

THE ANNUAL 2010

Journal for breeders and producers of plant material

# Prophyta

# AGRO BUSINESS SYSTEM

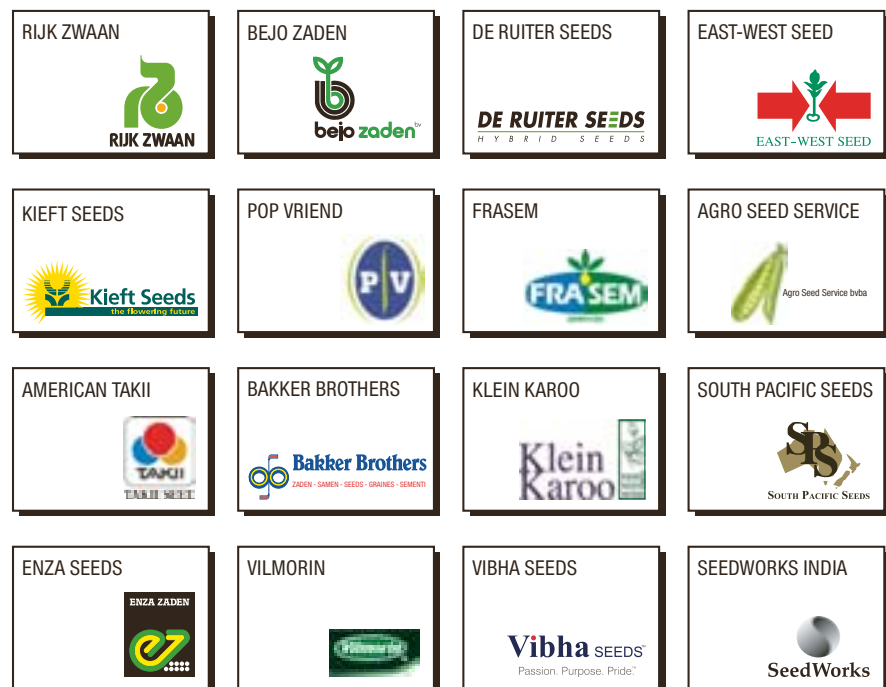
ERP SOFTWARE FOR YOUR SEED COMPANY

## The software for the seed industry

This ERP software has been specially developed for the seed industry and other producers of agro genetic materials. With over 10 years of experience we serve the leading companies of this branch.

ABS helps you to control your business national and international, and is designed to be flexible and to change on the demands of your company.

### They use it



We will welcome you in our stand.



# Contents

## Prophyta – The Annual 2010

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** Kees Van Ettekoven, Charles Frink, Geert-Jan de Klerk, Jaap Kras, Laura Rojas-Martinez, John van Ruiten, Hajo Strik

**COVER PHOTOGRAPH** Digidaan

**SUB EDITOR** Mireille McNutt

**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

info@prophyta.nl

www.prophyta.nl

© 2010 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.

- 4 In Short
- 5 Editorial
- 9 Prophyta Foundation
- 
- 10 World Seed Congress 2010  
Innovative Canadian farmers need ground-breaking breeders
- 14 Protecting Intellectual Property  
Anti Infringement Bureau offers a helping hand
- 16 Food for Life  
Starring the veggies
- 19 Tomato Seed And Plant Production  
Managing hygiene fends off invisible threat
- 22 Hyperhydricity in Plant Tissue Culture  
Drowning from within
- 26 AFSTA Celebrates its 10th Anniversary  
Seed organisation strengthens communication throughout Africa
- 29 Adventitious Presence  
Costs to prove GM-free status hard to bear
- 30 Wazalishaji Mbegu Bora  
Afrisem creates a win-win situation
- 32 Propagating Material and Biodiversity  
EU makes way for traditional varieties
- 36 On the Threshold of Changing Legislation  
EU attempts to reduce red tape and decrease bureaucracy
- 38 Green Biotechnology  
Making genomic breeding affordable for more companies
- 40 Lookalikes Or Essentially Derived Varieties  
Snow White is not a fairy tale
- 42 Why Plants Grow in Tissue Culture  
Questions, answers and exciting prospects
- 45 Seed Valley  
UC Davis creates cradle for new breeders
- 
- 46 Syngenta Seed Care  
New insecticide seed treatments prove innovative
- 48 Advantages of Scale Patently Obvious  
Monsanto sweeps the vegetable market

## Fleuroselect announces Gold Medal winners

FLEUROSELECT, the international organisation for the ornamental plants industry, has awarded two Gold Medals this year. The judges at the fifteen European trial grounds awarded the honours to the striking sweet pea, *Lathyrus odoratus* 'Villa Roma Scarlet' from Hem Zaden in the Netherlands, and the sizzling, orange-red *Zinnia marylandica* 'Double Zahara Fire' from PanAmerican Seed in the U.S.A. Since its establishment in 1970, Fleuroselect has brought the industry over 140 outstanding Gold Medal winning varieties from truly innovative breeders.



**'Villa Roma Scarlet'**  
'Villa Roma Scarlet' is the first *Lathyrus odoratus* to win the Gold Medal, impressing the twenty Fleuroselect European judges with its innovative, striking, bright colour, its overall attractiveness and its excellent garden performance. 'Villa Roma Scarlet' is an excellent addition to the current range of compact

*Lathyrus odoratus*. The variety is suitable for both professional and consumer use for container gardening, hanging baskets and for full-ground direct sowing. For plug production, the variety can be sown as early as January, and for direct sowing in the garden from April/May. The variety requires no staking or trellis work and flowers profusely and efficiently from July to September. With the advent of modern container gardening, compact sweet peas have risen to new heights of popularity. 'Villa Roma Scarlet' blossoms earlier than existing varieties, a real bonus for the professional *Lathyrus* grower. Containers of sweet peas are instant gardens and a striking container of these scarlet beauties will provide garden centres with high added retail value. Expert consumers will be able to purchase seed through the amateur packet seed market for home-sown success, while regular gardening enthusiasts can choose ready-made plugs or finished plants for home-grown gratification.

**'Double Zahara Fire'**  
*Zinnia marylandica*  
'Double Zahara Fire' is the first disease-tolerant zinnia. This Gold Medal winner has large, truly perfect, fully double flowers and is particularly disease tolerant versus *Zinnia elegans*.

The variety has been developed for use in mass landscape plantings in high light and warm temperate climates. It is a must for borders and containers and will be available in 10.5 cm pots for consumer sales. One really must see this flower in the field to appreciate the colour of this variety. The effect of outdoor light and the reflections in the leaves of the flower add to a visual attractiveness and draw the attention of everyone. PanAmerican Seed has added a lot of professional advantages, like excellent germination, easy crop scheduling and compactness, which makes it a perfect, modern annual. Stunning beds of disease-tolerant plants flower from late spring to first frosts, making low-maintenance borders. The unique colour, it cannot be emphasized enough and large, truly double flowers will certainly draw consumers. This drought-resistant and heat-loving flower ensures a superb garden show all summer long.



### Construction Floriade well underway

GARDENERS OF FLORIAD 2012 have started to plant out the 80,000 perennials that will cover the park. The sixth edition of this world horticulture expo will be held from April to mid-October 2012 in Venlo, the Netherlands. The contours of the five themes: relax & heal, green engine, education & innovation, environment and world show case, have become visible in the landscape. Roads, footpaths and ponds have already been constructed.

Floriade is held every decade in the Netherlands. The 2012 edition will, however, be a completely different exposition than previous events. The 66 hectares are wholly aimed at experiencing nature. Using the senses of sight, hearing, taste, touch and smell, visitors can experience first hand the influence horticulture has on the quality of their daily lives. Over two million visitors are expected from all over the world.

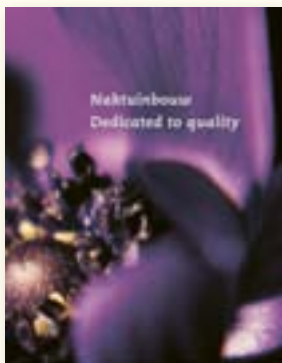
So far, reservations have been made by 16 countries. In March, Spain, Hungary and Kenya were added and ten more countries are expected. Besides horticultural and other companies, public and semi-public bodies will also be present. By the end of this year, the exhibitors will start to lay out their contributions. The official opening will take place on 5 April 2012.





## Dedicated to Quality

THIS SPRING, the Dutch inspection service has published a book 'Naktuinbouw - Dedicated to Quality', in which it documents the past and reflects on the role played by



Naktuinbouw and its predecessors, NAKG and NAKB, through the years. The book chronicles the developments from inspection service to the current independent administrative body that acts as an instrument of the government and the business community - from inspection service to expertise

centre. The book illustrates, explains and describes the importance of the variety, quality and health of propagating material. The book can be ordered by sending an email to [communicatie@naktuinbouw.nl](mailto:communicatie@naktuinbouw.nl), stating your address details. The price is € 10 excluding postage and handling.

## A world to win

5

It was a shocking observation to learn how few people eat sufficient vegetables. According to the World Health Organization, an adult human should eat at least two pieces of fruit (approximately 200 grams) and the same weight of vegetables. In Europe, only two per cent of the population meet that recommendation. And we are talking about Europe, not about the poorest inhabitants of a backward region in an under-developed country. Of course, people involved in plant breeding and their families will no doubt eat plenty of fruits and vegetables, but the rest of the population suffer from a lack of necessary nutrients that protects their bodies against diseases. Another shocking fact: thirty to forty per cent of all cases of cancer can be fended off by a healthy diet, combined with physical exercise. Vegetables even help to combat cancer cells. It is hard to imagine a more forceful argument to improve vegetable consumption and thus production. Maybe we can convince governments to add an 'eat veggies' campaign alongside their 'quit smoking' campaign. It might even be profitable if the increasing costs of medical care are taken into account.

