Zealand remains at the forefront of forage breeding in the world. We are fortunate that in Australasia we have farmers that are capable of extracting the gains that have been afforded by breeding and associated technologies. This market at least domestically, is expected to continue to grow as the rate of pasture renewal increases with farmers recognising the significant gains between the ‘existing’ pasture and the new cultivars and technologies”, concludes Ann Harper.

Apples

New Zealand exports more than worth over 2 billion NZ dollars of fruit, flowers and vegetables to over 100 countries. Vegetable seed export amounts to 39 million NZ dollars. There has been substantial business growth in vegetable seeds over the past 20 years, as New Zealand has established itself as an important supplier of this product.

Grow with Bejo

Vegetable seeds for professionals

Bejo, a name that stands for quality



New Zealand



The flesh inside the new apple has a red colour caused by the high concentration of anthocyanin

Photo: Briar Shaw, copyright HortResearch

One of its most renowned products is apples. New Zealand has a name to uphold when it comes to breeding new apple varieties. According to the World Apple Review more than 12 percent of all apples worldwide have New Zealand in its ancestry. Apple varieties entered New Zealand from Europe and the USA during the 19th century. At the time the country was comparatively free of pests and diseases. During 1970 however woolly aphids succeeded in establishing themselves. The industry was saved by a local nurseryman who discovered that the variety Northern Spy was resistant to these aphids. The discovery marked the start of a search for an aphid resistant rootstock. But it was not only the rootstock the researchers were looking for. The most well known New Zealand varieties are Royal Gala and Braeburn. Unfortunately at the time these varieties were released New Zealand did not have plant breeder's rights and remained unprotected. Only in 1981 did the country become a UPOV member. The latest novelty is a red-fleshed apple that has been bred by HortResearch, the country's leading research institute in this field. From the outside the apple looks like almost any other, but bite into or slice it and the fruit's rich red flesh is revealed – given its unique colour by a high concentration of anthocyanin – an antioxidant known to offer human health benefits. HortResearch began the work in 1998, using apples that have naturally red flesh, but do not

possess the external appearance, eating qualities or storage capability required to meet commercial standards. Breeders crossed these apples with high quality white-fleshed apples, creating breeding lines with fruit that range from white/pink to full purple. Breeders continue to work on the apple, which is not expected to become commercially available for 6 to 8 years. The red-fleshed apple is not HortResearch's first foray into the novel fruit colours. In 1996 the company released to growers a vibrant yellow-fleshed kiwifruit called HORT16A, which has gone on to become a multi-million dollar global success under the brand name ZESPRI™ GOLD.

Kiwi

Of all products New Zealand exports, kiwi fruit is on the top of the list. Nearly 700 million NZ dollars worth of kiwi fruit was exported to customers outside New Zealand, more than double the value of apples. Kiwi fruit production in New Zealand started in 1903, when Isabel Frasier took kiwi seeds home when she visited her missionary sister in China. The Actinidia deliciosa plants came from the Yang Tsje Kiang valley and she planted them at her home in New Zealand. In 1905, the first 'Chinese gooseberries' were ripened. It remained a plant for hobby gardeners until in the 1924 nurseryman Hayward Wright selected the well-known green 'Hayward' and gave the fruit its name. Most of the varieties known today stem from his variety. The genus Actinidia consists however of more than 50 species. In 1977 researchers in New Zealand took seeds from the Actinidia chinensis variety home from the botanic gardens in Beijing to Te Puke in the Bay of Plenty. The goal was to develop more varieties and even new fruits. The result is Zespri Gold, a variety with a fig-like shape and smooth skin. But the real difference is inside. The yellowy-gold flesh is beautifully sweet, with tropical overtones of mango, peach, melon, a touch of lemon and even a little honey, according to the admirers.

Environmental movement dominates celebrations in Europe

16 Theo Leoné

• **What started in 1951** with the foundation of the European Coal and Steel Community has turned into a system that can be felt in all parts of society. • “The Common Agricultural Policy has gone a long way, due to its original structure and the control on production”, says Mariann Fischer Boel, Commissioner for Agriculture and Rural Development. “Today, ‘decoupling’ is the cornerstone of our reforms.” This is the cutting of the link between direct agricultural subsidies and production, but instead supporting farmer’s income. During

Half a century ago, the word ‘Europe’ was almost never used in agricultural circles. Since 1957, it has the sector firmly in its grip. While Brussels has less civil servants than the average national ministry, more and more rules stem from the EU. For agriculture, nature and food quality over 80 percent is covered by European legislation.

the celebration of 50 years of the European Union Mrs Fischer Boel says that the agricultural policy has developed on the waves of time. Too slow for many people, too fast for others. “But it has developed in a way policy should. We continue to change, to satisfy the needs of the 21st century. To support a competitive agriculture, high environmental standards and economic diversification. And also to ensure a good quality of life in our agricultural community.”

Founding countries

The successful cooperation within the European Coal and Steel Community and the organisation for nuclear energy Euratom formed the base in the early 1950s to the foundation of a European Economic Community. On May 25, 1957 the six found-

ing countries, Belgium, France, Germany, Italy, Luxembourg and the Netherlands, joined forces. Their goal was to establish a common market. On its way to the 21st century the European Union continuously expanded. In 1973 a hesitant Britain joined as did Ireland and Denmark. Greece became the 10th member in 1981. Together with Spain, Portugal, Austria, Sweden and Finland, who became members in the following years, the objective changed in 1992. In Maastricht it was decided that the Europe would not only be solely focused on economic affairs but would widen its scope towards a integrated European Union. A single currency was one of the results. Since January 1, 2007 when Bulgaria and Romania joined the European Union the organisation has 27 member states. The realisation of a Common Agricultural Policy is in no way accidental. Already in the 1930s the pattern of production exceeding demand became visible. After the second world war France especially became a producer of surpluses. The country started bilateral agreement with important markets such as Germany. The architects of the common market realised that to protect the free trade zone in Europe measures should be taken to support it. French logic made clear that those costs should be a communal burden. Who cared about the bill? Most people assumed that the costs could simply be paid from the import duty. The common zone would certainly remain a net importer, the majority believed. This scheme made the choice of United Kingdom a difficult one. Should they give up their diminishing privileges with their commonwealth counterparts and the link between pounds and dollars? On the other hand, Europe threatened to close the borders of the continent.

Citizens’ believe

The foundation of the EEC turned out to increase production more than initially assumed.

Mariann Fischer Boel: ‘the celebrations reminded me of the key role the Common Agricultural Policy played in the creation of the EU we have today. And this made me more determined than ever to get the message across that the CAP has moved with the times to become a modern policy and still has an important role play in the future’



Photo: European Community 2007

The first signs of overproduction were simply ignored until finally drastic measures had to be taken. The reform-minded Brussels proved to be able to do so. The big changes in the agricultural policy that will be on the way in 2007 are only welcomed by half of its citizen. The results of a recently held poll of 25,732 Europeans from all 27 member countries show that clearly. It seems difficult for the agricultural and horticultural sector to ask attention for its interests. The dangers of populist slip-ups increase, as the influence of experts in Europe diminish. From those in doubt on the Common Agricultural Policy, 14 percent did not give their opinion and 26 percent could not make the choice between good and bad. Another 11 percent of the European population believe that the agricultural policy is absolutely bad. When questioned how to judge the spiral of ever decreasing subsidies, only the people in countries such as Romania, Estonia and the Netherlands approve; 60 percent agrees with it. The feelings are completely different in Denmark and Italy where only two in five citizens welcome liberalisation. It is remarkable that the better people were educated the more they agreed with cutting back subsidies. The poll, under the authority of European Commission made it painfully clear on what basis the – voting – European citizens founded their judgement. Which source is believed to be the most trustworthy? Not the experts of the national governments. That answer was only given by 10 percent. The European Union itself scores hardly better with only 12 percent. The champions of the opinion forming on ‘green’ affairs are consumer organisations and organisations that stand up for nature and the environ-

ment. An astonishing 38 percent follows the view of Greenpeace and similar groups. Only one in three citizens bases himself on the opinion of agricultural specialists and 28 percent listens to what agricultural organisations have to say. The role environmentalists play in opinion forming on the European Union varies strongly country by country. In Germany an amazing 57 percent believe environmental groups are the most reliable source for information. France is slightly less with 56 percent. The top five countries consists further of Denmark (52 percent), Sweden (49 percent) and the Netherlands (47 percent). In Belgium only one out of three citizens give the highest honour to environmental groups. In Poland and the Baltic states only 20 percent of the population attach importance to the opinion of environmentalists.

Moving forwards

Mariann Fischer Boel however makes clear that the EU will confidently follow its own political line. Is the US grumbling during the WTO negotiations, let them look at their own subsidies. “We will not permit the Doha conference to become the principal guideline for our own agricultural and rural policies in the coming years. Some of our trading partners seem to think that the European Union should swallow every agricultural concession, even demanding drastic changes in the communal agricultural policy. They are wrong. The reforms that are under way have enabled us to present a valuable offer during the Doha Congress. We remain flexible, but there are limits. The Common Agricultural Policy is still moving forwards.”

17

On May 25, 1957 the European Union came into being



Photo: European Community 2007

German court clarifies cascade principle

Monique Krinkels

18 One of the most complicated elements in the UPOV 1991 Act is the scope of the cascade stipulation. Last year the supreme court in Germany decided on two different infringement cases. Both times it ruled in favour of the breeder; both times with different arguments.

The German breeder Kurt Kramer Heidezüchtung at Edeweicht found two of his varieties of heather (Calluna vulgaris) ‘Amethyst’ and ‘Melanie’ at a garden centre. The first is protected by European breeder’s rights, the second by German breeder’s rights. “Every year during the flowering period in September and October three colleagues inspect wholesalers and garden centres. Not only to see whether they have illegally produced plants for sale, but also whether the quality meets our standards”, says Christoph Heymer-Small, marketing manager, also responsible for licence administration and controlling of Kurt Kramer Heidezüchtung. “In 1997, 1998 and 1999 unlicensed plants in several garden centres attracted out attention.” He discovered that the plants were produced in France without his permission, traded to a Dutch wholesaler, who exported the plants to Germany and subsequently were sold to a garden centre. Therefore the breeder started legal proceedings against the German purchasing agent, the Dutch wholesaler and the French producer at the Landgericht Mannheim (magistrates court). After a favourable ruling for the breeder, the defendants went to the Oberlandsgericht Karlsruhe (regional court of appeals) and when again they got the door slammed in their faces they went to the Bundesgerichtshof (supreme court) which confirmed the earlier rulings.

Unauthorized use

One of the arguments the defenders put forward, was that the breeder refrained from acting in

Remarkable decrees

Testing – The defendants claimed that it would need at least thirty specimen to prove that a plant is of a certain variety. That is the number published in the guidelines for examination of UPOV to decide whether a variety is sufficiently distinct, uniform and stable to be granted plant breeder’s rights. According to the supreme court this argument does not hold, because that figure relates to DUS-testing, where also stability and uniformity have to be established. Obviously more plants are needed for the latter . But to prove infringement even a single plant would suffice.

an earlier stage. Article 14 of the UPOV 1991 Act states, that the breeder’s rights extends to harvested material, but only if the material is obtained through the unauthorised use of propagating material and if the breeder has not had reasonable opportunity to exercise his right in relation to the propagating material. This provision constitutes what has been popularly called a cascade. This implies that the breeder should only exercise his right in relation to the harvested material if he has not been able to exercise his right in relation to the propagating material. If a product is made from the harvested material, he can only exercise his right if he has not been able to do so in relation to the harvested material. In the case of ‘Melanie’, the supreme court concluded that the breeder obviously did not have the opportunity to act earlier, as the production took place in France, where ‘Melanie’ is not protected by PBR. According to UPOV 1991 it is therefore allowed to enforce breeder’s rights on the harvested products. This finally answers the question whether a breeder should protect his plants in all countries where it can be produced. This would mean a heavy burden on the breeder because the number of UPOV member states is steadily expanding. At the moment there are sixty-three countries that have acceded to the UPOV convention.

Different reasoning

In the case of ‘Amethyst’ the breeder would have had the opportunity to enforce his rights against the producer in France, as this variety is protected by European breeder’s rights. The defendants claimed therefore that that the breeder failed to exercise his right at the proper moment: when they were raised at the grower. The court had however a completely different view. The judges decided that according to the communal breeder’s right act, the plants should not be considered harvested plants, but instead were plant components. This latter term is used for complete plants, or parts of plants that can grow into complete plants. According to the court it was therefore of no consequence that the breeder could have started litigations earlier as this only applies if the plant would have been harvested material. In its decree it

Melanie is still a very popular heather variety



Remarkable decrees

Knowledge – The German purchaser claimed that he was not liable as he did not know and could not know that these plants were a product of infringement. According to him he bought the plants from a renowned and experienced wholesaler he believed he could trust, unless there would have been indications that the plants were obtained illegally. According to the supreme court manufacturers and traders have the duty to investigate if a product might be protected by intellectual property protection. They have to ascertain that the trade of the products is not in conflict with third parties rights. Although they do not have to do that themselves, they have to make sure that at least one party in the chain has thoroughly examined this.

can be read: “Die von den Beklagten vertriebenen vollständigen Pflanzen sind jedoch nicht aus einem in weitesten Sinne als Ernte qualifizierbaren Vorgang hervorgegangen und daher kein Erntegut” (The by the defendant sold fully grown plants have not in any way been obtained by a means that could be called harvesting and are thus not harvested material).

Harvested or not

According to Huib Ghijsen, global manager germplasm protection of Bayer BioScience, is the fact that the courts decided that plants of ‘Amethyst’ were not harvested material, but plant components

most remarkable. In the first case, that of ‘Melanie’, the court decreed that the defendants did not bring propagating material into circulation as according to the German breeder’s rights act this is defined as being ‘plants, plant parts including seeds, that are meant for the production of plants or other means’. The potted plants of ‘Melanie’ were therefore considered harvested material. ‘Amethyst’ on the other hand was expressly considered not to be harvested material, but a plant component. This reveals a differences in wording between the German and the Communal breeder’s rights act. The latter has not taken the exact definition in the UPOV which mentions that harvested material can be complete plants and plant parts. However, nor UPOV nor the other acts contain exact definitions what can be understood under harvested material and harvesting. In the view of Huib Ghijsen this could lead to unfavourable situations as other judges might conclude that grain is propagating material as it can produce plants or seed grain is harvested material as it has been harvested. A clear definition of harvested material and harvesting is obviously necessary. He sees the ruling as further proof how complicated the cascade provision is and what unfavourable side effects that might cause. Enforcing breeder’s rights is very hard or even impossible in some European countries. It is the result of the fact that the European Communal breeder’s rights act has not been followed by a harmonised system of exercising plant breeder’s rights. As a consequence of this ruling a breeder might decide to protect his varieties only in the most important trading countries and



AGRO BUSINESS SYSTEM

ERP SOFTWARE FOR YOUR COMPANY



This ERP software solution has been developed specially for the seed industry and other producers of agronomic materials.

ABS manages your primary and secondary business processes on top level or drilled down to detail, all in connection with your standard financial software. It is capable of handling your processes, national and international, and is designed to be flexible to change on the demands of your organization, while bringing more efficiency.

Further information and details regarding the functionality of ABS can be found on our website or presented on a demo CD.

Visit our website www.agrosolutions.nl or contact us via info@agrosolutions.nl

Or visit our stand in the exhibition area

They use it



The purple coloured Amethyst stands out in a flowerbed



refrain from European breeder's rights. In this way he does not have to enforce his rights in the more difficult countries, but instead ascertains that he can exercise his rights when the harvested plants are imported in these countries. Huib Ghijsen believes it is therefore advisable to reconsider the cascade provisions once more, especially in the light of the argument used for these provisions, that a breeder should not be free to choose the moment when to exercise his rights, because it would hamper trade.

Afterwards

The case of 'Melanie' and 'Amethyst' has ended well. The main defendant, a garden centre chain, was convicted to pay compensation and an adequate sum has been transferred to the bank account of Kurt Kramer Heidezucht. And the plants? Christoph Heymer-Smalla: "The cultivars 'Melanie' and 'Amethyst' are still popular with gardeners. But we did not stop breeding of course. Improvements include 'Alicia', which also has white buds and an upright habit and 'Athene' with bright red buds. Our varieties with coloured leaves complete the assortment of our bud bloomers."

Remarkable decrees

Accountability – The purchaser claimed that he could not be asked to hand over his bookkeeping to establish the appropriate compensation. While the communal breeder's rights act says that infringers can be forced to pay an adequate compensation, nothing is mentioned on the way this has to be determined. The supreme court set their arguments aside stating that this measure is only meant to establish the level of the compensation that could be enforced in an efficient way and not as a means of protection.

The case had a positive side effect as well. "Other owners of garden centres gained an insight into the matter of illegal propagation. They paid compensation at the value of the usual license for the plants they imported. However, two wholesalers allege, like the chain mentioned above, that it does not trade varieties protected by the company Kramer. These lawsuits with the same background are still not finished", explains Christoph Heymer-Smalla, his fighting spirit still undiminished.

Multipurpose crop demands broadly-based approach

Monique Krinkels

22 There are no plant species having wider uses than grasses. It is the daily feed of herbivores as well as the mat for athletes, it is an essential part of playing fields, parks, landscapes as well as garden lawns. And that is worldwide, except from the ice covered polar zones and deserts. With some 30 species to work with, breeders do their utmost to comply with all the different requirements.

• **Grass is an old species.** Even the dinosaurs grazed on it and fossils prove that it had already undergone substantial diversification in the Late Cretaceous period, 70 million years ago, when these giant beasts still walked the earth. But it is in the last century that diversification peaked, when mankind started to breed varieties with characteristics that met their needs. In general they look for persistent and resistant varieties, but every use adds its own additional requirements. Stefan van der Heijden, research director at Barenbrug gives an overview. “As there are almost 10,000 grass species that have traits of interest of which we currently use only 32 for breeding purposes, much is possible. However, people have to come to us if they need characteristics we usually would not be looking for.”

Feed

One of the most important uses of grass is as the basic feed for cattle. Some 1.5 billion of cows,

bulls and calves roam pastures all over the world eating 60 kilos of grass a day given a free choice of feed. Which grass varieties they consume, depends on the farmers professional interest. In general they look for grasses that besides being persistent and resistant, are tasty as well. Local traditions in feed management however vary per region. In Northwest Europe for instance farmers use mainly grass mixtures, instead of straight varieties. Especially in the Netherlands, the diet consists for a large part of fodder, maize, soybean and other concentrates as alternatives to grass. That does not mean grass breeding has come to a stand still. On the contrary, the diet of cattle is in the middle of an era of new developments. “Campina, one of the major dairy industries, has set its eyes on healthier milk, with less saturated fatty acids, a higher content of unsaturated fatty acids and Omega 3 fatty acids. Saturated fatty acids contribute to disease such as cancer and diabetes and even neurodegenerative disorders such as Alzheimers. To reach this goal several measures have had to be taken, one of which is breeding new grass varieties”, according to Stefan van der Heijden. Another breeding goal is to reduce the nitrates and phosphates in the manure of cows. In Europe many cows hardly see a meadow these days, as stringent environmental legislation demands that the amount manure on the grass is limited. On the one hand environmentalists applaud this, but animal rights supporters on the other hand regret that cows have to spend their lives inside stables. A reduction of nitrate and phosphate in the manure or a reduction of the amount of manure would satisfy both. In the coming years several forums will discuss possible solutions. The so called ‘milk genomics project’ might even come with a different genetic background of the cow that has complete different diet requirements. Everyone in the chain has been asked to join. “If it becomes clear what is necessary we will have new breeding goals for grasses.” In New Zealand dairy farmers are very professional, choosing carefully which combination of a ryegrass variety, white clover and endophytes will offer them optimum results. “It stimulates breeding enormously”, says Stefan van der Heijden. “The big challenge is to combine the use of these endophytes to increase stress-resistance of the grasses in a stable

The amazing distance a golf ball goes when Tiger Woods hits it, has created a demand for a new grass mixture



Parks without a grass field would be unthinkable

mixture of ryegrass and white clover .” New products gain popularity very quickly in New Zealand and we want to stay on the forefront. Endophytes are non-pathogenic fungi that live in a symbiotic relationship inside the plant. The mycelium of the fungus grows into the sheath, stem, and leaf tissues of the grass, until it reaches the flowering stem and seed, through which it passes to the next generation. The endophyte causes a high resistance to foliar-feeding insects, because of the alkaloids the fungus produces. Besides, the grass-endophyte combination tend to be comparatively vigorous, produce greater numbers of tillers and roots, making them more drought or heat tolerant, more competitive with weed species, able to recover more rapidly from injury and generally more persistent in the field.

Sports

Professional sportsmen demand professional grass. Whether it is football or rugby, tennis or golf, the playing area must be meticulously kept. “Many factors contribute to maintaining a good playing field. Field management forms the most important part. But of course the right choice of varieties is a vital element.” Sport turf has to cope with difficult conditions. Besides heavy use, drought, heat and for example drainage water put pressure on the plants. The choice of grass varieties depends from the type of sport played. In football the relatively new trend of closed or semi closed stadiums have been a challenge to all breeders. Because of the lack of natural light and wind many pitches had to be replaced regularly and the call for synthetic ‘grass’ comes up regularly. “But this would change football forever”, says Stefan van der Heijden. “Football is a very physical sport and sliding on synthetics can be an unpleasant

experience. The risk of injuries would substantially increase. Moreover, football would become more predictable as can be seen in indoor football.” The combination of field management and varieties that are more or less adapted to these unnatural circumstances should offer a solution. “But there is more. The current football player is heavier, longer and faster and wears more advanced footwear then in the past. This leads to more intensive use so you need fast growing varieties grass to cope with that.” Barenbrug adds also special tall fescue to its football mixtures. “Its roots form rhizomes that make sure tears are quickly covered again.” Another sport, golf, has other problems to deal with. A golf course needs four different kinds of mixtures. The tee, the fairway, the rough and the green all have there specific demands. “And the golf course architects all have there own preferences. The varieties we use for St Andrews in Scotland are specially developed to the rainy, chilly circumstances over there. We have to explain to them that a grass mixture that is doing well in the USA, can be disastrous in certain areas of Europe.” The latest request comes from the USA, where ‘tiger proof’ grasses are wanted. And not because the golfers suffer from roaming predators. “Tiger Woods is one of the longest players off the tee. He is a formidable adversary to golf players. To make a match more even, smoother growing grass varieties with other physics are needed. Adding improved bluegrass hybrids to the mixture or even complete new species may help golfers to improve their game”, believes Stefan van der Heijden.

Leisure

Of course grass forms an important part of the landscape. A leisure area without grass is unthinkable.

Do you think of yourself as a professional breeder?

[Redacted text]

[Redacted text]

[Redacted text]

[Redacted text]

Secure your breeding capital with **Verdi**

[Redacted text]

[Redacted text]

[Redacted text]

[Redacted text]

[Redacted text]



Cars are constructed to need less fuel, but biofuels would greatly diminish the negative side effects of driving



able. Which varieties are chosen depends on the use as well as climate conditions. Often sports grasses are used. "But landscapes that are endangered by erosion need varieties that firmly keep the soil in place. And if it is not only meant for playing, but as feed for wildlife, legumes have to be added to the mixture." The same goes for the private back gardens. Most consumers are not fussy when it comes to choosing grass seeds for their garden. They often just pick up the first package they see. A low price seems to be an important criteria. But there have been developments. Stefan van der Heijden: "Grass that needs less mowing have become popular as are the mixtures that are suitable for a shady lawn." And of course grass has proven to be an appreciated garden plant on its own. "Gardeners plant tussocks of grass around ponds for instance. It gives the pond a more natural surrounding. But Barenbrug is not breeding grasses for this purpose. This is more the field of bedding plant breeders", he says.

Environment

Grass is also a very efficient user of CO₂. It could well be used as a source of energy, replacing maize and sugar for bio ethanol production. "However, as long as the USA heavily subsidises maize growing, grass cannot win the competition", is the conviction of Stefan van der Heijden. But there still might be a future for grass as a replacement for the more polluting fossil fuels. "Especially when there is a growing awareness that production should take place as close to home as possible and on land that currently can-

Improving the milk quality and lowering the eutrophication of the environment are but two of the many demands dairy farmers have

not be cultivated such as marginal areas. Transporting huge quantities of bio fuel or its raw material will lower its contribution to a healthier environment."

Future

There still is much to do for grass breeders. With a life cycle of varieties of three to six years there is a constant need of new varieties. Added to that are the continuously changing demands for specific characteristics. "And we also have to cope with the influence of climate change. Grass varieties have to be adapted to new diseases and more extreme weather conditions. We were one of the first to notice these changes as we observed diseases in countries they normally never occur", says Stefan van der Heijden. And besides these challenges, Barenbrug also wants to enter new markets. "We have subsidiaries all over the world, in almost all climates. The tropical regions however have mostly been overlooked so far, as most people concentrate their activities to temperate and subtropical zones." With 10,000 species to work with, this new endeavour will certainly be within the breeders' potential.

sbw INTERNATIONAL B.V.

Your reliable partner in Tissue Culture

A Dutch Tissue Culture Company with more than 30 years market experience!

We are an independent company that provides services to more than 350 breeding companies worldwide!

With large experience we have developed protocols to micropropagate more than 300 different crops, about 2.500 varieties, and 95% are protected by Breeders' Rights.

We offer micropropagation services, breeding techniques support and provide exclusive consultancy when required.

The word is already out there and we at SBW are proud to call ourselves your reliable partner in tissue culture.

For more information visit our website www.sbw-international.com or contact us via e-mail: info@sbw-international.com or tel: +31 (0)71 3314900

Winner of the NYO Cultivation Prize 2007

NYO

Protected or not, that is the question

Monique Krinkels

26 The exact scope of plant breeder's rights might be difficult to demarcate by specialists or even judges, for many people in the business it is often also a source of misunderstanding. They sometimes believe their varieties are fully protected, while everyone has the right to propagate them, or think the opposite, that they are not protected at all.

• **"My pepper variety is well protected against infringement. It was tested on Distinctness, Uniformity and Stability, is registered and received approval of our Ministry of Agriculture."**

Wrong! Everyone is allowed to put your variety to his own use. Registration for national listing is a permission to trade the variety. Only plant breeder's rights protect the variety and that is therefore a totally different matter. In Europe registration to national listing is obligatory for every vegetable or agricultural variety. Only after approval it may be traded within the European Union. That does not give the holder of the registration any other rights than trading the variety. Registration to national listing and/or plant breeder's rights may take place in any of the 27 EU countries.

• **"I know that this grower is reproducing our lettuce, but we cannot do anything against that. He does not sell it, but only uses it in his own greenhouse. That is the problem with farm saved seeds."**

Wrong again! In the EU there is no such thing as farm saved seeds for vegetables or ornamentals. If a variety is protected by a Community plant variety right, no one is allowed to reproduce it, except when they have obtained a license to do so. According to EU legislation it is only allowed to use farm saved seeds in certain agricultural crops, mainly cereals. The use of these seeds is not altogether free as a remuneration has to be paid. The only exception are small scale farmers (producing less than 92 tonnes of cereals), who are allowed to use their seeds without paying that remuneration. The number of farmers using farm saved seed is still substantial, but the number is declining. In France 46% of winter wheat is produced using farm saved

seeds according to the CPVO. In Spain and Portugal this is 78%. But for crops used by the food industries such as barley, rice and durum wheat almost all seeds are obtained from seed companies and are certified.