More shocking news: the average consumption of vegetables in Africa is at present less than 50 kilos per person per year. But hopefully that fact will be remedied in the near future. The production of vegetables in Africa has recently received a boost, since Rijk Zwaan and East West Seed Company opened their subsidiary, Afrisem, in Tanzania. It is virtually a non-profit organisation, as it will take many, many years before the new company will reach break-even, to say nothing of earning a fair profit. The goal is to develop hybrid varieties of local species, improve cultivation techniques and develop an infrastructure to make marketing of the harvest possible. It seems an almost impossible endeavour to create a healthy horticultural industry in sub-Saharan Africa, and it will no doubt take a lot of effort and perseverance by all parties involved before it can be called a success. But even so, this initiative will help to steadily increase the vegetable intake in Tanzania. Breeders worldwide have contributed enormously to a healthy lifestyle by offering consumers a wide variety of beneficial foods. Whether it is taste, colour, texture or preparation method, there is enough choice to please every palate. The question is, where and when will people choose to part with their unhealthy dietary habits, and will vegetable consumption reach a healthy level? There is a world to be won, but we need to spread the word.

Monique Krinkels

## EU launches official campaign on biodiversity

DESPITE NUMEROUS efforts around the globe, studies show that biodiversity is still diminishing at startling rates. With street events in cities, including Amsterdam, Warsaw, and Madrid, the EU is now launching a Europe-wide campaign aimed at raising citizens' awareness of this issue. The main thrust of the campaign will be to show

citizens the real implications biodiversity loss will have in their daily lives, with a focus on actions citizens can take to help protect Europe's natural capital. This innovative campaign, which coincides with the UN's designation of 2010 as the Year of Biodiversity, will be disseminated through a dedicated website, a viral clip, PR actions, street art and slots in print media and social media. Global biodiversity – the rich variety of life on this planet – is under severe threat, with spe-

cies being lost at 100 to 1000 times the normal rate. More than one third of all species is considered to be under threat of extinction and an estimated 60% of the Earth's ecosystem services have degraded in the last 50 years. Mostly, human activities are causing this loss, through land-use change, over-exploitation, unsustainable practices, pollution, introduction of invasive species, etc. This often leads to habitat -and later on species- destruction, fragmentation and degrada-

tion. Climate change is also an increasingly important factor. Garlich von Essen, Secretary General of the European Seed Association, welcomed the EU's approach. "Plant breeding is based on access to and use of biodiversity. This is how plant breeders have managed to continuously create new biodiversity in the area of agricultural, vegetable and ornamental species. ESA therefore clearly supports the EU in raising awareness of this important subject", he stated.

6

6

## Doomsday vault becomes most diverse seed collection



AFTER ONLY TWO YEARS, the Global Seed Vault at Svalbard, Norway, has a collection of over half a million unique samples. It has become the most diverse assemblage of crop diversity ever amassed anywhere in the world. The Global Seed Vault, or 'Doomsday vault' as it is nicknamed, is an initiative of the Global Crop Diversity Trust which partners with the Norwegian government and the Nordic Genetic Resource Center in Sweden in operating the vault. The Global Crop Diversity Trust was founded by the United Nations Food and Agriculture Organisation (FAO) and Bioversity International, acting on behalf of the foremost international research organizations in this field (CGIAR). The Trust is currently hosted in Rome by FAO.

A wild bean from South America that could be critical in averting a crippling crop disease, a highly valuable strawberry species plucked by a collection team from the flanks of a volcano in Russia's remote Kuril Islands, and a treasure trove of soybeans from the United States, some of which have been cultivated domestically for over a century, were among the crops that arrived this March from Columbia, Peru, Mexico and the US for storage deep in an Arctic mountain on a remote island in the Norway's Svalbard Archipelago. "Reaching the half million mark brings mixed emotions, because while it shows that the vault at Svalbard is now the gold standard for diversity, it comes at a time when our agri-

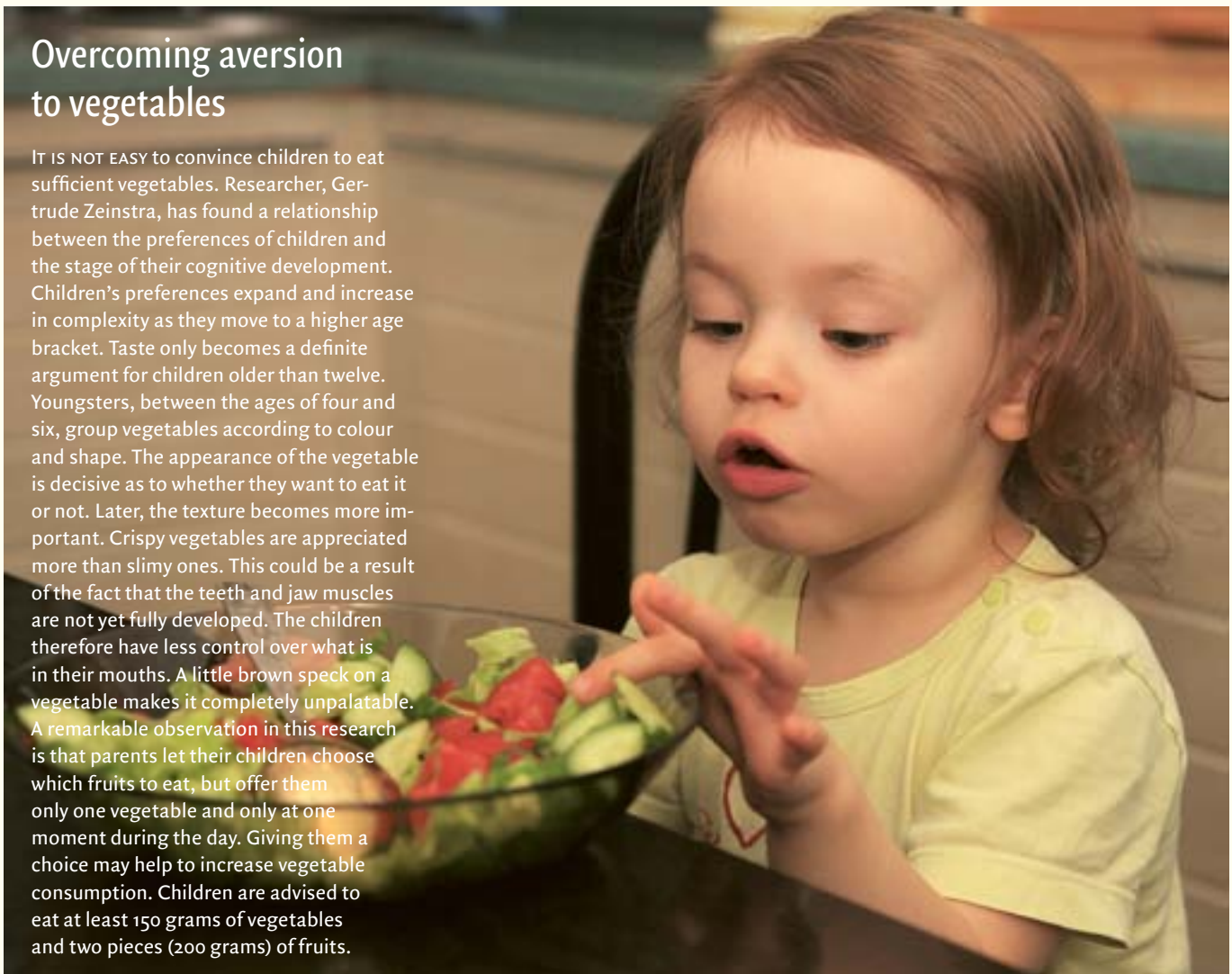
culture systems are really sitting on a knife's edge," said Cary Fowler, Executive Director of the Global Crop Diversity Trust. The array of crops protected in Svalbard and other seed banks around the world supported by the Global Crop Diversity Trust are "the keys to climate change adaptation for the world's farmers", says Fowler. Like all seeds coming to the vault, the samples are duplicates of seeds from other collections and are being sent to Svalbard for safekeeping, not for everyday use. Fowler noted that it is important to understand that the material directly acquired by plant breeders is maintained by national and regional crop genebanks. Many of these genebanks are threatened by neglect and lack of funds.

Svalbard is a fail-safe backup to be used whenever a depositing seed bank loses part or all of its collection. "Something as mundane as a poorly functioning freezer could ruin a collection that ten years from now could be critical in averting a food crisis", according to Fowler. The Svalbard Global Seed Vault is designed to store duplicates of seeds from seed collections from around the globe. If seeds are lost, e.g. as a result of natural disasters, war or simply a lack of resources, the seed collections may be re-established using seeds from Svalbard. The seed vault is owned by the Norwegian government which has also financed the construction work, costing nearly NOK 50 million (6.3 million euro).



## Overcoming aversion to vegetables

IT IS NOT EASY to convince children to eat sufficient vegetables. Researcher, Gertrude Zeinstra, has found a relationship between the preferences of children and the stage of their cognitive development. Children's preferences expand and increase in complexity as they move to a higher age bracket. Taste only becomes a definite argument for children older than twelve. Youngsters, between the ages of four and six, group vegetables according to colour and shape. The appearance of the vegetable is decisive as to whether they want to eat it or not. Later, the texture becomes more important. Crispy vegetables are appreciated more than slimy ones. This could be a result of the fact that the teeth and jaw muscles are not yet fully developed. The children therefore have less control over what is in their mouths. A little brown speck on a vegetable makes it completely unpalatable. A remarkable observation in this research is that parents let their children choose which fruits to eat, but offer them only one vegetable and only at one moment during the day. Giving them a choice may help to increase vegetable consumption. Children are advised to eat at least 150 grams of vegetables and two pieces (200 grams) of fruits.



## Genetically modified potato approved

THE EUROPEAN COMMISSION has recently approved the genetically modified potato 'Amflora' by BASF. This starch potato is developed specifically for industrial use. With the aid of biotechnology, researchers have succeeded in 'deactivating' the gene responsible for synthesizing amylose. The result is that 'Amflora' produces pure amylopectin, the starch preferred by the industry. Amylopectin makes yarn stronger and paper glossier; it also makes spray concrete adhere better to the wall and keeps glue liquid for longer. It took more than 13 years before this decision was made. The official

request for approval was filed in 1996 in Sweden. As a consequence of the European approval, Sweden is now able to put in a request for the formal juridical approval. The European Food Safety Authority (EFSA) has repeatedly confirmed that 'Amflora' is completely safe for humans, animals and the environment. The EFSA previously confirmed the safety of the antibiotic-resistant marker genes. It was not all red tape and bureaucrats that delayed the procedure. The moratorium from 1998 until 2004, in which no approval for genetically modified crops was given, created a tremendous delay for all pending applications. In 2003 and 2005, when changes in the EU legislation attitude towards GMO's led to optimism, many firms filed new applications. So did BASF and after

a positive report from EFSA in 2006, all seemed ready for introduction. However, due to a procedure mistake by the Commission, the proposal to approve was not sent to the correct authorities. It forced BASF to commence legal proceedings in order to get this approval. Whether this speeded up the procedure or not is unclear, but the EU machinery became active again and finally gave it the green light. Mr. Stefan Marcinowski, member of the Board of BASF SE, expressed his satisfaction about this important step. "It took more than 13 years of waiting, but we are glad finally to be able to start producing 'Amflora'. We do hope this approval will lead the way for the next generation of innovative products that will support competitive and enduring agriculture", he said.

# 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



Inspections  
Certification  
Quality Control

- Naktuinbouw Elite
- Naktuinbouw Select Plant
- System Auditing
- Official Sampling
- Fytosanitary Certificates and Plant Passports

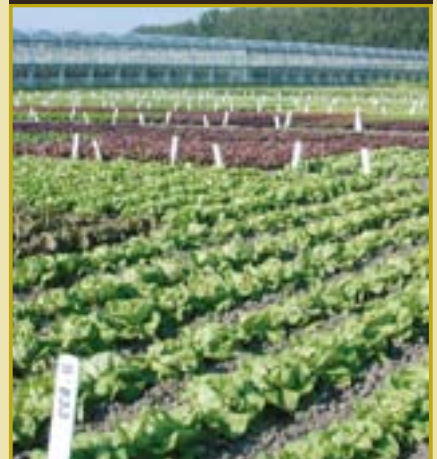
## Laboratories



R&D  
Seed Analyses  
Plant & Seed Health Tests

- ISTA Certificates
- 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

- DUS Testing
- Field Trials
- DNA-fingerprints
- Variety Descriptions
- Naktuinbouw Variety Tracer



# 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](http://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.

<b>ABZ Seeds</b>	Bovenkarspel, the Netherlands	<a href="http://www.abz-strawberry.nl">www.abz-strawberry.nl</a>	F1-hybrid strawberries
<b>Agratechniek</b>	Anna Paulowna, the Netherlands	<a href="http://www.agratechniek.nl">www.agratechniek.nl</a>	Air conditioning systems
<b>Agri Information Partners</b>	Wageningen, the Netherlands	<a href="http://www.agripartners.nl">www.agripartners.nl</a>	ICT solutions
<b>Agro Business Solutions</b>	Grootebroek, the Netherlands	<a href="http://www.agrosolutions.nl">www.agrosolutions.nl</a>	ICT solutions
<b>American Takii, Inc.</b>	Salinas, CA, USA	<a href="http://www.takii.com">www.takii.com</a>	Vegetable and flower seeds
<b>Anton Verbeek Roses</b>	Amstelveen, the Netherlands	<a href="http://www.verbeek-rozen.nl">www.verbeek-rozen.nl</a>	Rose plants
<b>Bejo Seeds</b>	Warmenhuizen, the Netherlands	<a href="http://www.bejo.nl">www.bejo.nl</a>	Vegetable seeds
<b>Blue Bird Publishers</b>	Velsen-Zuid, the Netherlands	<a href="http://www.bluebirdpublishers.com">www.bluebirdpublishers.com</a>	Agricultural communications
<b>Dekker Chrysanten</b>	Hensbroek, the Netherlands	<a href="http://www.dekkerchrysanten.nl">www.dekkerchrysanten.nl</a>	Chrysanthemum cuttings
<b>Deliflor Chrysanten</b>	Maasdijk, the Netherlands	<a href="http://www.deliflor.nl">www.deliflor.nl</a>	Chrysanthemum cuttings
<b>Distel Software</b>	Leiderdorp, the Netherlands	<a href="http://www.distel.nl">www.distel.nl</a>	Computer software
<b>Enza Zaden</b>	Enkhuizen, the Netherlands	<a href="http://www.enzazaden.com">www.enzazaden.com</a>	Vegetable seeds
<b>Grow Group</b>	Baarlo, the Netherlands	<a href="http://www.growgroup.com">www.growgroup.com</a>	Vegetable plants
<b>Holland Select</b>	Andijk, the Netherlands	<a href="http://www.holland-select.nl">www.holland-select.nl</a>	Vegetable seeds
<b>Keygene</b>	Wageningen, the Netherlands	<a href="http://www.keygene.com">www.keygene.com</a>	Genetic and genomic research
<b>Meddens Agriculture</b>	Haelen, the Netherlands	<a href="http://www.meddens-agriculture.nl">www.meddens-agriculture.nl</a>	Agricultural seeds
<b>Moerheim New Plants</b>	Leimuiden, the Netherlands	<a href="http://www.moerheim.com">www.moerheim.com</a>	Annual plants
<b>Moerheim Roses and Trading</b>	Leimuiden, the Netherlands	<a href="http://www.moerheim.com">www.moerheim.com</a>	Roses, bedding plants
<b>Naktuinbouw</b>	Roelofarendsveen, the Netherlands	<a href="http://www.naktuinbouw.nl">www.naktuinbouw.nl</a>	Inspection, varieties, testing
<b>Plantum NL</b>	Gouda, the Netherlands	<a href="http://www.plantum.nl">www.plantum.nl</a>	Seed association
<b>Royalty Administration International</b>	's-Gravenzande, the Netherlands	<a href="http://www.rai-worldwide.com">www.rai-worldwide.com</a>	Breeder's rights
<b>Rijk Zwaan</b>	De Lier, the Netherlands	<a href="http://www.rijkszwaan.nl">www.rijkszwaan.nl</a>	Vegetable seeds
<b>Rossen Seeds</b>	Hem, the Netherlands	<a href="http://www.rossenseeds.com">www.rossenseeds.com</a>	Vegetable seeds
<b>SBW</b>	Roelofarendsveen, the Netherlands	<a href="http://www.stbw.nl">www.stbw.nl</a>	Tissue culture
<b>SBW do Brasil</b>	Holambra, Brasil	<a href="http://www.sbwbrasil.com.br">www.sbwbrasil.com.br</a>	Tissue culture
<b>Sande</b>	't-Zand, the Netherlands	<a href="http://www.sandegroup.nl">www.sandegroup.nl</a>	Zantedeschia
<b>Seed Processing Holland</b>	Enkhuizen, the Netherlands	<a href="http://www.seedprocessing.nl">www.seedprocessing.nl</a>	Seed processing equipment
<b>Suet Saat- und Erntetechnik</b>	Eschwege, Germany	<a href="http://www.suet.de">www.suet.de</a>	Processing pelleting, seed coating
<b>Syngenta Crop Protection</b>	Basel, Switzerland	<a href="http://www.syngenta.com">www.syngenta.com</a>	Seeds, seed protection
<b>Takii Europe</b>	De Kwakel, the Netherlands	<a href="http://www.takii.nl">www.takii.nl</a>	Vegetable and flower seeds
<b>Takii Seeds</b>	Kyoto, Japan	<a href="http://www.takii.co.jp">www.takii.co.jp</a>	Vegetable and flower seeds
<b>Van de Bilt Zaden en Vlas</b>	Sluiskil, the Netherlands	<a href="http://www.vandebiltzadenvlas.com">www.vandebiltzadenvlas.com</a>	Agricultural seeds

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

# Innovative Canadian farmers need ground-breaking breeders

Monique Krinkels

10 “Canada is an exciting place in which to invest and do business”, states David Sippell, President of the Canadian Seed Trade Association. “It is a very stable country, with a predictable business environment, and forward-thinking, innovative farmers. I’m confident that with improving intellectual property protection measures, Canada will present increasing opportunities for business.”

• **Canada is one of the most** stable countries in the world and, with 10 million km<sup>2</sup>, is the second largest nation after Russia. The country is an international leader in agriculture and agri-food business. The Canadian seed sector is an important component of the Canadian economy, directly contributing 2.82 billion euro to Canada’s GDP and employing over 14,000 Canadians. David Sippell, President of the Canadian Seed Trade Association (CSTA), is proud to welcome the ISF delegates to his country.