• **"That grower is using cuttings of my tomato variety. It is unfortunate, but we cannot do anything about it as he does not use seeds."**

Oh yes you can! As long as you have your variety pro-

tected by plant breeder's rights. Whether a grower uses cuttings of BPR protected varieties or seeds to reproduce your variety it remains an infringement of plant breeder's rights. A grower might chose for cuttings as your variety is a hybrid, but that does not make it any more legal.

• **"I have decided to change the name of my protected variety into a fancier one. I believe it will sell better if it has a trendy, healthy sounding name."**

Watch out! You might be right that a trendy name will result in an upsurge in sales, but if you want to maintain the protection plant breeder's rights offer, make sure you state the original denomination on the label as well. The name used for the application of plant breeder's rights should always be mentioned, other-

Illustration: Marcel Bakker

wise you might lose your variety to an even smarter marketer.

• **"I will just let that grower propagate my plants and will take action when he exports it to my country. That will teach him a lesson!"**

Beware! You should intervene at the earliest possible moment. Only if you cannot reasonably exercise your rights on the propagated material, you are allowed to take action on the harvested products. And that only goes if it takes place in a country that has implemented the UPOV Act 1991, as the older Acts do not allow this.

• **"I have improved my variety enormously over the years by continuously selecting the best cabbages. But it is still the same variety and I sell it under its original name."**

Be careful. You might have given the world a new, free variety. Only if the variety remains within the range of description that is permitted, the original plant breeder's rights still apply.

• **"It is great that today mutants of my variety are protected as well. I do not have to worry that growers might find another coloured tulip in their fields."**

Don't count on it. Essentially derived varieties are only protected under the UPOV Act 1991, so make sure whether the country has adopted this latest Act. Furthermore, if the grower applies for plant breeder's rights, the inspectors might overlook the similarities between the essentially derived variety and the original variety, especially if the mutation it is not colour, but a less eye catching characteristic. A breeder should always remain attentive.

• **"I am sure my variety is well protected."**

Is it? If you have applied for a national plant breeder's rights foreigners might happily start exploiting your variety worldwide. Only if you are absolutely sure no-one outside your own country will have the slightest

interest national protection is it an option. If in doubt chose European plant breeder's rights.

• **"I don't have to apply for plant breeder's rights immediately, as I have a period of grace of one year. Let's just wait and see whether growers like my new petunia."**

Mark your agenda and start well in time! If you apply for plant breeder's rights later and something goes wrong during DUS-testing you might exceed the period of grace and your variety becomes public property.

• **"I probably will apply for plant breeder's rights later this year. Thanks to the period of grace of one year my variety is already protected."**

No way! The real protection starts at the moment of the granting of the right; however a limited protection exists the moment the application is received by the proper authorities. If you want to sell beforehand you do so at your own risk.

• **"We have European plant breeder's rights but if all goes well we will apply for PBR in other countries within four years."**

You may indeed. Just make sure you do so within four years of your first sale in Europe. DUS stations are known to thoroughly investigate this. Furthermore, it might be worthwhile to check whether the prospective countries have a period of grace in their legislation, as some countries demand that a new variety is indeed brand new.

One last warning Make sure you know for certain which of your varieties is protected by plant breeder's rights and which is not. Furthermore, it is important to know in what country PBR was obtained. There are differences between countries, even if they have UPOV Act 1991 incorporated in their legislation. It might be a different wording, exceptions to the general rule or something else. Infringers, and their lawyers, are notoriously smart in finding out where there chances lay. Do not give them the opportunity to get away with it.

The examples of misunderstanding plant breeder's rights mentioned in this article have been compiled by Aad van Elsen, Plantum NL and Maarten Leune, Royalty Administration International.

Gained knowledge put to beneficial use

Monique Krinkels

28 In the 1990's many European vegetable seed companies started to explore the possibilities of genetic modification. However, due to the opposition of both policy makers as well as environmentalist groups, most of these activities have since been stopped. But that does not mean that everything learned is being wasted. A group of researchers put their experience to good use.

• **The market for genetically** modified vegetables in Europe is virtually non-existent these days. Growers cope with pests and diseases using for instance predatory insects and small amounts of high-tech chemical compounds. Elsewhere in the world the picture is completely different. In Asia and Africa insects are a serious threat, dwindling harvests and threatening the livelihood of smallholder farmers.

Smallholder farmers

One of the most destructive pests is the Diamondback Moth caterpillar. It feeds on brassicas and can cause 100% yield loss if no insecticides are used. In the developing countries 30 to 90 percent of the cabbage and cauliflower production is lost due to the Diamondback Moth alone. To add to the problem, the moth has become resistant to almost all insecticides, except for pyrethroid, organophosphates and organochlorines, which are toxic to animals and humans and bring about environmental problems.

The people most affected by this pest are the smallholders in Asia and Africa for whom cabbage is a key crop as well as a primary vitamin source. Not only are their harvests diminished, they often suffer from pesticide poisoning due to the frequent use of highly toxic chemicals. Eye infections, headaches, eczema and stomach pains are the result. Traditional solutions to the problem of the Diamondback Moth have not worked out. Pest management systems based on strict agronomic regimes and the use of biological control agents may be useful in developed countries. But for the smallholders in Asia and Africa it would not only be cumbersome to implement, but the insect pressure in warmer climates makes it also unfeasible.

Collaboration

According to the researchers this problem has to be addressed urgently. That was the start of a new organisation: the Collaboration on Insect Management for Brassicas in Asia and Africa (CIMBAA). Among the participants are the World Vegetable Centre (AVRDC), the Centre for Environmental Stress and Adaptation Research (CESAR) of the University of Melbourne, the Department of Entomology and the department of international programmes of Cornell University, and the Natural Resources Institute (NRI) of the University of Greenwich. Together they worked out a solution: to create cabbages that are durably insect resistant.

India

India is the world's largest cauliflower grower and second largest cabbage grower, with 440,000 hectares and an annual production of 6.4 million tonnes. Every year some 6,000 tonnes of active ingredient of insecticides are used to prevent the Diamondback Moth destroying the harvest. The average number of insecticide applications is 13 per crop, or more than one per week, but when an outbreak of Diamondback Moth occurs this number may rise to as many as 30 applications per crop. Spraying Diamondback Moth with insecticide consumes more than 33,000 man-years of labour. The costs of cabbage and cauliflower protection is nearly 125 million euro annually.

Diamondback Moth

The Diamondback Moth (*Plutella xylostella*), is the single most destructive pest of cabbage and leafy greens worldwide. It originates from Southern Europe, but spread to the America's, Asia and Africa in the nineteenth century. As an adult the moths have a greyish-brown colour, with light Diamond shaped spots on the back of the wings and they have a wingspan of less than 15 mm. It lays its eggs underneath leaves. When young, the agile, green caterpillars eat the parenchyma leaving the outer layer on one side of the leaf intact. Older caterpillars consume all tissue. The Diamondback Moth easily adapts itself to extremely varied conditions. In warm climates their complete lifecycle takes about two weeks, producing more than twenty generations in a year.



When disturbed, a Diamondback Moth caterpillar wriggles backward violently and may even drop from the plant. As it remains suspended by a silken thread it will climb back onto the leaf and continue eating within seconds

The collaboration will engineer sustainable insect resistance traits into locally adapted cabbage and cauliflower varieties. The new varieties will produce insecticidal proteins from two different Bt genes. This material will be made available to local breeders in developing countries free of any technology fees, to ensure smallholder farmers will benefit from the endeavour. Plant Genetic Systems was in 1985 the first company to develop genetically engineered plants with insect tolerance by expressing genes encoding for insecticidal proteins from *Bacillus thuringiensis*. The use of Bt genes has widely spread since then. In 2006 19 million hectares were planted to Bt crops according to ISAAA. These crops have been grown without any significant environment or health problems emerging. CIMBAA has started the project focussed on two countries, India and Kenya. In these countries the Diamond Moth problem is high, but

Kenya

Kenya produces over half a million tonnes of brassicas each year, most of which is by the 40,000 smallholder family farms to whom brassica production is a major source of income. The cost of brassica crop protection varies from 150 to 325 euro per hectare (21% to 65% of the variable costs of production) depending on the crop and district.

that was not the only argument. Both countries have a well developed regulatory system to introduce genetically modified crops.

Pest management

The Diamondback Moth has not been widely exposed to the two Bt proteins before. Introducing two toxins together will prevent the caterpillars becoming resistant as they would have to develop resistance to both toxins simultaneously. CIMBAA strives to linking the two Bt genes closely before inserting them into the plants. Accidental separation by breeders, which could lead to produce single Bt gene plants, is therefore virtually impossible. That is not the sole precaution against the moths becoming resistant. The organisation plans to introduce a pest management programme when the insect-resistant plants will be introduced. CIMBAA will promote the use of natural enemies of these caterpillars and advise farmers on the cultural measures they should take. This will significantly reduce the production costs of brassicas in these countries. And that in turn will reduce poverty. Moreover, it will prevent harm to the public health as well as the environment. The endeavour of CIMBAA will therefore greatly contribute to improving living conditions in third world countries.

More information on the CIMBAA project: www.cimbaa.org

Photographer: Alton N. Sparks, University of Georgia, USA

Tackling variation, hyper-hydricity and recalcitrance

Geert-Jan de Klerk

30 Abiotic stresses such as drought, salinity and extreme temperatures are the primary causes of crop loss worldwide. Consequently, in plant biology abiotic stress has become a major research area. Abiotic stress is, however, not restricted to agriculture. This paper is on abiotic stress related to plant tissue culture.

• **When plants are growing** under natural conditions, they are frequently exposed to very unfavourable environmental conditions. These concern among others water availability (too little or too much), mineral deficiency, mineral toxicity, and too high or too low temperatures. Plants have evolved a range of mechanisms to cope with such abiotic stresses. Understanding of these mechanisms is very valuable for agriculture because it helps to develop stress-tolerant crops.

Putative stress

The major natural stresses and their importance in tissue culture are summarized in table 1. Especially during various specific in-vitro treatments, abiotic stresses may occur, in particular heat stress during thermotherapy and cold stress during storage. In general, though, the natural stresses do not seem to be relevant in tissue culture. However, drought stress is very significant for tissue-cultured plants when they are transferred to ex-vitro conditions. The reason is that the water retention capacity of tissue-cultured plants is poor due to malfunctioning stomata. The rapid water loss from leaves formed in tissue-culture relative to leaves formed in the glasshouse is shown in figure 1.

Table 1 Occurrence of natural abiotic stresses related to tissue culture

Drought stress	Heavy drought stress occurs when tissue-cultured plants are transferred from in-vitro to ex-vitro conditions
Flooding	In bioreactors or when double layer is applied (double layer is a layer of liquid medium on top of a solidified medium)
Water logging	During in vitro rooting
Heat stress	During thermotherapy
Cold stress	During storage
Salinity	Does not occur
Mineral deficiency	May occur at the end of a subculture cycle
Mineral toxicity (including heavy metals)	May occur at the start of a subculture cycle

Many specific tissue-culture conditions are very unnatural so that they seem to be stressful at first sight. Putative in-vitro stresses are summarized in table 2. However, knowledge whether plants indeed experience these specific tissue-culture conditions as stressful is almost completely absent and intuition may be a poor guide. For example, the concentrations of inorganic nutrients in tissue culture are often referred to as being very high: MS has a concentration of inorganics of 4.3 g/l and a common ex-vitro nutrient solution (Hoagland's) has only ca. 1.6 g/l. In natural soils, the concentrations of inorganics are even far lower. In a provisional study, no indications were found for the putative stress by high levels of inorganic nutrients. When the concentration was kept low during the start of a subculture cycle and extra amounts of inorganic nutrients were added manually later during the culture to achieve the normal dose in MS, growth was not improved. This indicates that the initial levels were not inhibitory. However, at the same time it might be that other genotypes do experience such unnatural environment as stressful.

Protection

Plants have evolved a number of mechanisms to cope with stress. Some types of stress are 'predictable', in particular climatic stress. Many plants develop dormancy to survive adverse climatic conditions for instance cold winters or dry summers using special stress-resistant organs such as dormant buds and seeds. To prevent damage by unpredictable stress, plants accumulate protective compounds. The accumulation of proline and glycinebetaine during drought stress are known for a long time. Other small molecular compounds, especially polyamines (putrescine, spermidine and spermine) and the sugar trehalose, play important protecting roles in many species. Also macromolecules, in particular proteins, may act as protectants. A major function of all these compounds is to protect vulnerable macromolecules (proteins, membranes, nucleic acids). Molecular biologists have transformed plants in such a way that they overproduce protectants. In many species it has been observed that the transgenic plants have become resistant to a range of stresses.

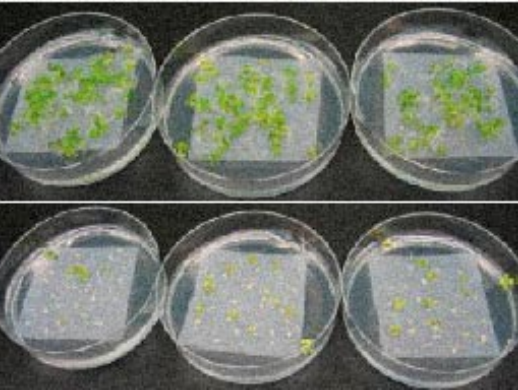


Figure 2. Arabidopsis after severe drought stress. The seedlings were kept for 150 minutes in a Petri dish on dry filter paper on top of blue silicagel. Before the drought-stress treatment, the seedlings in the upper three dishes were pre-treated for 2 days with 20 mM putrescine. The seedlings in the lower three dishes are the control that were not pre-treated with putrescine. In the control, less than 10% of the plantlets survived; in the putrescine-treated ones, survival was more than 80%.