**How long have you been President of the CSTA?**  
“In July 2009, I was elected the 2009-10 President of the Canadian Seed Trade Association. Executive terms run for one year at the CSTA. Prior to becoming President, I served as 1<sup>st</sup> Vice-President for a year, and prior to that as 2<sup>nd</sup> Vice-President for a year. My term as President will end this July and I will continue to serve on the Executive Committee for one more year as Past President. I have been a member of the CSTA board of directors for 5 years. Currently, I represent the CSTA on the Board of the ISF. Aside from the Canadian Seed Trade Association, I am the President of Syngenta Seeds Canada and lead the North American Oilseeds effort for Syngenta.”

**How many delegates are you expecting?**  
“We are hoping for 900 delegates and a number of special guests and exhibitors. As at 28 February, there were almost 800 registered delegates, with total participation exceeding 900.”

## Agriculture

Canada is a large producer of corn, barley, oat, wheat and rye. The Canadian oilseed production consists mainly of canola, soybean and flax. More and more, the grains are being used for the production of biofuels. Canadian farmers also grow speciality crops such as leguminous plants (chickpeas, dry beans, dry peas and lentils), buckwheat seed, canary grass seed, ginseng, herbs, spices, industrial hemp, mustard seed, safflower seed, sunflower seed, sugar beet, tobacco and wild rice. Around 70 per cent of the production is exported.



‘The world seed industry can and should play a very important role in providing the innovation and technology required to feed the world population’, says David Sippell, President of the Canadian Seed Trade Association

## What will be the most important topics under discussion this year?

“The Food and Agriculture Organization of the United Nations has challenged the world to almost double food production over the next 40 years, to ensure that the growing population can be provided

## Ornamentals

Ontario is the most important greenhouse producer of cut flowers (tulip, gerbera and roses) and potted plants (marigold, azalea, chrysanthemum, geraniums, begonia and miniature roses). The total retail value of horticultural crops produced in greenhouses is nearing the 1 billion euro mark.





with adequate nutrition. That challenge comes at the same time that agriculture is faced with environmental challenges, including competition for fresh water; competition for productive land, and climate change. It is estimated that nine out of every ten bites of food taken, start with a seed, so the world seed industry can and should play a very important role in providing the innovation and technology required to meet all of the challenges. The World Seed Congress brings together seed industry participants from around the world to work together to find international solutions to the challenges facing agriculture. We are hopeful that there will be fruitful discussion and debate around the introduction of new technology; the ability to generate funds for investment in research and development for seed driven innovation; and rules to facilitate the trade of seed internationally. We are also very pleased to offer a post congress conference on Adventitious or Low Level Presence of genetically modified material, which is a very good example of the work that needs to be done to facilitate trade.”

**Canada is a huge country. Are there regional differences in agricultural production?**

“Yes, there are significant differences in agricultural production. Most of Canada’s grain and oilseed production is in the arid prairie regions of Alberta, Saskatchewan and Manitoba, while most of the vegetable and fruit production is in British Columbia to the west, and Ontario and Quebec in Central Canada.”

### Vegetables

The Canadian horticultural sector has expanded dramatically over the last few years. The greenhouse area has increased by 21 per cent between 2001 and 2006. Since 2006, the production of vegetables in greenhouses is higher than that of ornamentals. The most important crops are pepper, tomato and cucumber. Nearly 53 per cent of the greenhouses, 22 million m<sup>2</sup> can be found in Ontario, followed by British Columbia with 10 million m<sup>2</sup> and Quebec with 5 million m<sup>2</sup>. The total retail value of the vegetables grown in greenhouses is 523 million euro.

**Canada is well known for its agricultural produce, but what about vegetable and flower production?**

“There is no significant vegetable or flower seed production in Canada. Virtually all of the seed is imported. Most of Canada’s vegetable and flower seed imports are from the United States and the Netherlands. In 2009, the value of flower seed imports from the USA was 5.8 million euro and from the Netherlands 0.9 million euro. Last year, the value of vegetable seed imports from the Netherlands was 18.3 million euro, followed by imports from the USA at 13.9 million euro. Total sales of fruit and vegetables by farmers in Canada totalled 1.07 billion euro in 2009. Sweet corn is the largest vegetable crop and blueberries the largest fruit crop.”

**It has been 18 years since the World Seed Congress was held in your country. What is the major change the Canadian seed industry has faced since 1992?**

“One of the major changes was the introduction of transgenic varieties. In 1995, Canada became the first country in the world to produce crops developed through modern biotechnology, and in 1996 became the first country to commercially produce GM canola, corn and soybeans. Canadian farmers have embraced the technology and in 2007, the acreage planted with genetically modified crops in Canada had reached over 17 million (about 6.9 million hectares). Today, 90% of Canada’s canola production, 90% of our corn production and 66% of our soybean production is made up of GM varieties.”

### Speciality products

There are over 3,600 organic farmers in Canada, who grow organic products on 530,000 hectares. The retail value of organic produce is 650 million euro, of which 25% is vegetables and fruits. The Canadian consumers show interest in healthy, high quality products and sustainable production techniques. The demand for locally produced food is on the increase, as can be seen from the rise in the number of farm markets, farm sales and the increased development of regional marketing programmes.



# Working with Nature

At different times  
In different places



*Bejo, a name that stands for quality*

## Vegetable seeds for professionals



Bejo Zaden B.V. • Trambaan 1 • P.O. Box 50 • 1749 ZH Warmenhuizen • Holland  
Tel. +31(0)226 396162 • Fax +31(0)226 393504 • E-mail: info@bejo.com







**Has the Canadian seed industry changed?**

“As in many other countries, the Canadian seed industry has been contracting because of company consolidations and restructuring. We don’t see a reversal in that trend.

The private sector in the seed industry is now the single largest investor in plant breeding and research in Canada, accounting for 39% of the total investment. Investment is expected to almost double between 2007 and 2012 to over 75.6 million euro. However, almost 95% of the investment will be in three crops: canola, corn and soybeans, where developers can recover their investments. Hybridization, biotechnology, the use of contracts and other intellectual property protection tools have resulted in greater use of certified seed in these crops, generating more funds for further investment. At the same time, the share of private sector investment held by other crops such as cereals and forages continues to decline. That, combined with declining public sector investment, has slowed innovation for those crops. The Canadian Seed Trade Association (CSTA) continues to advocate for more meaningful intellectual property protection for these other crops, in addition to incentives to use certified seed and increase funds for investment in the future.”

**What are the main regulatory changes?**

“Over the last few years, there have been some significant regulatory changes that have benefited the seed industry in Canada. The requirement for wheat varieties to be visually distinguishable from all other varieties in order to be registered, was removed for Ontario wheat in 1989, but it remained a requirement for western wheat until 2009. The removal of the Kernel Visual Distinguishability (KVD) requirement is expected to result, as it did in Ontario, in a substantial increase in the number of new wheat varieties available to Canadian farmers. After many years of work, Canada’s system of variety registration has been amended to make it more flexible in an effort to help bring new, improved varieties of 52 different crop species/types to farmers more quickly. Canada’s Plant Breeders’ Rights Act was passed into law just before the last World Seed Congress. The use of PBR to protect varieties has waxed and waned

over the years since. Canada’s legislation still only conforms to the 1978 convention of the UPOV.”

**Did the trade relations change?**

“In 2005, after almost five years of work, the Canadian Seed Industry was successful in its efforts to convince the European Union to include forage seed in its Common Agricultural Policy Reform, removing heavy production and export subsidies. In 2007, the final year of forage subsidies, Canadian exports of seed of many forage species increased dramatically. The next international trade challenge for Canadian seed is the development and adoption of an international policy on the low level presence of biotechnology products.”

**What has been the most important that Canada has offered the world?**

“Canadian plant breeding is world class, beginning with researchers like Charles Saunders, who developed Marquis Wheat in the early 1900s. Marquis wheat revolutionized wheat production in North America, extending the area where wheat may be safely grown. By the early 1920s, Marquis made up at least 90% of the spring wheat in western Canada and over 60% of the spring wheat in the US. However, a more recent, very significant accomplishment was the development of canola. Canola was developed by Canadian breeders in the 1970s. It is a low erucic acid, a low glucosinolate relative of oilseed rape. It has become Canada’s number one oilseed for domestic and export markets, and its low saturated fatty acid content makes it the preferred choice for a growing number of nutritionists and food processors. Canola now adds 10 billion euro annually to Canada’s economy. A new type of canola, with a modified fatty acid profile to make high oleic and low linolenic oil, was introduced in the mid-1990s. This speciality canola provides high stability oil for frying and does not require hydrogenation, allowing food companies to reduce the amount of trans fat in the foods they produce, creating a healthier option for today’s consumers. Other speciality canola products - such as ultra-low saturated fat and omega-3 enhanced canola - are also on the horizon.”

# Anti Infringement Bureau

Monique Krinkels

14 Everyone agrees that a breeder should take action if his Intellectual Property Rights are violated. But if it happens it is easier said than done. Even worse, sometimes the people involved might not be aware that an infringement has taken place. This spring, vegetable seed companies opened an Anti Infringement Bureau in Brussels. Managing director, Casper van Kempen, offers breeders a helping hand.

Over the past number of years, vegetable seed companies have seen an increase in the illegal production and distribution of their varieties. “The main cause is that the natural protection hybrids offer has been undermined as infringers have started to sell cuttings, instead of seeds. Furthermore, the illegal propagation of open pollinated varieties and the sale of inferior seeds packaged as a renowned brand has not lessened”, explains Casper van Kempen. It is high time to take a stand and that is just what he and his Anti Infringement Bureau intends to do.

## Awareness

Exact numbers are unavailable, but the yearly losses suffered by the seed companies mount up to at least

**‘Sometimes only an expert can distinguish the original product from its illegal imitation’**

tens of millions of euros and are increasing. “In some countries more and more cuttings are used for the production of tomato plants, instead of seeds. And companies

that copy the packaging of seeds have become more professional recently. Sometimes only an expert can distinguish the original product from its illegal imitation”, says Mr. van Kempen.