Table 2 Abiotic conditions in tissue culture that are very unnatural and may cause stress

Head space	Very high humidity
	Accumulation of organic gases (e.g. ethylene)
	Large fluctuations in O ₂ and CO ₂
Medium	Application of high doses of plant hormones
	Application of sucrose /mixotrophic growth
	Toxic compounds in agar
General	Levels of inorganic nutrients that are initially very high and later on very low
	Low light intensity
	Culture of incomplete plants
	Wounding during subculturing
	Disturbance of natural gradients (e.g. auxin enters from the basal side; normally it enters from the apical side)

The low molecular weight protectants can also be sprayed over the plants. This has been done only incidentally because of major problems involved: the protectants do not permeate easily through the cuticle into the tissue and they are rapidly consumed by microorganisms. In tissue culture, though, they may be added via the media. When tissue-culture plantlets

are loaded with protectants in vitro before planting out, they turn out to be protected against the acclimatization stress imposed by the ex-vitro conditions. Thus, when rose and apple plants had been cultured on medium with protectants just before planting, they performed ex vitro much better. In a similar experiment with lily bulblets, we expected no major ef-

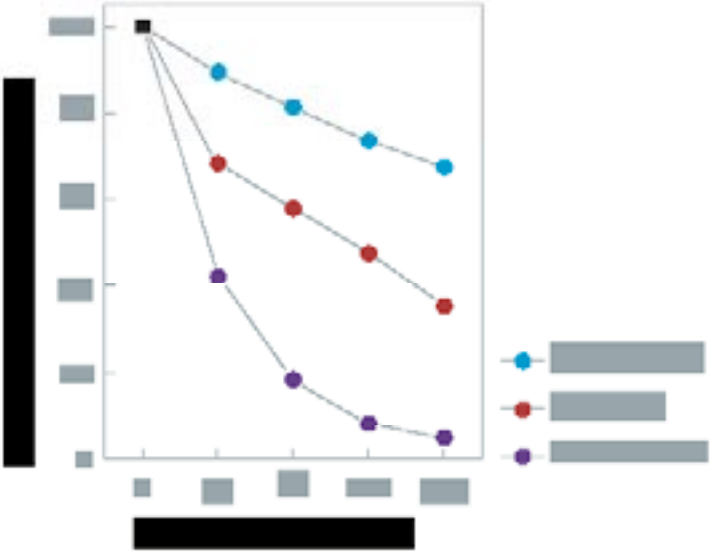


Figure 1. Loss of water from detached leaves. In vitro leaves very rapidly loose water (after two hours more than 90% of the water is lost). Persistent leaves (leaves formed during tissue culture that survived acclimatization) also loose water rapidly. Leaves formed ex vitro showed only little water loss.

Variation, hyperhydricity and recalcitrance

32 The experiments reported in this paper have been carried out in the former Center for Plant Tissue Culture Research in Lisse, the Netherlands, and in Plant Research International, Wageningen. The experiments have been carried out by Jolanda ter Brugge, Agata Ptak and Anne Bremkens.

fects since bulblets are supposedly stress-resistant. However, all three lilies tested showed improved growth with one, Pésaro, reaching almost double growth. Figure 2 shows protection by putrescine against drought stress in Arabidopsis seedlings. The most straightforward way to obtain protection is the addition of the low MW compounds, but there are several other ways that are summarized in table 3.

Knowledge

In conclusion, in normal tissue culture abiotic stress may occur because the conditions are very unnatural. Whether these conditions are experienced as stress possibly depends on the genotype. Unfortunately, our knowledge is virtually nil. It has been hypothesized by researchers that problems such as hyperhydricity (vitricification), epigenetic and genetic variation and overall recalcitrance are caused by the specific tissue-culture stresses. When tissue-culture plants are exflasked they suffer from heavy (drought) stress and measures to reduce the negative effects of stress have

Table 3 Measures to protect plants from stress

Addition of protective macromolecules such as polyamines, proline, glycinebetaine, and trehalose. Addition may be either by straightforward addition or by transformation with suitable genes
Addition of signal molecules that are known to be involved in the natural stress reaction
Application of a soft stress before the severe stress
Culture in the dark to avoid the production of reactive oxygen species

been shown to have significant positive effects during acclimatization. Whether similar measures may solve problems like hyperhydricity, somaclonal variation or recalcitrance to growth remains to be examined.

specialists in manufacturing seed processing equipment

40 YEARS
1967 2007
WORLDWIDE INNOVATION

Meet our sales manager, Mr. Paul Knoonen, at the ISF World Seed Congress in Christchurch.

Seed Processing Holland BV
Zoutketen 12, P.O.Box 32
1600 AA Enkhuizen
The Netherlands
Tel: +31(0)228 353000
Fax: +31(0)228 353001
Email: info@seedprocessing.nl
Internet: www.seedprocessing.nl

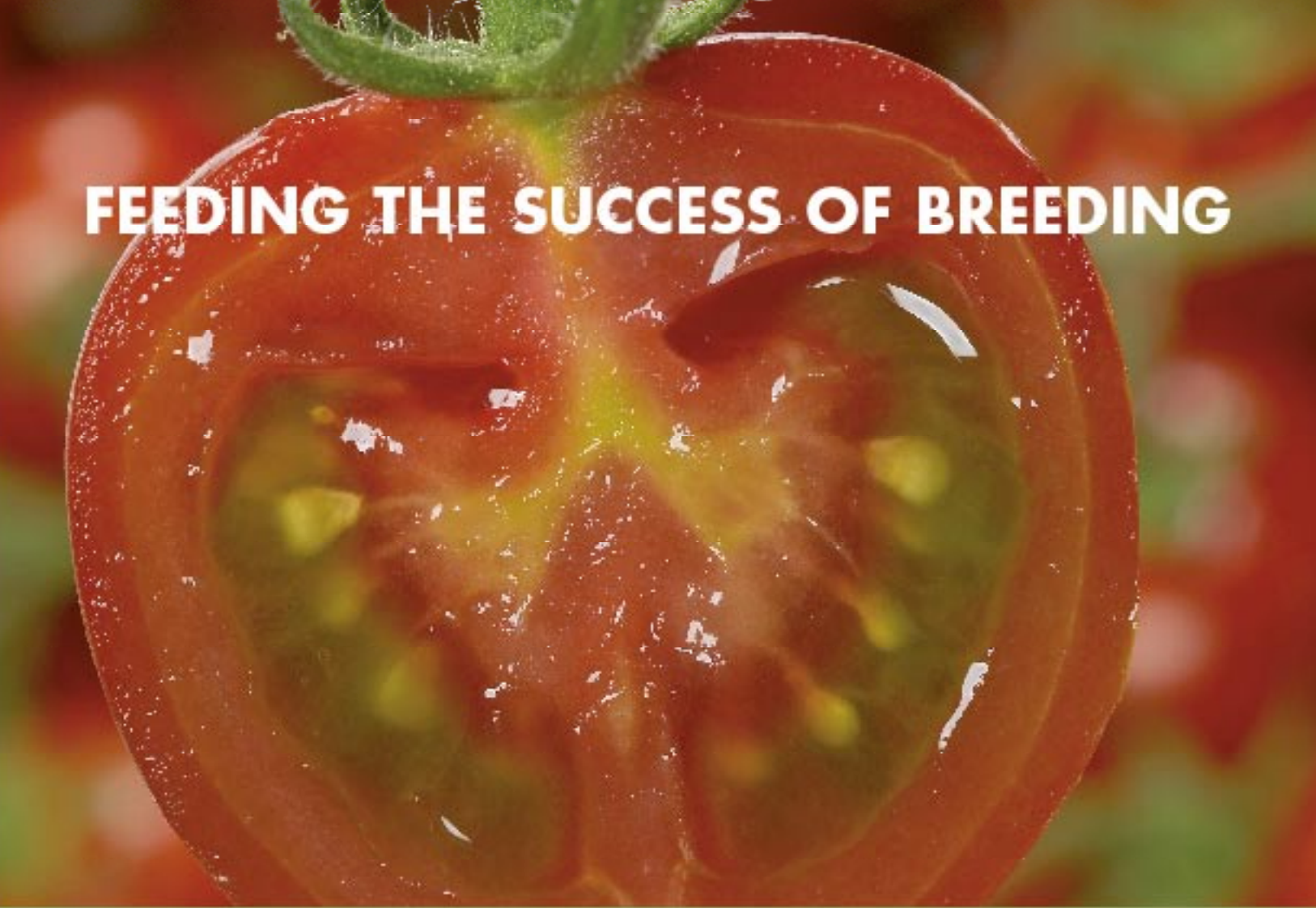
NEW!

Film coater & integrated dryer

Seed threshing equipment
Seed extraction equipment
Seed drying equipment
Seed technology equipment
Seed quality control equipment
Laboratory seed cleaning equipment
Seed fine cleaning equipment
Seed pelleting equipment
Seed film coating equipment
Seed counting, weighing and packing equipment
Storage and transportation equipment
Dust suction equipment

Individual equipment
Complete processing plants
Research and development
Engineering
Training
Turnkey projects

SEED PROCESSING
HOLLAND



DE RUITER SEEDS

HYBRID SEEDS



Quality and efficiency of procedures tackled

Peter Lentjes and ArndJan van Wijk

34 For years, Naktuinbouw has been involved undertaking training, seminars and meetings in China in relation to plant breeders’ rights. This year the cooperation was intensified. In a two-year project technical expertise on variety testing will be transferred to the Chinese counterparts. The goal is to streamline procedures to improve the quality and the efficiency of the Plant Breeder’s Rights system in China.

The Netherlands general inspection service for horticulture Naktuinbouw carries out the supervision and the statutory inspections of propagating material as prescribed in European directives and in Dutch legislation (Seeds and Plant material Act). Furthermore, Naktuinbouw is the leading European organization in DUS (Distinctness, Uniformity and Stability) testing for vegetable, ornamental and agricultural crops. A broad team of experienced specialists in these crops works at its headquarters in Roelofarendsveen and at its department in Wageningen. When the Dutch government decided to stimulate scientific and technological collaboration between the Netherlands and China, it was no more than logic it turned to Naktuinbouw. Together with Plantum NL, the Dutch association for breeding, tissue culture, production and trade of seeds and young plants, and two Chinese parties, they developed a plant breeder’s rights project in China in 2007 and 2008. The so-called Asia Facility for China of the Ministry of Foreign Affairs funds the project. It involves the transfer and exchange of knowledge and skills and aims at creating a long term relationship between the parties involved.

Partners in co-operation

Naktuinbouw has been involved in training, seminars and meetings in China in relation to plant breeders’ rights in past years. The Asia Facility gave the opportunity to intensify this work. Together with Plantum NL, Naktuinbouw has drafted a project proposal aimed at improving the technical knowledge and procedures surrounding plant breeder’s rights in China. The proposed project was recently approved and will be implemented in 2007 and 2008. The Chinese partners are the Development Centre of Science and Technology of the Ministry of Agriculture (responsible for organising the plant breeder’s rights tests) and the Institute of Vegetables and Flowers (in Beijng) of the Chinese Academy of Agricultural Sciences, one of the most important of the fourteen DUS testing stations in China.

Plant breeder’s rights in China

In March 1997 the People’s Republic of China introduced an active legal system of Plant Breeders’ Rights (PBR). The system was named ‘Regulations

of the People’s Republic of China, the Protection of New Varieties of Plants’. It was based on the 1978 version of the Act of the UPOV Convention. China officially became a member of UPOV in April 1999. The PBR system has been introduced in China through the strong initiative of the Chinese central government in Beijing, in close collaboration with provincial and local Governments. In China, there are two main authorities that operate separate plant variety protection schemes and therefore are responsible for a distinctive part of the entire gamut of species that requires protection for the rights of breeders that have developed these species. The Chinese Ministry of Agriculture (MoA) - the Office for Protection of New Varieties - is responsible for the protection of new varieties of: vegetables, ornamental species, cereals, fruit crops and grasses. During the period April 1999 and February 2006, protection has been gradually extended to a total of 62 genera and species. The MoA has 14 DUS testing stations. These DUS stations are located in the following areas and are each having the following crops to conduct tests on:

- Harbin DUS Testing Station, located in Heilongjiang Province: cereals, potato;
- Gongzhuling DUS Testing Station, located in Jilin Province: cereals;
- Beijing DUS Testing Station, located in Beijing: vegetables, flowers;
- Jinan DUS Testing Station, located in Shandong Province: cereals, cotton, field vegetables;
- Yanglin DUS Testing Station, located in Shan’xi Province: cereals;
- Urumuchi DUS Testing Station, located in Xinjiang Ugor Autonomous Region: melons, cotton;
- Xinin DUS Testing Station, located in Qinghai Province: cereals;
- Nanjing DUS Testing Station, located in Jiangsu Province: cereals, oil seed rape;
- Shanghai DUS Testing Station, located in Shanghai: vegetables, flowers, ornamentals;
- Hangzhou DUS Testing Station, located in Zhejiang Province: rice;
- Chengdu DUS Testing Station, located in Sichuan Province: cereals, oil seed rape, vegetables;
- Guangzhou DUS Testing Station, located in Guangdong Province: rice, vegetables;

One of the benefits of the plant breeder’s right system is that new, foreign ornamental species have been introduced

- Kunming DUS Testing Station, located in Yunnan Province: cereals, oil seed rape, flowers, ornamentals;
- Danzhou DUS Testing Station, located in Hainan Province: subtropical species.

The State Forestry Administration (SFA) is responsible for the protection of new varieties of: forest trees, bamboo and woody rattan, woody ornamental plants (including among others roses), fruit trees (dry fruit), woody oil-bearing plants, plants used for condiments and woody herbs. During the same period between April 1999 and February 2006, the protection of new varieties under the authority of the SFA has gradually been extended to 78 genera or species.



The State Forestry Administration has established the Office for the Protection of New Varieties of Plants for the administration of plant variety protection. In March 2007 Plant Breeders’ Rights in China are applicable to a total number of no less than 140 agricultural, horticultural and forestry crops. More species will be added in the course of 2007.

Benefits of the PBR system

In recent times, a substantial number of awareness-raising campaigns have been organized at various levels. As a direct result one can say that recognition of the PBR system is steadily increasing among commercial Chinese breeders as well as among Chinese farmers/growers of various crops. Looking at the reality on the ground today, one can say that although China’s RVP systems have been in operation only for a limited number of years, the following effects can already be observed:

- There is a distinct increase in the number of varieties that are now available for Chinese farmers and consumers, both in major staple crops and in horticultural crops, including traditional flowers.
- The total acreage planted with protected varieties that are new to China has rapidly increased. This in itself is a clear indicator of the level of improvement in the usage of better varieties, and the application of these varieties will (and indeed does) cause an increase in productivity in the crops concerned.

- Commercial breeding activities in Chinese public research institutes as well as in domestic seed companies show a noticeable upsurge.
- New foreign varieties have been introduced, in particular the segment of ornamental species (cut flowers and plants), that are both new to the Chinese market and quite often meant for exports as well.
- A number of new ventures has been initiated and existing seed companies and young plant companies have expanded their operations.
- Breeders have seen their income increase. This includes public research institutions and agricultural universities. As a consequence, further investment in plant breeding has been encouraged.

In the wake of these developments, it is of great importance that the technical and administrative knowledge in the field of PVP/PBR is - where necessary - strengthened and maintained at a high level so that there will be no impediments for foreign companies interested in selling their propagating material in China, to apply for PBR in the country. The agricultural industry in China will benefit tremendously from this development.

Endorsement

The Chinese government also wants to improve implementation of the plant breeder’s rights system. There is a general tendency in China of growing interest in the principle of ‘protection of intellectual property’. The government wants to encourage the transition from ‘Made in China’ to ‘Invented in China’. For this reason, the project proposed by Naktuinbouw and Plantum NL is highly valued by the Chinese authorities. The government is convinced that a solid plant breeder’s rights structure will release better varieties from abroad to Chinese farmers and the horticultural sector and that it will stimulate breeding activities in China. The start of the project in 2007 will include detailing the experiences of Dutch and Chinese companies with the PBR system in China. Plantum NL will co-ordinate this inventory and will actively involve the Dutch business community. The Chinese system will be compared to the Dutch system and the differences and similarities will be explained during a study visit of Chinese representatives to the Netherlands. Recommendations will also be made to streamline procedures in China. Subsequently, the project will emphasise the technical training required to implement plant breeder’s rights research at the fourteen testing stations in China, including the development of test protocols.

For more information: Peter Lentjes (project co-ordinator), phone + 31 (71) 332 61 36, email p.lentjes@naktuinbouw.nl

New plant breeding group has lowered its threshold

Florentine Jagers op Akkerhuis

36

In the summer of 2005 plant breeding researchers at Wageningen University and Research Centre have joined forces. Since then, staff members of the Laboratory of Plant Breeding and of the Plant Research International Business Unit Breeding and Diversity have focussed together on five themes. The results are promising. “Good research has again become more important than money”, says head of the department Richard Visser.

Plant breeding is as a matter of fact a hybrid science”, says professor Richard Visser. “On the one hand it is almost craftsmanship, while on the other hand it concerns itself with fundamental scientific questions. You could compare a breeder to a dentist, as that profession also demands skill as well as scientific approach to increase knowledge.” The merger of the Laboratory of Plant Breeding of Wageningen University and the Plant Research International Business Unit Breeding and Diversity was therefore a logical step. Fundamental and applied science and education have come closer together in the new group named Wageningen UR Plant Breeding. The establishing of the group took however some doing. “We have mixed different blood types and that is always complicated”, says Richard Visser. “People sometimes poached on each others territory. On the other hand it turned out that the groups complement each other quite well. Now, nearly two years from the start, we have a firm base with which we can optimise research.” The cooperation in Wageningen UR Plant Breeding fits within the overall picture of reorganisation of the university. Five years ago the Plant Sciences Group was established and the research in this field is divided into three subdivisions: Wageningen Univeristy Plant Sciences, Plant Research International (PRI) and Applied Plant Research (PPO). The new Plant Science Group will move to the new campus, which is under construction.

More efficient

“Research is number one on the list again in the new group”, says Richard Visser. “That sets a completely different trend. In the old situation we struggled with declining finances and researchers devoted much time to cover the funding of their projects. Now we have joined forces we are more efficient and we can focus on what we really should do: developing new knowledge and educating students. The two groups partly worked on the same themes and partly on complementary ones. We have brought the laboratories together and that clearly gives advantages. But of course it is still important that the financial picture is fitting.” In the old situation the university was focused strongly on the quantitative aspects of breeding and

selection, while PRI concerned itself with biodiversity and applied sciences. Some 150 people are working in the new group, of which a third are students with scholarships. The fact that a large part of the employees are not employed on a permanent basis makes it easier to cope with fluctuating incomes.

Themes

Research in the new group is organised around five themes, namely:

- abiotic stress, such as drought, salinity or a changing climate;
- biotic stress caused by diseases and pests;
- growth, development and quality, such as plant morphology and the development of organs. Special focus is placed on ornamentals and the bio-based economy;
- inventory and use of biodiversity and genetic variation, on plant as well as molecular levels;
- quantitative aspects of breeding, such as the development of statistical models.

“Per theme we work on several crops groups”, explains Richard Visser. “The first two themes are the most important and take about half of the total work we do. We distinguish biotic and abiotic stress because of the huge differences in questions and methodologies.”

In general, the breeding research in Wageningen concentrates on three major crop groups: the Solonaceae (potato, tomato, sweet and hot pepper), Brassicaceae and barley. “We have chosen these groups as we have an extended collection of plant material available. That is our treasure trove. Nowadays it is virtually impossible to have a broader scope.”

Spider in a web

Research however does not restrict itself to these three crop groups. “We actually also research other crops, but then the clients provide us with the plants and the knowledge on growing techniques. Our contribution in those research projects is the knowledge on genetics, molecular biology or the physiology of the processes involved. If a question arises about the fruit size of cucumbers, we often are able to contribute and help breeding one step further. After all, we know how organs grow, what

Richard Visser: “If a question arises about the fruit size of cucumbers, we often are able to contribute and help breeding one step further”



37

the determining factors for growth are and on which genetic characteristics those are based.” Plant Breeding is a spider in the web in Wageningen and has many contacts with other institutes and organisations. There is for instance close cooperation with the Centre for Genetic Resources and the Centre for BioSystems Genomics, which can both be found in Wageningen. Besides, the Plant Breeding Group is part of the virtual community Green Genetics.

Low thresholds

Plant Breeding also closely cooperates with the business community. “At the moment we have many precompetitive projects,” Richard Visser explains. Sometimes research is so expensive that one company alone cannot afford it. The only way to have it done is when companies join forces and bring up the funding together. Afterwards the participants can proceed with the research themselves, as competitors and market the new products individually.” Besides there are several bilateral collaborations with larger and smaller breeding companies and with foundations. For all projects clear agreements are made up about publication rights, proprietary rights and confidentiality.

“Companies should realise however that we are an academic educational institute and that means some provisions have to be made. Furthermore we have to guard our name. We would not like to have the image that we are the gate of one or another multinational. We want to be an institute with low thresholds where anyone with questions on breeding can enter the door. We are interested in the more simple traditional breeding questions as well as in molecular research, for which knowledge on market technology or genomics is necessary. In the Netherlands our group is the only place where scientific research on breeding takes place. I have the impression that the business community, whether small or large companies, know how to find us”, Richard Visser concludes.

Specialised software increases production control

Monique Krinkels

38 Today, more and more seed production techniques are known and they take place under increasingly sophisticated conditions. That was the reason software company HAPit rebuilt the production module of its software programme from scratch. Together with production managers of several seed companies the company created highly specialised software.



In a greenhouse all observations can be entered on a PDA which will later be uploaded in the system

• **Creating a production module** that is custom-made for the seed industry, was the goal HAPit set itself. From the start users were invited to make their wishes known. “We used to work with a system based on Microsoft Excel and other database-like programmes. It was far from ideal, especially as production companies had their own registration systems”, says Hans van den Berg, seed production specialist at De Ruiter Seeds. “Moreover, since we are a ISO-certified company we need to record all processes meticulously. We have listed all the elements that are important to us. I expect that these functionalities will all be incorporated in the software. We have high expectations of this new production module.”

Seeds only

The new production module has been developed for seed production only, whether it is a seed company or a specialised production company. “In this respect the module is unique. Of course not every seed company has exactly the same production process, but the system is flexible, so it can be adapted to the procedures a specific company is used to”, expects Hans van den Berg. The module fits within the Agro Business System (ABS) programme HAPit developed earlier. ABS supports all business processes that are needed in a seed company, with the exception of breeding activities. As soon as a new variety is created and seed of the parent lines is available, ABS starts to register and monitor all processes. This includes the multiplication of the parent material, the necessary quality tests, sales forecasting of the varieties, planning of the future production needs, production contracting, the receipt and processing of the seed, the procedures in the laboratory, inventory management and finally booking and shipping sales orders to customers. The philosophy behind the new module is to increase the control of the production quantities and qualities of seed. The software solution is designed to work very flexibly, able to work with limited information, helpful in controlling and completing the production process and easy to change the process upon demand of the user. Furthermore the flow of

information, like the status of orders, assignments and realisation of the production, will be transparent from one subsidiary to another in the same group. The management can use the same information as a steering instrument to increase business control.

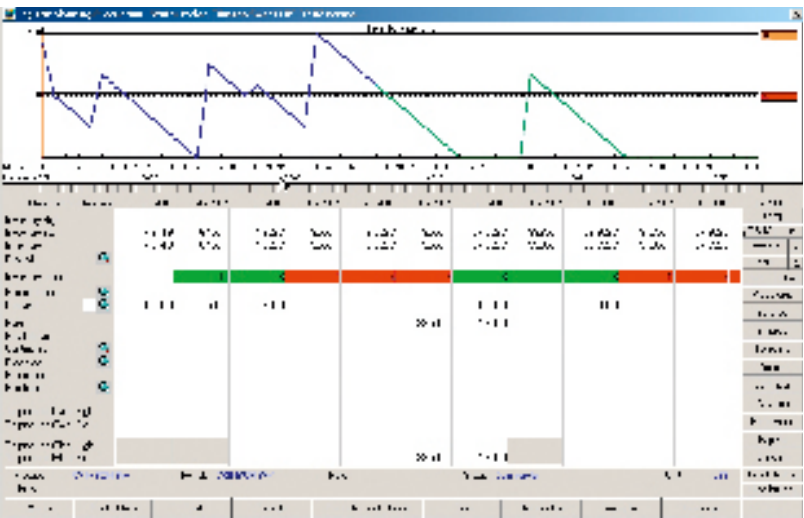
Flexibility

“HAPit is a Dutch software company that stemmed from the seed industry”, explains co-founder Henk van Wielink. “My colleagues and I have all been working for over 15 years in seed companies ourselves. That is why we understand the needs of these companies so well and why we are able to build a module that needs little or no adjustments of the procedures a seed company is already used to. The principle of the new production module of ABS is that all activities involved in the seed production process will be monitored.” The list of functionalities comprises among other things contracting, basic material inventory control, plant raising, plant allocation, field capacity planning, field follow-up, invoicing customers and making an historical analysis of production fields and materials. For the production of seeds the information needed is centred around three cornerstones: the variety, the field where the production will take place and the contract between the seed grower and the seed production company. At the start of the process the production company usually does not have all information needed for production. Most likely information regarding only one cornerstone will be available at a time. The module will handle this limitation by helping the user to find its options with respect to the other cornerstones when available and offers therefore maximum flexibility.

Monitoring production

Before the production process starts, all activities can be planned in time and resources, including for instance quality inspections. ABS will monitor the planning as well as the results and findings. Results and findings in the field will be made available in the system when local teams have uploaded new information from their Personal Digital Assistant (PDA)’s into the system. Based on these results additional actions can be initiated and planning can be adjusted.

Everyone within the seed company and at the seed producers knows exactly what to do



One glance at the production planning makes clear what the inventory is

Inventory management on basic material in the production process is a crucial issue as this material is very expensive. The production module makes sure that this is arranged in the most efficient way. ABS calculates, according to the production plan and the circumstances of the production, the exact quantity of the basic material to be used. First, when young plants have to be grown, ABS checks the correct quantity of seeds to be used and the allocation of the right plants to the right production fields. During production the fields will be inspected regularly. Usually the observations are noted in writing and later copied to a production administration file in order to be able to consult these details later. The new production module has completely automated this process. As soon as the location of the production field is known, it is registered in the software system and automatically the system suggests a list

of activities and observations that need to be done during the entire growth on that specific field. Dates of the activities are also suggested in plan. This list can be created based on different production protocols, depending on the species, the variety, the production area and the production technique. Before a production specialist visits a field, he will download all planned activities, including observation lists to a laptop or a PDA. During his visit he can verify the details of the field. The exact location can be registered using a GPS. With pre-defined result codes he can record his observations, create new activities and observation for the future and schedule a next visit. Afterwards all information can be uploaded into the software system with one push on a button.

Optimising stock

Customers tend to postpone their choice of varieties until the last moment. This means that the planning of the seed quantities needed has to be done with much uncertainty. On the one hand a sufficient amount of seeds need to be available in time to avoid missing sale opportunities. On the other hand, stock is unwanted because of loss of quality and obsolescence. The registration of the actual production data is therefore crucial and the information is needed real-time every day. With electronic registration of data and its transfer, the guarantee of having information timely available is secured. “We believe this module will improve communications within the seed company and between us and seed producers. It will secure our processes better and improve our performance”, concludes Hans van de Berg.