The companies’ lost revenue is but one of the problems infringers create. Worse is that it also undermines the high quality standards they have set for themselves regarding the plant raisers, the growers, the retailers and, ultimately, the consumers. Plant raisers and growers cannot fairly compete with their colleagues using illegally propagated material. The first assignment the Anti Infringement Bureau has, is to create more awareness of what Intellectual Property Rights on plant material constitutes. Plant raisers and growers generally know more or less what Plant Breeder’s Rights breeder’s rights are and what the scope of the rights is. Most supermarket managers, however, will be unaware that the vegetables on display could be grown from illegally reproduced propagating material and might under circumstances be confiscated.

“Information and deterrence will encourage them to

be careful when purchasing food. The seed companies believe that if they knew, supermarket chains certainly would carry out consistent checks to avoid buying dubious produce. The financial gain is negligible as seeds have a minimal influence on the cost price, while if they are caught it would cause considerable inconvenience and create negative publicity.”

## Competence centre

The ultimate aim is to let the Anti Infringement Bureau develop into an acknowledged competence centre for the enforcement of Plant Breeder’s Rights in vegetable crops. Mr. Van Kempen is well equipped for this endeavour. His former position was as chief operations officer at Florensis, an international company engaged in the production and sale of ornamentals. As infringements by producers of vegetative bedding and pot plants occur regularly, he played an active role reviving the anti-infringement activities within the Fleuroselect organisation. But he also has extensive knowledge of vegetable seeds because he worked for eight years as sales director at Zaadunie, now part of Syngenta Seeds. In addition, his international experience with the World Bank in Africa, in the Caribbean, and his academic studies in the Netherlands, England and Switzerland make him a true cosmopolitan. The Bureau will be located within a stone’s throw of the European Seed Association in Brussels, sharing the office with Breeders Trust and its director Leon Mol. Breeders Trust started in 2008 as an organisation of five seed potato companies from Germany and the Netherlands. Europlant, Solana, Agrico, HZPC and C. Meijer BV founded Breeders Trust as a means to enforce Plant Breeder’s Rights on their potato varieties. This is done by informing the potato growers about the risks of using uncertified seed potatoes and informing them about the rules applicable under Plant Breeder’s Rights protection. Breeders Trust also takes legal action against growers and other players in the market who purposely break the law.

## Improving legislation

Casper van Kempen will gather expertise on how to prevent infringement and will start a survey to map the number of infringement cases. “The latter may be used by ESA and the national seed associations to



# offers a helping hand

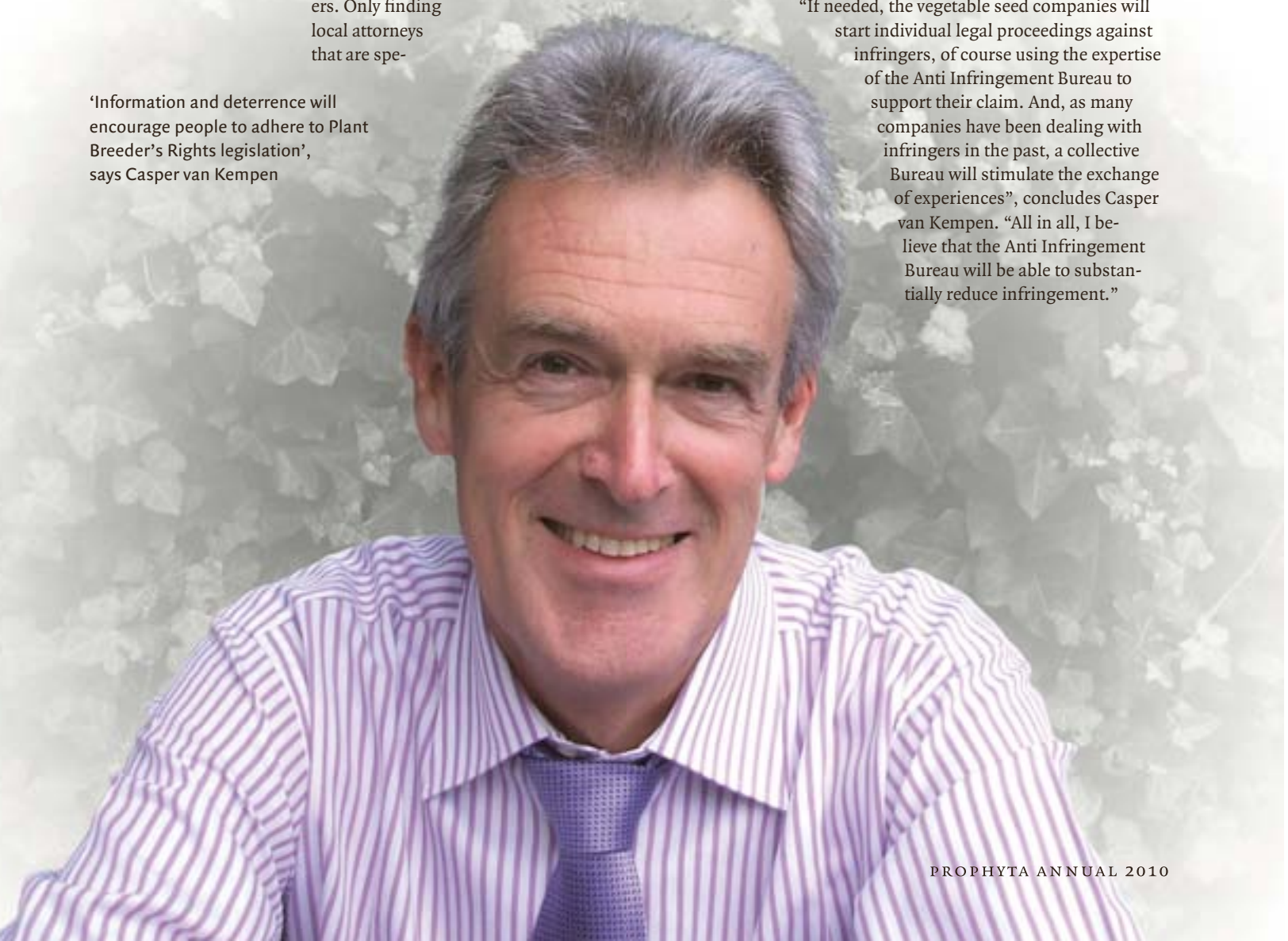
• lobby for improved legislation and enforcement support.” The Bureau will provide information and advice to national government agencies and organisations to discourage and prevent intellectual property infringement. It is clear that AIB will cooperate closely together with ESA to work as effective as possible. “Besides educating people on what breeder’s rights are, the Bureau will also collect information on how vegetable seed companies may enforce these rights in certain countries. It avoids every seed company having to start from scratch when instituting legal proceedings against infringers. Only finding local attorneys that are spe-

‘Information and deterrence will encourage people to adhere to Plant Breeder’s Rights legislation’, says Casper van Kempen

cialized in Plant Breeder’s Rights and who speak a common language can be hard.” And, of course, there are small but significant differences between countries as to how the UPOV Convention is interpreted and translated into law. Even between countries within the European Union, the wording of the laws may lead to different judgements in similar cases. It is good to know these differences beforehand. All in all it is expected that when they know the seed companies take infringement seriously, most plant raisers and growers will abide by the law and refrain from buying illegal seeds.

“If needed, the vegetable seed companies will start individual legal proceedings against infringers, of course using the expertise of the Anti Infringement Bureau to support their claim. And, as many companies have been dealing with infringers in the past, a collective Bureau will stimulate the exchange of experiences”, concludes Casper van Kempen. “All in all, I believe that the Anti Infringement Bureau will be able to substantially reduce infringement.”

• 15  
•  
•  
•



# Starring the veggies

Monique Krinkels

16 **Everyone knows that eating vegetables is healthy, but exactly what does it do in a human body? Does it only prevent disease, or could it even have healing effects? In the Netherlands, oncologists, dieticians and cancer patients came together last year to distinguish facts, half truths and fairytales about food. The overall conclusion: vegetables help combat diseases.**

• **So far, medical scientists** have mostly ignored the influence of food on cancer. “While there are over 7,000 scientific papers on the preventative characteristics of food, there are only 100 papers dealing with the effects of food after a patient is diagnosed with cancer”, states Winald Gerritsen, professor of medical oncology and director of the Cancer Centre Amsterdam at the VU University Medical Center, the Netherlands. “Cancer is a complex disease and we know far too little about the possible influences of food. Cancer patients, however, need answers and they need them now.”

## Trial field

It all started with the US ambassador in the Netherlands, Terry Dornbush. When he was diagnosed with prostate cancer for the second time, he wanted to personally contribute to his recovery. When he asked whether food could help his body to recover, his oncologist did not have an answer. The disease inspired him to change the way he used to live and to search for a method to prevent the cancer from recurring. He met the American scientist Folkman, who advised him to eat more soybean products. Nowadays, Terry Dornbush combines conventional therapy with additional treatment. He chooses food that helps prevent cancer and has increased his physical exercise. ‘Eat for life’ is his motto. The 76 year old American is in top condition and can regularly be found cycling in the mountains of the French Vosges. Winald Gerritsen learned that other cancer patients also struggled with this issue. Doctors

might prescribe surgery, chemotherapy and radiation therapy but patients want to play a part in their own convalescence. It stimulated him to organize the three-day event, Food for Life, where the role of food ingredients was discussed by oncologists, dieticians and cancer patients. One of the locations where the event took place was Bejo Zaden, where the famous open days had just finished. After the speeches, the participants roamed the trial fields and were amazed by the sheer amount of vegetable varieties. Most of them had never been to a trial field before and had certainly never realized there is more than one broccoli to choose from.