A hard act to follow (sometimes)

Wilbert Hetterscheid

40 This year the world celebrates the Tercentenary of the birth of its best-known taxonomist ever: Carl Linnaeus. This Swedish professor invented a new, logical ordering system and laid the foundation for an entirely new classification of plants, based on their reproduction. Linnaeus' well-known system for naming is still the international standard.



1737-2004: From Species Plantarum to the International Code of Nomenclature for Cultivated Plants



known at the time as a good place to study and publish science. Shortly after his arrival Linnaeus gained his PhD at the University of Harderwijk (no longer in existence). His subsequent 3-year stay in the Netherlands brought him world fame.

Cataloguing plants

An important period during Linnaeus' stay in the Netherlands was that of his assignment (1735 – 1737) as personal physician to the rich merchant George Clifford. During this period he was asked to catalogue all plants in Clifford's garden called 'the Hartecamp', near Haarlem. Linnaeus studied and described the plants on the estate and collected herbarium material.

Life and career

Born in 1707 in Sweden, Carl Linnaeus (his birth name) was destined to become a vicar like his father. He went to high school where a teacher noticed his interest in plant sciences and convinced his parents that Carl had better follow a medical career than theology. He went to the university in Lund but after only one year he found that Lund didn't have enough to offer, so he left for Uppsala. There Linnaeus managed to win the trust of two important professors of medicine, Olof Rudbeck the Younger and Lars Roberg. Linnaeus collected many kinds of natural history objects and started to dream about changing science forever by focusing on order. In order to get his PhD, he was required to study abroad and Linnaeus went to the Netherlands,

• The binomial plant name system used by plant taxonomists today was born in the well-ordered brain of Carl von Linné, better known as Carolus Linnaeus. Although plant traders suffer from name changes they must realise that had Linnaeus not devised the binomial system, they might well be suffering today from even more complicated systems of 'shorthand' for plant names. Linnaeus came up with a vastly better system, still in use today.



In 1737 he published the plant descriptions in a book called Hortus Cliffortianus, a precursor for his world famous Species Plantarum of 1753. The actual Clifford herbarium prepared by Linnaeus is conserved for the larger part in the British Museum of Natural History in London, but approximately 500 original herbarium specimens are kept in the Netherlands in the herbarium of the Biosystematics Department of Wageningen University.

Binomial system

Linnaeus published his revolutionary hierarchal ordering system of life in his book Systema Naturae (1735), while still in the Netherlands. This hierarchical system of boxes-in-boxes was based, at least for plants, on sexual characters, notably the number and shape of the stamens. The most important category according to him was the species, and a box with a number of species together, based on a common character of the stamens, was called a 'genus'. A box of genera was a 'Family' and so on. There was also a box lower than the species, called the 'variety' (varietas), of which more will be said below. Back in Sweden, Linnaeus published his famous binomial naming system in 1753 in his book Species Plantarum, one of the most important publications in the history of science. Up to that time organisms were always referred to in writing and in oral communication by long cumbersome Latin sentences (so called 'phrases'). At that time Latin was the scientific language. Linnaeus had the good sense of creating a shorthand version of these phrases and reduced them to basically two Latin terms, by which every plant species could be referred to. Such a name, a 'binomen' consists of a first word referring to the genus and a second word indicating the species in that genus. The life of biologists instantly became a lot easier and the fine art of taxonomy (naming of taxa = groups of organisms) was born.

Cultivated plants

Linnaeus was a religious man and he believed species to be 'created' entities. He was well aware of the fact that cultivated plants were derived by man from existing species. As a logical corollary of this, he claimed that these cultivated plants themselves are not spe-

The first manuscript on Linnaeus sexual system



cies and he named them 'varieties'. These varieties (named or unnamed) should be assigned to species. In an important statement in his Hortus Cliffortianus (1737, preface), Linnaeus writes "...botany has been burdened and overborne by the system of varieties for long enough, especially in the recent period, to such an extent that very few, if any, agree as to what constitutes a species, or what a variety; and so the number of species has been lamentably enlarged. I wish the system of varieties were entirely excluded from Botany and turned over entirely to the Anthophiles [plant hobbyists], since it causes nothing but ambiguities, errors, dead weight and vanity." In this statement Linnaeus shows himself a keen observer of the mess created by treating wild plants (species) and cultivated plants (his 'varieties') in the same scientific context, which unavoidably leads to confusion. In Species Plantarum, Linnaeus officially separated the cultivated plants as varieties, assigned them to species and named them separately.

Errors

In 1764 Linnaeus repeats his disdain for cultivated plants in strong terms: "The grouping of cultivated forms under species is the task of beginners in botany, a qualified botanist studies species and higher taxonomic levels." Despite Linnaeus's strong beliefs, he was often unaware of whether a form was cultivated from a species or 'created' as a species. For instance he described Hyacinthus monstrosus as a species but this was nothing more than a cultivar of Muscari comosum. And the other way around he treated Prunus avium in 1753 as a variety to P. cerasus but changed it to a species in 1755. Thus, although his philosophy was clear, his practical implementation was far from consistent.

Carl Linnaeus: 'I wish the system of varieties were entirely excluded from Botany and turned over entirely to the Anthophiles, since it causes nothing but ambiguities, errors, dead weight and vanity'

In the final equation however it is Linnaeus who recognised the separate status of cultivated plants and consequently implemented this awareness in his Species Plantarum and so laid the foundation of cultivated plant nomenclature, even though it took a few centuries for taxonomists to start realise that this separation was essential.

Linnaeus' inheritance

Taxonomists after Linnaeus did not appreciate his separation of cultivated plants from wild plants and adopted the variety as a full classification category for both cultivated and wild plants (the present-day 'botanical variety'). This automatically led to the general custom of classifying cultivated plants and wild plants in the same way, being a continuation of the tradition to name all types of plants as Linnean entities, with full Latin names, a mandatory description and choice of a nomenclatural type etc. Even today we are confronted with full Latin names for plant groups that fully consist of cultivated materials. Despite a revival of Linnaeus's thoughts by Liberty Hyde Bailey (1918), who recognised 'indigenes' (species in the wild) from 'cultigens' (groups of plants consisting entirely of cultivated materials), taxonomists persisted in their classification and naming of cultivated plants as wild plants. After Bailey (1923) introduced the term 'cultivar' (cultivated variety), the way was paved for naming these entities separately. In 1953 the first nomenclature code for cultivated plants was published. Today, in 2007, the separation of cultivated and wild plants in terms of classification and nomenclature is slowly moving back to Linnaeus' philosophy but still hinges partly on impractical nomenclatural procedures for wild plants. A more radical separation was proposed by Hetterscheid & Brandenburg (1995). It is hoped that this separation will become well-supported in the near future because its main goal is to simplify and stabilise nomenclature of cultivated plants, something that would automatically have emerged earlier had Linnaeus' ideas been appreciated by taxonomists.

DNA-analysis adds valuable identification tool

Monique Krinkels

42 Comparing the morphological characteristics has long been the only way to irrefutably prove the identity of a crop. However the method has several disadvantages. It takes a great deal of time and it is difficult to explain the results to outsiders such as judges. In case of suspected infringement on breeder's rights DNA-analyses gives a quick answer.

• **When a case of suspected** infringement is taken to court there is one basic question that has to be answered beyond any doubt: Is the plant the variety that is protected or not? For years the contestants have had to rely on reports claiming that the morphological characteristics are similar. Recently the Netherlands inspection service for horticulture, Naktuinbouw, has offered DNA-tests as part of the Variety Tracer service. It gives breeders a more powerful weapon in their struggle to protect their varieties.

Valuable addition

"DNA testing is a valuable addition to our services", states Kees van Ettekovén, manager of the varieties and trials department at Naktuinbouw. "It is a fast and reliable method of establishing the genetic identity of a variety and therefore helps to attach a unequivocal name tag to a plant. Of course it does not replace morphological assessments. In case p.e. mutants the genetic difference may not be detectable in a DNA fingerprint. But a morphological test and the results of a DNA analysis can confirm and therefore strengthen each other." Kees van Ettekovén is pleased that Naktuinbouw now has a fully equipped DNA laboratory on its premises. "We use the AFLP-technique of Keygene. It is a technology that displays a random part of the genes, but it is very reliable. A huge advantage is that no special primers are needed. That keeps the costs on an acceptable level. If needed we can also use micro satellites. With this technique, it is possible to make the part of the DNA visible in which changes

The mutant Kalanchoe

A Kalanchoe was suspected to be a protected variety and therefore Naktuinbouw was asked to establish its identity. An inspector who specialised in this crop took the samples. Part of that sample was planted together with reference material and in due course the morphological traits were compared. At the same time DNA fingerprints were made. The conclusions of both investigations were similar. The suspected variety was not identical but the differences were small. It could be concluded that the suspected variety was an essentially derived variety.

easily occur. But the disadvantage is the type of primer that is needed. For the widely grown crops these primers are publicly available, but the costs to develop crop specific primers are immense." He says that he will use DNA analysis as evidence in an infringement case about six times a year. Not much if you consider the costs of the laboratory. "The simple fact that we have the opportunity to perform the analysis is often enough for an infringer to come to an agreement. What is the sense of going to court if you know beforehand you will lose? It is far better to come to an agreement with the breeder."

Swift

There are several drawbacks of identification solely based on morphological traits. For one reason, it is subjective. However hard anyone tries to make it more objective, in the end it is a persons eyes that notes the differences and similarities. A second drawback is that plants of the same variety may look different due to growing conditions. DNA is objective, can be repeated and does not depend on a persons experience. Usually DNA fingerprinting is combined with morphological testing, but that is not always possible. The 1991 Act of UPOV gives breeders the right to seize end products, but that is only possible if the identity can be established. Then DNA fingerprinting is the only viable way to identify a variety. Other examples are plants that take a long time to mature, for instance trees. You cannot wait until an oak tree produces acorns to compare it with a suspected acorn. It would take years, while DNA fingerprinting can do it in days or at most weeks. On the other hand the costs are high. "DNA fingerprinting with the AFLP technique will cost between 4.000 and 5.000 euro", Kees van Ettekovén estimates. "At least when the basic data is known. After all, every crop needs its own treatment. If micro satellites are used and specific primers have to be developed first, the costs can run up as high as 100.000 euro.

Easily accepted

A DNA fingerprint has more advantages. Judges have a weak spot for DNA. They are easily convinced



Not only knowledge of DNA-fingerprinting techniques, but also of sampling and choosing the right reference varieties strengthen a case in court

that the simple stripes on a sheet are the irrefutable prove of an identity. With morphological tests it is possible to create doubt, as it is hard for judges to fully comprehend the concept. On the other hand they are used in forensic investigations by the police, where the identity of individuals is also done by DNA fingerprinting. "Especially as we are an independent institute, we can give valuable expert witness and judges trust our opinions." That trust is not only based on its independence. Its expertise in related matters that also counts. Take for instance the sampling. If that is not done correctly, the conclusions can be challenged easily. The same goes, if the choice of reference varieties leaves doubts. "That is why breeders give preference to institutes such as ours above for instance universities. A university lab may be able to execute DNA fingerprinting in itself, they do not have the experience with the other matters involved in plant identification." Naktuinbouw is the only organisation in the Netherlands appointed by the government to carry out DUS (Distinctness, Uniformity and Stability)-tests for plant breeder's rights applications. The organisation is therefore a unique knowledge centre for this type of research. The knowledge of judicial systems in other countries also comes in handy. "In Anglo-Saxon countries we can act as an expert witness, but for instance

in Germany the proof is presented in court by the solicitor. That demands a different manner in which the conclusions are formulated."

Future

It is hard to believe that an organisation would establish a fully equipped DNA laboratory for only six infringement cases a year. "Of course we have not", agrees Kees van Ettekovén. "We use the lab also to create databases that can help us to better manage large reference collections. We are involved in a EU and LNV-subsidised research on potatoes to create a DNA database of the cultivated varieties. That will help to establish identities in the future." And in the future he sees other applications. "It may become possible to identify plant diseases. That would certainly help to make disease control much more efficient."

Novel drying systems beat traditional ones

44 The name Hoopman equipment & engineering might sound new, but the company certainly is not. It has a history of nearly a century. In 1911 the grandfather of the present owner started in engineering agricultural machinery. Today, the Hoopman Group has a specialised branch developing seed treatment machines. The latest novelty are two non vibrating fluidised bed dryers.

• The technology of seed coating has developed rapidly. The application of newly developed pesticides and fungal or bacterial antagonists has increased strongly and the coating technology has kept pace. However one problem has remained: of how to dry the seeds quickly after coating. “So far this has not received full attention”, says Jan Willem Hoopman of Hoopman equipment & engineering. “Often seeds are dried in a rather amateurish way. We therefore have developed two new drying systems.”

Automated systems

Hoopman equipment & engineering is a specialist in application equipment for seed. “Our novelty is that we have been able to combine the extreme rapid application advantages of the rotary coating principle with a connected non vibration fluidised bed system”, Jan Willem Hoopman explains. “The rotary coating system, while developed already in the early nineties of the last century, is still state of the art. The accuracy of pesticide application, the very short process time, and the ease with which one can learn to operate this machinery have made rotary coating equipment very popular. Drying however remained a problem. The chemicals are dissolved in water and that has to be removed. One solution, adding drying air into the rotary coater is not smart, as it would greatly affect the capacity of the system.” Hoopman therefore developed devices connected to the rotary coater. The result is two fully automated coating drying systems, one for pelleted seeds, the other for encrusted and filmcoated seeds. The seeds dry quickly and safe, keeping in pace with the coating machine, because of the highly efficient fluidised bed principle. The seeds freely float on a cushion of air, which ensures even drying. The application as well as the drying can be controlled by an easy to use touch screen panel and the recipes can be stored in its memory.