## Natural protection

Nutritionist Ellen Kampman, professor in ‘Diet and Cancer’ at Wageningen University and Research Centre showed that diet, its nutrients and bio-active compounds influence the molecular processes that affect the development of cancer. “Thirty to forty per cent of all cases of cancer can be prevented by a healthy diet and sufficient physical exercise. Research has revealed that an unhealthy diet influence the occurrence of some types of cancer. There is, for instance, a clear link between alcohol consumption and the risk of gastrointestinal, breast and liver cancer and eating red meat more than five times per week increases the risk of colon cancer. Conversely, the consumption of sufficient amounts of fruit and vegetables protects people against cancer of the mouth, the head and neck region, the oesophagus and the stomach.” Professor Kampman is worried about the ignorance of the general public. “If I ask people how diet may influence cancer risk, they blame colouring agents, food additives, hormones in meat or radiation of food. These are all factors where consumers have no influence. Maybe it is because in the early days of cancer research, scientists focused on relatively small groups exposed to high levels of carcinogenic substances, such as asbestos.” The association between food and cancer is less strong than the risk associated with asbestos exposure, but more people are ‘exposed’ to unhealthy eating habits. “Today it is widely recognized that a diet with plenty of vegetables, fruit and high-fibre grains is healthy, even though we do not know exactly why.” That knowledge and the possibility to eat a

Participants of Food for Life roamed the trial fields







Professor Winald Gerritsen (left) was amazed by the number of vegetable varieties, while Ger Beemsterboer, director of Bejo Zaden, explained how breeders seek to increase health promoting compounds

more plant-based diet is, however, restricted to the elite, professor Kampman explains. In the Netherlands, only one in every five people eats two pieces of fruit a day and only two in every one hundred people eat a daily portion of at least two hundred grams of vegetables. “It seems we cannot convey the message. Especially the eating habits of youngsters are worrisome. Even today we see an increase in the incidence of cancer, but as the disease needs about thirty years to develop, the prognoses are gloomy. To be honest, I do not know what to do about it, but explain to as many people as possible what we now know about the role of diet in the prevention of cancer.”

### Champions

Bert Schrijvers, head of research at Bejo Zaden, explained to the Food for Life-participants how a seed company may contribute to cancer prevention. Many vegetables contain compounds that are beneficial. Researchers have, however, discovered that the amount of beneficial compounds varies widely between species and between varieties. Alliums and especially garlic have, for instance, organo-S compounds (allicin), to a level where it protects against cancer. Bert Schrijver showed that broccoli contains ten times as much glucosinolates than, for instance, cauliflower. It is one of the substances which are proven to offer protection against cancer. When it comes

### Quiz

- 1 Which of the products contain the most vitamin C per 100 gram?
  - a strawberry
  - b orange
  - c pepper
- 2 Which manner of preparation ensures vegetables keep their vitamins?
  - a steaming
  - b cooking
  - c stir-frying
- 3 Are vitamin supplements a good substitute for fruit and vegetables?
  - a true
  - b untrue
- 4 How much vegetables and fruit should we eat daily?
  - a 150 gram
  - b 400 gram
  - c 600 gram
- 5 Does the nutritional value of fresh vegetables equal that of frozen vegetables?
  - a true
  - b untrue

to vitamin C, borecole is the absolute champion, with three times as much of this compound than any other brassica. Carrots contain carotenes, a group of compounds that neutralizes free radicals and helps to protect cells against damage. “The more we know about the substances that prevent cancer, the better breeders are able to create varieties that contain more healthy food compounds”, he concludes.

### Superstar

What remains is one question: which vegetable ranks number one when it comes to conquering cancer and is the superstar among the veggies? Should we add garlic to every recipe, consume a portion of broccoli daily, or have a sweet pepper as an evening snack. “There is no easy answer to that”, says Jacqueline Langius, research dietitian at VU University Medical Center. “We are still not sure how these compounds interact with cancer cells in the human body. The processes involved in the development of a tumour are complicated and so far scientist have to base their conclusions mainly on laboratory research. However, it seems that it are not the compounds on their own, but the vegetable as a whole that does the trick. Captured in a pill as a nutritional supplement, the healthy compounds are suddenly not as healthy anymore and can even increase the risk of some cancers. My advice therefore: eat as much and as many different vegetables as possible.”



# Our flora and fauna is natural, but cannot be taken for granted

Nature's wealth is abundant and essential for life. At Rijk Zwaan we are acutely aware of this. We develop the very best vegetable varieties and vegetable seeds, every day again, making use of the raw materials and possibilities Nature has to offer us. But we also accept Nature as it is. After all, our aim is to continue developing new varieties for many years to come and that is only possible if we use our knowledge with respect for Nature. That's what we believe in.

**Rijk Zwaan. [www.rijkzwaan.com](http://www.rijkzwaan.com)**



# Managing hygiene fends off invisible threat

Hajo Strik

In recent years, serious outbreaks of infection of tomato seeds and plants with *Clavibacter michiganensis* subsp. *michiganensis* has been worrying tomato growers all over the world. French and Dutch organisations of seed and plantlet producers developed a system of Good Seed & Plant Practices, GSPP. Today, an accreditation system is almost ready to be implemented.

**Battling an invisible enemy** is difficult. *Clavibacter michiganensis* subsp. *michiganensis* (Cmm) often does not have any visible symptoms. Over the years, infections have been discovered in Mexico, Canada and Southern Europe, but despite thorough searches for the sources of these infections, the puzzle was too complicated to solve. “The only way to stop the spread of infection is prevention in every phase of the production of seeds and plants”, explains Jaap den Dekker of Plantum NL and chairman of the GSPP Foundation

## Co-operation

It all started three years ago with an inventory in order to establish the main producers and production markets, and to look for knowledge and support. France and the Netherlands were selected because these two countries represented nearly all the major seed companies and tomato plant produc-

ers. There were, however, a few differences in the way these markets were organized. Whereas in the Netherlands both plant raisers and seed producers are part of the same organisation (Plantum NL), in France these companies are independently organised in the vegetable seeds federation (Union de Française des Semenciers, UFS) and the plant producers syndicate (Syndicat Français des Producteurs de Plants pour Professionnels, SF3P). “Initially, some barriers had to be eliminated due to the different approaches to this problem in both countries and, of course, different ways of looking at things. The French way of dealing with problems differs from the Dutch way, but eventually this turned out to be a big advantage”, explains Jaap den Dekker. “Where the French researchers focused in detail on the ‘global gap’, the Dutch concentrated on the sources of infection. This resulted in an elaborate inventory, in which ex-



‘The different approaches of the French and Dutch researchers proved to be a huge advantage as together they covered most aspects of the problem’, says the chairman of the GSPP Foundation Jaap den Dekker



## Four risk factors

- 1 Water** Management of a production site must ensure that the water is free of Cmm. If required, the water must be disinfected.
- 2 People** Wherever there is a risk of infection of products by personnel, visitors or technicians, people will have to change their clothing or wear protective clothing before entering the production area. Everybody must wash their hands with sanitizing soap before entering the production area.
- 3 Propagation material, seed and plants** All propagation material has to be produced by the GSPP standard. If the material is not GSPP accredited, the production area needs to be separated by hygienic measures from other parts of the site where GSPP accredited material is growing.
- 4 Materials** The risk of bringing in harmful organisms needs to be assessed by risk analysis. Depending on that analysis, materials (such as machines, trays, potting soil) can be classified as safe or unsafe. If materials are not safe, they have to be disinfected before entering the production area.



20 According to the GSPP-system parent lines plants should be raised in separate compartments



pected and unexpected potential dangers were listed. This result was a very pleasing result.”

### Development group

Those who were involved formed a Development Group, whose main purpose was to look for the possibilities of a global approach and international criteria. The first step was to start with establishing a benchmark at both seed and plant raising companies. “This had to be done in various markets, as they each have different risk factors. An important outcome of this was that the need for a clear and

#### Principles of the system

- isolation of the seed and seedling production location from the environment
- separation of seed and seedling units
- prevention of infection by managing the four risk factors
- constant monitoring during the growth season
- check before delivery: all seed lots must be tested by seed tests approved by GSPP
- independent supervision by recognised institutes