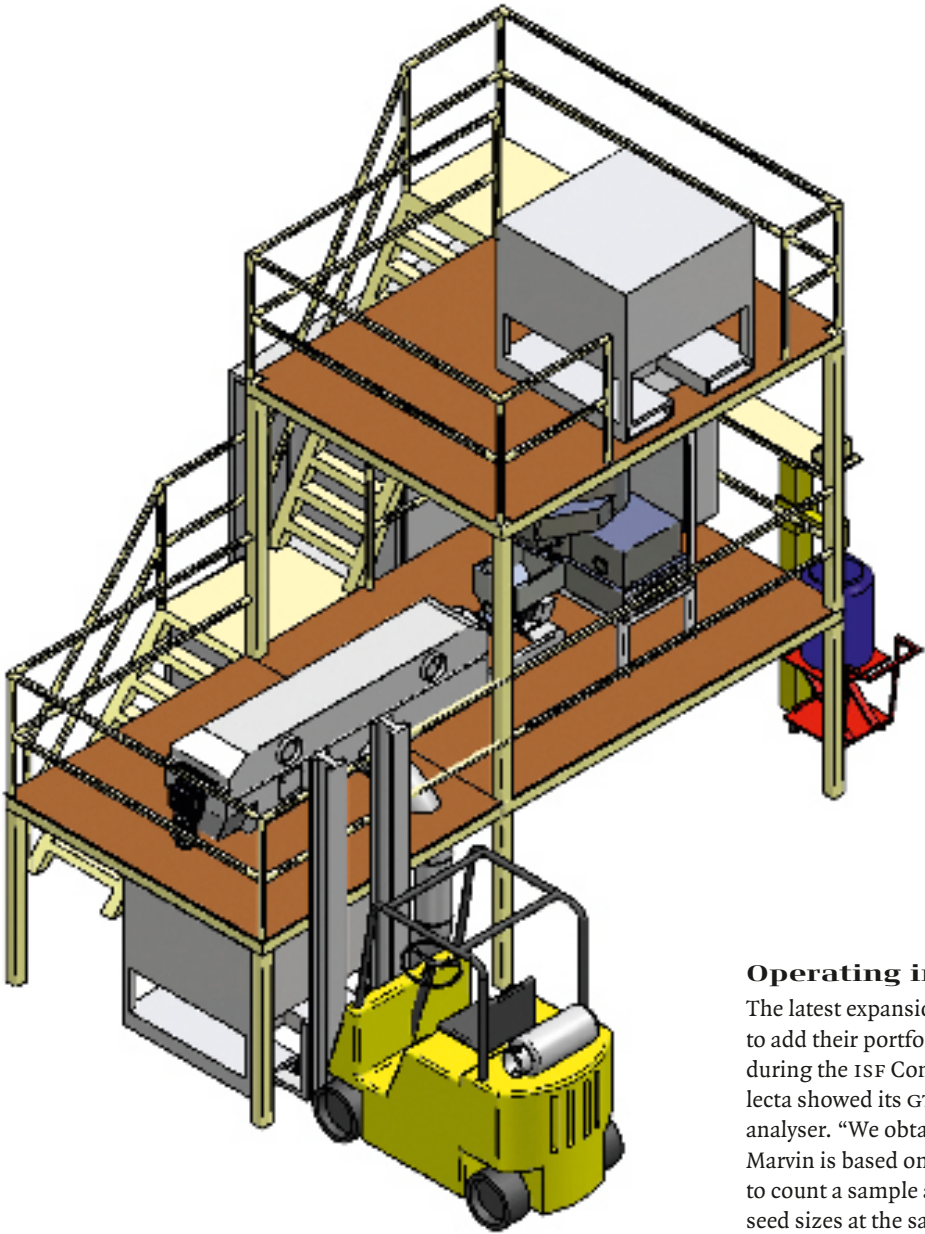
Rapid and compact

The automated batch fluidised bed drying system is suitable for combining coating and drying of batches of pelleted seeds. If pelleting takes for example 15 minutes, four batches can be dried in 60 minutes. There are several sizes of the drying system, for batches from 60 to 600 litres ready available.

Because of the simple and straightforward design, larger capacities can be relatively simply produced. The advantages of the newly developed machines are obvious. “Conventional belt dryers take enormous floor-space, use lots of drying air and are noisy, whereas vibrating fluidised bed systems are not only noisy, they are extremely costly too. Our non vibrating systems are neither. To tell the truth, I believe they are exceptionally compact and cost effective”, says Jan Willem Hoopman. Another advantage of the batch system is, that it provides continuous moisture control by weighing the batch during drying. That is far more accurate than humidity control. “And the hazard of inadvertently mixing seeds of different batches is greatly reduced as the dryer rotates upside down to make sure it empties completely.” The continuous rotary fluidised bed drying system has been developed for encrusted and filmcoated seeds. “Filmcoating has basically taken over all conventional powder or slurry based seed dressing. The challenge was to design a machine that is able to maintain a continuous flow of seeds. Our continuous rotary fluidised bed drying system does exactly that. It combines the speed and efficiency of a fluidised bed system with the speed and simplicity of a continuous rotary drum system.” Capacities for example available for encrusted grass are 100 – 1000 kg per hour with still very compact systems.

Expanding

It are but two of many seed treatment related machines Hoopman has designed during the years. A special division of the company shifted its focus from manufacturing agricultural machines in general to seed related equipment in the fifties. “My father acquired a licence from a German chemical industry to produce coating material for cigars. Our coating went to all the renowned Dutch cigar manufacturers. When coating technology became available for seeds in the late sixties, we added this to our portfolio. We developed the necessary chemical compounds and also the machinery. The next step was to offer the treatment of seeds to our customers. This eventually led to the daughter company IST, which was sold to Germain’s in 1998.” The company has been expanding in recent years. “In the end of 2005 we obtained Franken Agri & Seed.



In the demo lab of Hoopman the process of seed treatment and drying is demonstrated

45

Operating internationally

The latest expansion was the agreement with Selecta to add their portfolio to that of Hoopman. It started during the ISF Congress in Copenhagen, where Selecta showed its GTA/Marvin digital seed counter and analyser. “We obtained the exclusive sales rights. The Marvin is based on image analysis, making it easy to count a sample and analyse on two dimensional seed sizes at the same time at very high speed.” Soon after it was decided that the cooperation should be extended to all of Selecta’s seed processing and cleaning machines. “It is however only the sales and marketing activities we have taken over. As we are operating internationally, it was felt that we could better promote the Selecta machines outside the Netherlands. It gives them the opportunity to focus on innovative machine design, while we are able to offer our clients a complete line of seed related equipment.” Whatever the changes, Hoopman equipment & engineering remains a traditional machine manufacturer. “Our employees have hands-on knowledge and develop ingenious solutions for customers production challenges, often also by trial and error. Of course technical institutes and universities give their input nowadays and evaluate our findings. But all in all our pragmatic approach forms an important part of developing new machinery. One of the things I enjoy most is to give experts the space to experiment. That is the way many of our innovations as well as these new dryers came into being.”

New EU-countries assisted to improve inspections

Peter Lentjes

46 Before becoming member states of the European Union, countries have had to adjust their legislation to conform to EU requirements. But legislation alone does not suffice. They have to build up inspection, testing and registration systems, that fit within the EU standards and are assisted by organisations from other EU countries.

• The experience of Naktuinbouw, the Netherlands general inspection service for horticulture, built up in a history of over 60 years, is valuable for countries, building up their inspection, testing and registration systems. Therefore Naktuinbouw is often invited by new or (possibly) future EU countries to assist them with practical approaches and practical expertise. Since 1999 Naktuinbouw has been participating in projects aimed at supporting countries recently acceded to the EU or that hope to become members in future. These projects might be the so-called pre-accession projects, funded by the Dutch Ministry for Economic Affairs, or twinning projects, funded by the EC in Brussels. Aspects involved are inspection, variety testing and certification of propagation material for horticultural crops. Naktuinbouw considers it important to support new and prospective member states and hopes in this way to build up good contacts with inspection and registration institutions in those countries. Among other things, this will facilitate mutual and bilateral commercial contacts and problem free collaboration with these countries for the Dutch business community in the future.

Slovak Republic

In the Slovak Republic, Naktuinbouw supported the national inspection service UKSUP in an EVD-project in setting up a system of inspections and certification of fruit plants. Assistance has also been offered

in adapting the laws and regulations to the EU requirements. Inspectors have been trained. Theory has been explained, but most importantly practical on-the-job training has been given by Dutch inspectors, both in the Netherlands and at production sites in the Slovak Republic. In addition, help has been offered in composing a quality manual and working instructions for the performance of inspections. At Haniska, in eastern Slovak Republic, a test centre with laboratory has been set up for inspecting fruit propagation material and making it virus-free. Here, virus testing takes place and virus-free candidate plants are produced; the first step of the process to produce certified, virus-free fruit trees. The employees of the test centre have been trained for both field tests and laboratory research. The benefits of a well functioning production system for certified propagation material have been explained to the Slovakian fruit growers, both during symposia and open days at nurseries in the Slovak Republic, and during a study trip to the Netherlands. In this way, fruit growers are motivated to make use of this high-quality propagation material in their business. The project in the Slovak Republic concluded in 2005.

Turkey

The project 'Plant breeder's rights and quality propagating material' was run from 2004 by Naktuinbouw, together with NAK and the Board for Plant Varieties, the Turkish Inspection Service (VRSCC) and the Turkish Ministry of Agriculture and Rural Affairs (MARA). The project was funded by the EVD of the Ministry of Economic Affairs and lasted two and a half years. The Turkish government had indicated its intention to bring legislation relating to plant breeder's rights and the quality of propagating material more in line with EU-legislation. They also wanted to improve the technical expertise of inspectors and variety researchers. Naktuinbouw supported the Turkish sector in these aspects, partly because the outcome was important to the Dutch business community. Plantum NL was also involved in the project and was responsible for contacts with the Turkish seed industry association Türkted.

Naktuinbouw organised a field training on variety testing in Turkey



Assisted by Dutch experts in the project, the Turks have completed the regulations and legislation surrounding granting plant breeder's rights. This legislation now fully complies with the UPOV Convention. According to the Ministry, official membership of the UPOV will follow shortly. Advice was given on the new Plant and Seed Act. It took some time before this was dealt with by the Turkish Parliament, but at the end of 2006 this new act was passed. The process of drafting inspection protocols and regulations was already started in the beginning of 2006, in the framework of the aforementioned project. Plenty of energy was devoted to practical training of inspectors, laboratory staff and variety researchers. More than 100 people were trained in a series of sessions. In most cases, these people trained were the trainers of their colleagues (train-the-trainer programme). Important items in the final year of the project were the organisational and structural aspects and the responsibilities of each party in this triangular relationship formed by the Ministry, inspection services and the business community. The Turks are now considering the form these issues should be given in the future and are highly interested in the Dutch structure. In a new EU-twinning project, probably starting at the end of 2007, implementation aspects of the new legislation will get much attention.

Bulgaria

Bulgaria, acceded to the EU in the beginning of 2007, the inspection service EAVTFISC asked Naktuinbouw and NAK for support in a number of specific areas. This support was provided in an EVD short-term pre-accession (PPA-Short) project. It involved primarily variety testing on DUS so

that the varieties could be admitted to the National list according to the EU rules and plant breeder's rights for vegetables. Also the conduct of inspections for vegetables and seed-potatoes was an important item. Trainings on these subjects took place both in the Netherlands and in Bulgaria.

Romania

In Romania, another country that joined the EU in 2007, a large EU-twinning project is running, led by the Dutch Plant Protection Service in Wageningen. They have invited Naktuinbouw and NAK to assist with practical expertise in inspections and variety testing. Legislation is already well developed and in conformity with EU requirements. The assistance consists of practical training of inspectors in the field, advice on variety testing and support in drawing up procedures and working instructions. This is mainly carried out by visits of Dutch experts to Romania, but also by visits of Romanian experts to the Netherlands, to see the system functioning in practice.

Czech Republic

In the beginning of 2007, an EU-twinning light project was started on request of CISTA (the Central Institute for Supervising and Testing in Agriculture), in the Czech Republic. CISTA wants to improve the methodology for official control and certification of propagating material in hops, vines, fruit and ornamentals. The project is supervised by the Greek organisation NAGREF. On request of CISTA, the Greek project leader has asked Naktuinbouw for experts in the field of propagating material of fruit and ornamentals. First step in this project is to analyse the existing system and, consequently, to work on suggestions for improvements. This will be followed by practical training on-the-job of inspectors.



The planet turns greener rapidly

Monique Krinkels

48

The UPOV system of protecting plant breeder’s rights is now in operation on a worldwide scale, with almost 13,000 applications for protection each year. “It is encouraging to see that more and more developing countries are becoming aware of the economic benefits and are preparing their accession to UPOV”, says Rolf Jördens, vice secretary general of UPOV. “The continued expansion of UPOV over recent years has certainly been a most impressive development.”