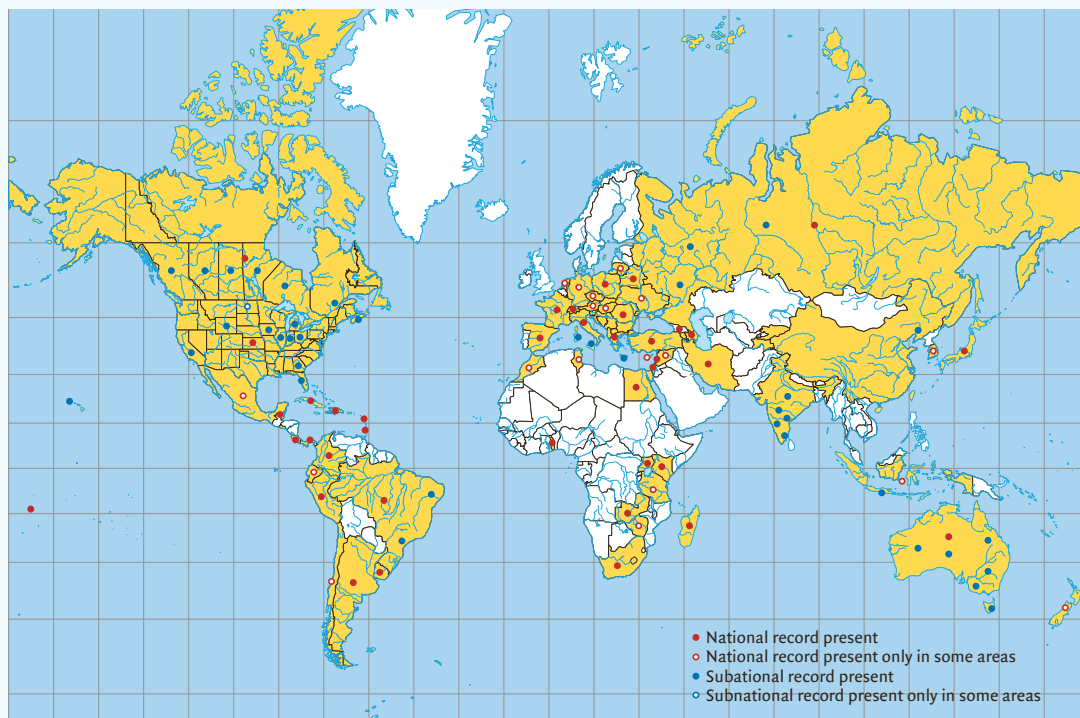
The GSPP standard is based on state of the art knowledge and will be evaluated yearly. Experts from the industry and research institutes are consulted to ensure that the GSPP standard is up to date.

uniform description was recognised”, says Jaap den Dekker. The main difference can be found when production processes are scaled-up and more and more risk situations can occur. Grafting, for instance, increases the risk of infection. This calls for a risk analysis and every company should perform that exercise. In the opinion of Jaap den Dekker: “Managing and analysing the risk of infection is always the responsibility of the producer. Working according to GSPP rules reveals the whole process and shows the impact if things should go wrong.” This risk analysis is scheduled to be carried out collectively in the Netherlands and, so far, many companies have shown

interest. Using the risk analysis, companies can implement their own control measures and working procedures to meet the GSPP standard.

### Auditing

Now that the essence of Good Seed & Plant Standard is almost finalized, companies can request participation in the GSPP system. It calls for auditing via recognised institutes and the Dutch Naktuinbouw and French Service Officiel de Contrôle, SOC, will train and provide the auditors specific to the country. After the audit, an advice for accreditation will be given to the GSPP Foundation. When the GSPP Foundation takes over the advice, a certificate of GSPP approval will be given. Companies can use this certificate as a product bonus to show their commitment in preventing the further spread of the disease. Tomato plants can only be sold with the GSPP logo if both the seed and the plant production unit have been accredited. Having representatives from both seed companies and plant raisers from France and the Netherlands, it is the intention of the GSPP Foundation that a new documentation and implementation audit will be performed every three years. After the initial accreditation, an audit will be performed every year. “Sales always want to use positive arguments and being able to ensure that seed and plants are free of Cmm is, of course, a huge product bonus. However, I have to stress that in science, things are never 100% guaranteed. Seed sampling and testing involves statistics, minimizing the risk that an infected seed or plant slips through. The GSPP certificate can only



be used as an important sign, that the company has taken this risk very seriously and that it has taken all possible precautions”, says Jaap den Dekker.

### Finding the leak

GSPP has to be fundamentally embedded in the whole production chain. “Think about Track & Trace systems, where separate batches of the same production must be tested separately before mixing. In this way, one can detect which batch is contaminated and which is not.” The essential goal of GSPP is finding the leak. “If you look at every production phase and consider the entrance and exit as a sluice, then the sluice doors should not leak, not even a tiny drop. GSPP forces production managers, controlling departments, and shipping and transport, to look for an anomaly every step of the way. In fact, it will mean that some practices which are

now taken for granted, will have to be re-examined and re-evaluated. It also means that GSPP can be introduced only with the full support of the company management. The leak might not even be a physical or organisational malfunction, it could also be the wrong person in the wrong place.”

### Future

At the moment, the first auditing is on its way at several production sites in Thailand, South America and other areas specialised in tomato seed production. The companies involved are very motivated and the first results will be ready within a year. “I expect that in July 2011, we will be able to introduce the GSPP brand, and companies will be able to display the GSPP logo as a sign of their professional skills in preventing infection.”

#### Procedures

A GSPP accredited seed or seedling production unit has to comply with the GSPP standard and has to implement management, prevention and control measures, focusing on the aforementioned risk factors. For tomato seed and young plants which have been supplied and produced following the GSPP regulations, the GSPP logo will be used on seed packets and pallets with plantlets. The first GSPP accredited tomato seed and plants will be available in July 2011 in the Netherlands and France. GSPP accredited seed and plant lots are produced according to the GSPP standards and during production they are checked for Cmm. Other diseases in tomato may follow. If despite all efforts Cmm does occur, a special procedure will be followed to ensure that it is adequately investigated in order to find the root cause of the problem. If required, the GSPP standard will be adapted to prevent reoccurrence.

#### Identity

**Name:** *Clavibacter michiganensis* subsp. *michiganensis* (Smith) Davis et al.

**Synonyms:** *Corynebacterium michiganense* pv. *michiganense* (Smith) Dye & Kemp, *Corynebacterium michiganense* (Smith) Jensen

**Taxonomic position:** Bacteria: Firmicutes

**Common names:** Bacterial canker, bird’s eye (English), Chancre bactérien (French), Bakterienwelke (German), Marchitez bacteriana (Spanish), Cancro batterico (Italian)

**Host:** mainly tomato, also on other *Lycopersicon* spp. and on the wild plants *Solanum douglasii*, *S. nigrum* and *S. triflorum*.

**EPPO A2 list:** No. 50

**EU Annex designation:** II/A2

# Drowning from within

Laura Rojas-Martinez and Geert-Jan de Klerk

22 So far, the causes of hyperhydricity are very vague. Most research concerns procedures to overcome the problem and anatomical features of hyperhydric plants. Recent research attempts to identify the underlying mechanism. On the basis of the outcome, new procedures will be established to avoid the development of hyperhydricity.

**Hyperhydricity**, also referred to as ‘vitrification’ or ‘glassiness’, is a physiological disorder of plant tissues cultured in vitro. It is caused by the special conditions in tissue culture and occurs in many genera (herbaceous, woody, cactaceous, bulbous). Hyperhydricity affects production in commercial micropropagation and losses of up to 60% have been reported.

### Glassy appearance

Plants experiencing hyperhydricity display translucent, wrinkled or curled and brittle leaves giving them a glassy appearance (Figure 1). Hyperhydric plants fail to survive when transferred to the greenhouse which is probably caused by the distorted anatomy of the leaves. Severe hyperhydricity results in a reduced propagation and -especially when the apical buds are affected- in dying back of the explants. Usually, hyperhydricity develops some time (1-4 weeks) after the start of a subculture cycle. Anatomical studies in a wide range of species have shown that the leaves of hyperhydric plants develop an unorganized mesophyll, rich in large intercellular spaces, with thin cell walls, a low chlorophyll content and an abnormal organization of the stroma and grana (chloroplast components). The

epidermis is defective, having a low deposition of wax and abnormal stomata; also reduced lignification of the vascular tissue has been observed.

### Essential feature

Initially, researchers used the term vitrification, but this term was badly chosen since it is also used to describe the transition from the liquid to the solid state, namely, the formation of ice in cryopreservation. The term hyperhydricity was introduced in 1992 and is now commonly used. ‘Hyper’ refers to a surplus and ‘hydro’ to water. So the term indicates that hyperhydric plants contain ‘too much water’. It has been repeatedly shown that the water percentage in hyperhydric plants is somewhat higher. Gribble showed with NMR-analysis in hyperhydric *Gypsophila* that a surplus of water occurred in the apoplast, so in the cell walls and in the intercellular spaces. Apoplastic water can be collected from the tissue by mild centrifugation. Indeed, from plants with a hyperhydric appearance, more water is collected by centrifugation than from normal looking plants (Figure 2). It is interesting to note that, for example, in submerged aquatic plants, the apoplast contains air. We presume that because of the water logging