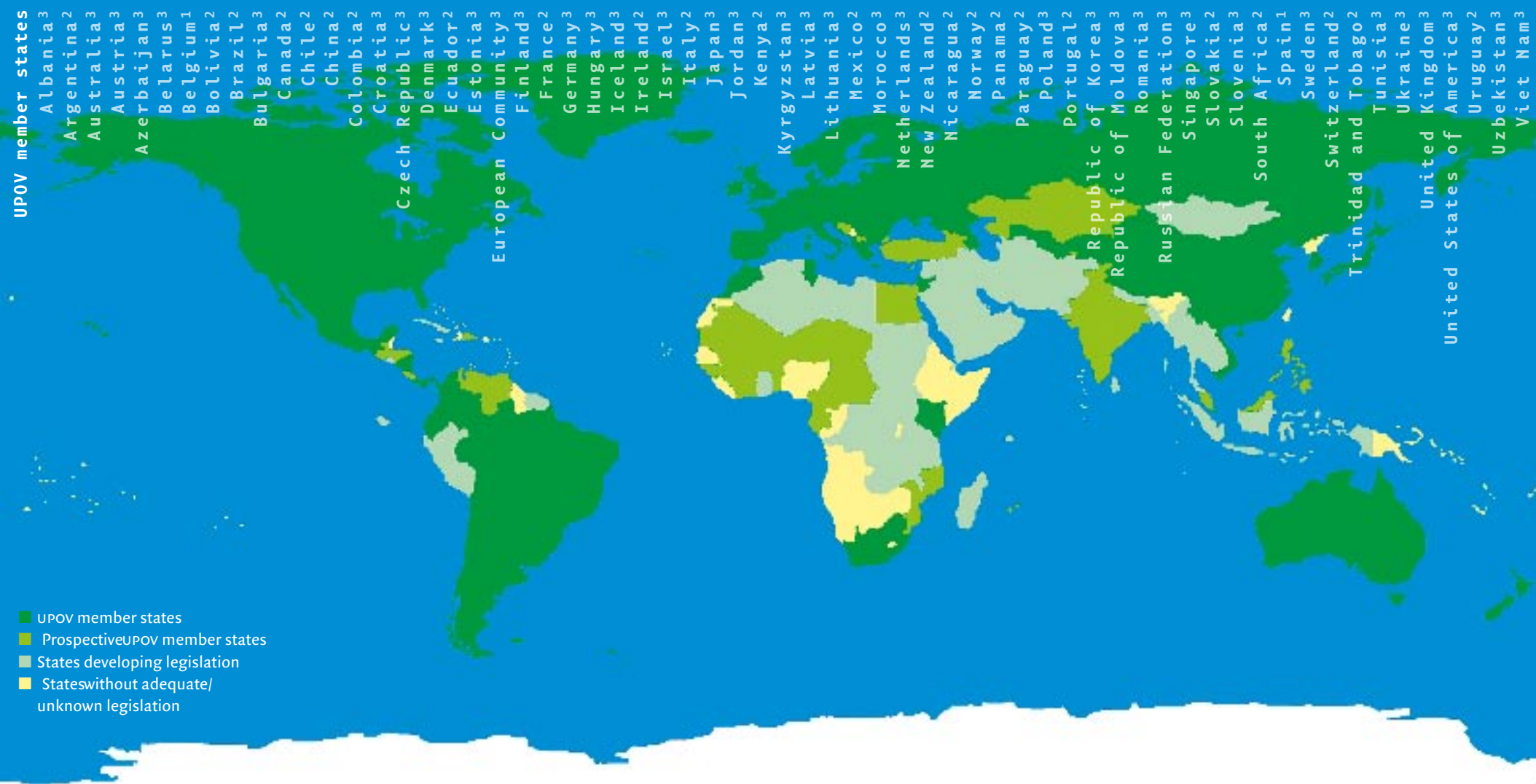
• **The International Union** for the Protection of New Varieties of Plants (UPOV) currently has 63 members, with one intergovernmental organisation, namely the European Union. The EU operates a supranational Community plant variety rights system which covers the territory of its 27 members. Some 20 other states have initiated the procedure for becoming members of UPOV. The African Intellectual Property Organisation (OAPI), comprising 16 member States also seeks membership. Furthermore, over 40 states have contacted the office of UPOV for assistance in the development of legislation on plant variety protection. So far about 75,000 varieties are protected by plant breeder’s rights in accordance to the UPOV Convention. “The growth in membership of UPOV is also beneficial to the present members of UPOV since it opens up new business opportunities for international trade in varieties, seeds, and agricultural and horticultural products”, declares Rolf Jördens.

Advantageous

“Our recent publication ‘UPOV Report on the Impact of Plant Variety Protection’ demonstrates that plant variety protection in line with the UPOV Convention and membership of UPOV can open a door to economic development, particularly in the rural sector. The ways and the extent to which this happens may of course vary according to the particular

States developing legislation

States which have been in contact with the office of UPOV for assistance in the development of legislation on plant variety protection: Afghanistan, Algeria, Bangladesh, Bahrain, Barbados, Burundi, Cambodia, Congo (Democratic Republic of), Cuba, Cyprus, Djibouti, Dominica, El Salvador, Fiji, Ghana, Greece, Guyana, Indonesia, Iraq, Islamic Republic of Iran, Jamaica, Lao People’s Democratic Republic, Lebanon, Libyan Arab Jamahiriya, Madagascar, Malawi, Mongolia, Myanmar, Nepal, Oman, Pakistan, Peru, Saudi Arabia, Seychelles, Sri Lanka, Sudan, Suriname, Syrian Arab Republic, Thailand, Tonga, Turkmenistan, Uganda, United Arab Emirates, United Republic of Tanzania, Yemen, Zambia



circumstances of a country, but the overall picture the report sketches is strongly in favour of plant breeder’s rights”, says Rolf Jördens. The report is based on individual country studies in Argentina, China, Kenya, Poland and the Republic of Korea. Some very clear messages have emerged from this study, with perhaps the most important being that the introduction of the UPOV system of plant variety protection and membership of UPOV can open a door to economic development, particularly in the rural sector. A key conclusion is that the UPOV system of plant variety protection provides an effective incentive for plant breeding in many different situations and in various sectors, resulting in the development of new, improved varieties of benefit for farmers, growers and consumers. In Argentina the plant variety protection (PVP) system became fully compatible with the 1978 Act of UPOV in 1994. Since then the average annual number of titles granted to foreign breeders has trebled. The new, protected varieties showed an improved performance as can be concluded from the risen proportion of certified seeds. For wheat the acreage increased from 18 to 92 percent and for soybean from 25 to 94%. China’s PVP systems have only been in operation for five years and for a limited number of genera and species and it is not yet possible to evaluate their full impact. Nevertheless, a rapid uptake of new protected varieties can be observed. Farm-

- 1 1961 Convention as amended by the Additional Act of 1972 is the latest Act by which two States are bound
- 2 1978 Act is the latest Act by which 24 States are bound
- 3 1991 Act is the latest Act by which 36 States and one organisation are bound

ers have decided to buy the more expensive seed of staple crops such as rice, maize and wheat, the price of which includes royalties, in anticipation of a higher economic return. The new foreign ornamental crops have stimulated horticultural productivity and the export of these products. Kenya acceded to the 1978 Act of the UPOV Convention in 1999. Since then a significantly higher number of varieties have been developed and released across a range of agricultural crops and for maize in particular. The horticultural sector has been strengthened. A flower industry had emerged, but also in vegetables and industrial crops Kenya has proven to be competitive in global markets. Besides the number of Kenyan-bred varieties has increased. Many of these are in the hands of public institutions and local farmers can use the propagating material of the new, protected varieties under privileged conditions. Subsistence farmers for example have been permitted to exchange seed among themselves. In Poland a PVP system was introduced in 1987 and its development coincided with the reform of the Polish society from the planned economy to the market economy. Polish breeders have utilised the PVP system in major agricultural, horticultural and ornamental crops where it is important to support their breeding activities. It resulted in improved characteristics of varieties of crops important for Polish agriculture and horticulture, for instance

gerberas, potatoes and tomatoes. Besides the access to foreign varieties has improved, especially in the ornamental sector such as gerbera and rose. In 1997, the Republic of Korea introduced a system of PVP which conformed with the provisions of the 1991 Act and became a member of UPOV in 2002. Protection has gradually been extended and in 2004, 155 genera and species were eligible for protection. The introduction of PVP resulted in a large number of PVP applications by residents. Membership of UPOV was associated with a large number of PVP applications by non-residents, particularly in the ornamental sector. The introduction of new foreign varieties of ornamental crops such as rose, provided immediate benefits for the flower industry of the Republic of Korea. It is become one of the fastest developing sectors of agriculture in the country.

New members

“With regard to potential new members, UPOV focuses its assistance on those states and organisations which have expressed clear commitment to implement plant variety protection according to the UPOV Convention and to accede to UPOV”, Rolf Jördens explains. “UPOV approach with potential new members is to seek to raise awareness of the beneficial impact of plant variety protection, and to provide an understanding of the principles of the UPOV system for decision-makers and administrators.”

49

Prospective UPOV member states

States and organisations which have initiated the procedure for becoming members of the Union: Armenia, Costa Rica, Dominican Republic, Egypt, Georgia, Guatemala, Honduras, India, Kazakhstan, Malaysia, Mauritius, Montenegro, Philippines, Serbia, Tajikistan, The former Yugoslav Republic of Macedonia, Turkey, Venezuela, Zimbabwe, as well as the African Intellectual Property Organization in which Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Congo, Côte d'Ivoire, Equatorial Guinea, Gabon, Guinea, Guinea-Bissau, Mali, Mauritania, Niger, Senegal and Togo are united.

When requested, the office of UPOV assists in the drafting of legislation on plant variety protection and provides guidance on the accession procedure to UPOV. Regarding the implementation and operation of plant variety protection, UPOV, in cooperation with its members, organises training of administrators and technical experts. "The assistance may take the form of briefings of delegations at the UPOV headquarters, participation in the UPOV distance learning course, regional or national workshops and special training visits to plant breeder's rights authorities of UPOV members, coordinated and facilitated by the office of UPOV."

Furthermore, a number of UPOV members are running very intensive national training programmes on plant variety protection in which the office of UPOV is also involved. The Naktuinbouw in the Netherlands for instance organises a PVP course from June 4 to 15. This course includes: legal aspects, procedures and administration, technical aspects such as DUS-testing, the testing of names, assessment of novelty, the use of biochemical and molecular techniques, royalty collection systems and enforcing rights. "More advanced assistance is provided, for example, through guidance materials developed by UPOV, including the 'general introduction to the examination of distinctness, uniformity and stability', the 'Development of harmonised descriptions of new varieties of plants' and the crop specific test guidelines. A greater understanding in the operation of DUS testing is provided through participation, in an observer capacity, of potential new members in UPOV sessions of Technical Working Parties in particular."

Improving legislation

Little over half of the member states have acceded to the 1991 Act. This Act gives breeder's better opportunities to enforce their rights and limits farmer's privilege. It is therefore important that countries adopt legislation in accordance with this latest act. "Accession to the 1991 Act of the UPOV Convention of members bound by previous Acts is an autonomous decision of its members", believes Rolf Jördens. "In our contacts with members and during our information and training activities, the office of UPOV explains, as appropriate, the benefits of the 1991 Act." The same goes for the scope of protection. "The UPOV report on the impact of plant variety protection demonstrated that, in order to harvest the full benefits the system is able to generate, protection should be offered for all genera and species. One of the important advantages of the UPOV system is that this target is achievable for individual members thanks to international cooperation in variety testing based on harmonised and accepted UPOV principles. In our training activities, particular emphasis is given to the relevance of international harmonisation and cooperation in the framework of UPOV", concludes Rolf Jördens.



GTG
your flexible, responsive
and reliable partner

Germaist Technology Group, Global HQ
Hemba Road, Hemmick Industrial Estate, King's Lynn PE30 4LG, United Kingdom.
Tel: +44 (0) 1553 774012 Fax: +44 (0) 1553 773145 email: info@germaist.co.uk
For World Wide site locations, contacts and distributors go to www.germaist.com

Seed drying & equipment

AGRATECHNIEK BV from HOLLAND is specialized in drying all kinds of seed. We have more than 30 years of experience with Seed drying and processing technology



BOX/CONTAINER DRYING INSTALLATION
for all kind of seed



CONTINUOUS BOX DRYING INSTALLATION
for drying each container/box individually

ROTARY SEED-COATING MACHINE
for film-coating, encrusting, pelleting and insecticide coating



ECONOMIC STORAGE BOXES
All kind of seed, volume up to 3,5 m³ each



DRYER WITH DRAWERS AND TRAYS
Drying of flower seed and small amounts of basic seed



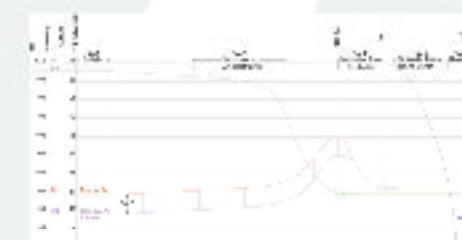
ROTATION DRYERS
for controlled drying of fruit-vegetable and primed seed



SEED CALIBRATION
Number of sizes available, silent, excellent calibration



HYBRID, ABSORPTION & CONDENSATION INSTALLATION FOR DRYING & CONDITIONING
Standard in any climate down to 5°C with 10% RH, specials also to -1-20°C and 20%RH



GRAPHIC DRYING PRINCIPLE
AGRA DRY-CONTROL

CABINET DRYERS
for Economic and controlled drying of primed, pelleted and coated seeds



Agratechniek b.v.
van Nieuwenhuizen

SEED DRYING INSTALLATIONS & EQUIPMENT

P.O. Box 91 • 1760 AB Anna Paulowna (The Netherlands)
Tel. +31 223 522824 • fax +31 223 521949
E-mail: info@agratechniek.com • Website: www.agratechniek.com



Takii Seed, High quality, Reliable, Innovative brand

A grain of seed harvested from one of the many production sites over the world, packed with great potential, turns to be a quality seedling, demonstrates its excellent characteristics and eventually gives excellent crop as expected.....we consider such seeds to be "high quality seeds"

TAKII SEED

Kyoto, Japan
www.takii.co.jp

TAKII EUROPE B.V.

De Kwakel, The Netherlands
www.takii.nl