Percentage of water obtained by mild centrifugation in *Arabidopsis* leaves

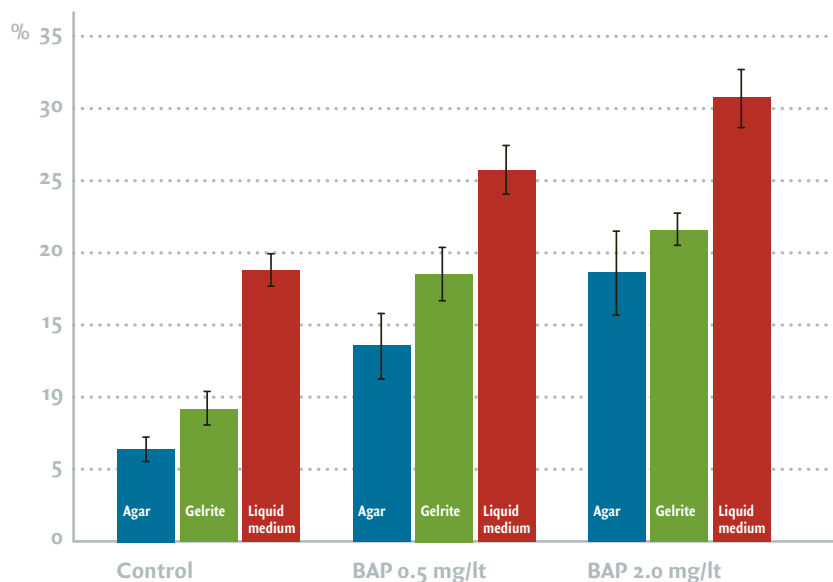
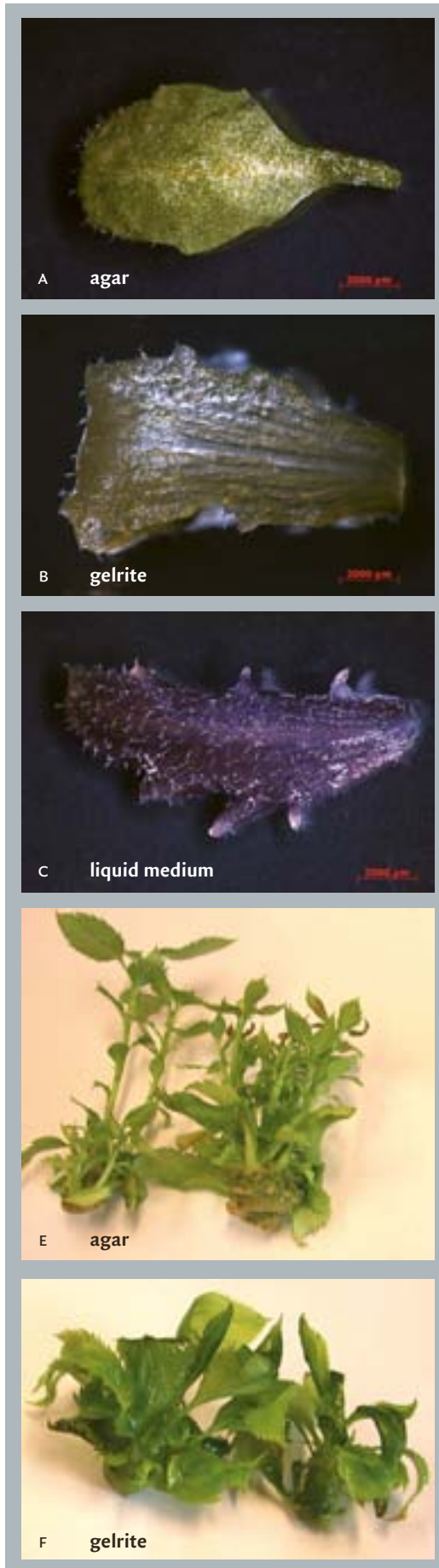


Figure 2. Percentage of water (presumably apoplastic water) obtained by mild centrifugation from *Arabidopsis thaliana* leaves. Plants were grown in media with different composition (gelling agent and BAP concentration). Bars represent SEM, n=6

The research on hyperhydricity in Wageningen University and Research Centre, the Netherlands, is funded by technological Top Institute Green Genetics and the Horticultural Product Board



Figure 1. Symptoms of hyperhydricity in *Arabidopsis thaliana* seedlings (A-C) and *Malus* shoots (d and e) grown on media with different gelling agents or liquid medium. Note the development of anthocyanins in *Arabidopsis* grown on gelrite and liquid medium. The hyperhydric malformations are clearly visible in *Malus*



of the apoplast, gas exchange from the symplast is disturbed, leading among others to accumulation of ethylene and  $\text{CO}_2$  in the symplast (= cytoplasm, vacuole and nucleus) and to anoxia. This in turn leads to the morphological aberrations that characterize hyperhydric plantlets.

23

Why do hyperhydric tissues have a surplus of water? The environment in tissue culture is very humid. Levels of 98.5–99.5% relative humidity have been measured close to the leaves of plantlets in vitro. This strongly reduces transpiration. With in vitro plants, water is taken up from the medium and moves upwards driven by (low) transpiration from leaves and possibly also by capillary action. In hyperhydric plantlets, this water is insufficiently transpired and accumulates in the intercellular air spaces.

### Availability of water

The gelling agent used to solidify the nutrient media and its concentration is important. Observations in many plant species (*Olearia microdisca*, *Prunus*, *Malus*, etc.) concur that the use of gelrite is related to the development of hyperhydric shoots. Why gelrite leads to hyperhydricity has not been examined. Since liquid medium also leads to hyperhydricity, we presume that a higher water availability in gelrite-media leads to hyperhydricity. Preliminary experiments, in which the uptake of a dye (acid fuchsine) from the medium was examined using medium solidified with agar or gelrite, or liquid medium, confirmed that water was more rapidly taken up from gelrite and liquid medium. Various studies indicate major differences in matrix potential between gelrite and agar. This difference determines the increased availability of water from nutrient media solidified with gelrite.

### Other medium factors

However, water availability is not the only determining factor. In particular, the addition of the cytokinin BAP (6-benzylaminopurine) to the media (to maximize the shoot multiplication rate) contributes to the development of hyperhydric malformations. Commonly, the combination of gelrite with BAP causes more hyperhydricity than the use of gelrite alone. Experiments run in WUR showed that plants grown



# Be part of it

For three days in 2011, key figures in the world's seed industry will come together in Belfast to plan for the future and enjoy the city, the country and the culture that is unique to Northern Ireland.

Be sure to be part of it.

## ISF WORLD SEED CONGRESS UK

30 MAY - 1 JUNE 2011 BELFAST



[www.worldseed2011.com](http://www.worldseed2011.com)  
[www.discoverireland.com](http://www.discoverireland.com)

## Drowning from within

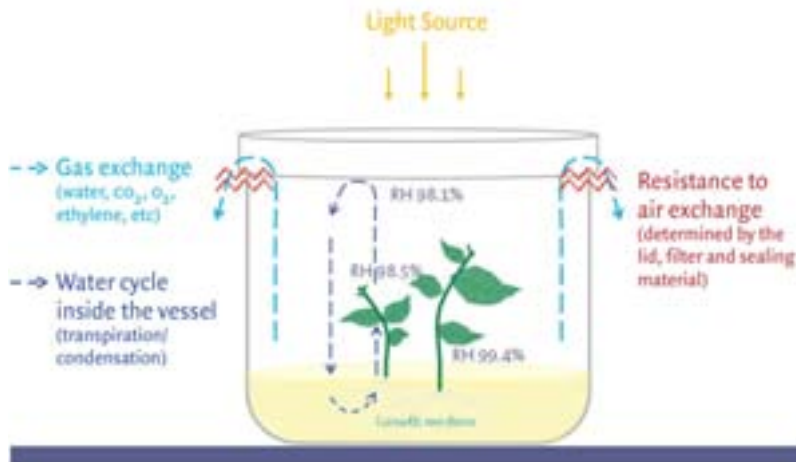


Figure 3. Schematic representation of the flows of air (light blue) and water (dark blue) inside the culture vessel. The restriction of air movement imposed by the lid and heat transfer achieved by base cooling to decrease RH are highlighted

in different media present different amounts of water (presumably apoplastic) in the tissues (Figure 2). The reason why BAP causes hyperhydricity is not clear. It should be noted that plantlets that develop hyperhydricity in the presence of BAP, suffer from heavy stress as indicated by the abundance of anthocyanins (Figure 1c). Perhaps stress causes hyperhydricity. This can be concluded from the finding that protective measures against stress, e.g. the application of putrescine, a stress-protectant, have been reported to alleviate hyperhydricity. It may be that stress interferes with the water balance in plants. Oxidative stress is known to block water transport via aquaporins.

### Stress

So far, most studies have dealt with the multitude of factors that reduce hyperhydricity and with the anatomical features of hyperhydric plants. The resemblance of some responses in hyperhydric tissues to processes occurring in stressed plants (e.g., by drought, hypoxia, or light) has attracted the attention of researchers. As a common approach, the study of activated oxygen metabolism and the subsequent generation of Reactive Oxygen Species (ROS) started. Indeed, hyperhydric shoots have increased levels of H<sub>2</sub>O<sub>2</sub>, higher lipoxygenase and superoxide dismutase activity (i.e. carnation, *Mamillaria gracilis*, *Euphorbia milli*, *Prunus avium*). Moreover, specific stress-related proteins, namely BiP (Binding Protein; a member

of the 70 Kilodalton heat-shock-protein family), have been found to occur in hyperhydric plants.

### Avoid hyperhydricity

Most researchers attribute hyperhydric abnormalities to the specific environmental conditions during tissue culture, in particular to water status and gas movement and composition. Since plants are enclosed within containers, gas exchange rates (water, CO<sub>2</sub>) are significantly restricted (Figure 3). This has a direct effect on transpiration, since the Relative Humidity (RH) inside the vessel is very high. A significant study by Gribble showed that the surplus of water was located in the intercellular air spaces. If this is indeed the key feature, the way is open for a focused approach to avoid hyperhydricity. A major option is to enhance evaporation from leaves. This has been achieved by base cooling, which can completely remove hyperhydricity. The fundament behind this strategy lies in the reduction of the RH inside the container by means of water condensation onto the cooled medium. This method has been successfully used in apricot, carnation and *Phalaenopsis*. Nevertheless, in standard culture rooms, base cooling is difficult to achieve, and is impractical in rooms with many shelves. Furthermore, the costs are high. The need for air tight conditions in tissue culture to ensure sterility, affects the exchange of gas between the container and the exterior. This has consequences for the concentrations of CO<sub>2</sub> and water vapour inside the vessel. The lids of the containers in which plants are cultured, therefore play an important role, and a good ventilation rate is essential to avoid hyperhydricity in tissue cultured plants. The use of different tapes and lids has been suggested. The main feature is a layer of permeable tape in the lid that allows an increase in the air exchange rate. However, this method can result in loss of water from the medium which can retard root growth and nutrient uptake. Alternative methods will be examined by Wageningen University and Research Centre, the Netherlands. Other ways to treat and/or prevent hyperhydricity may be related to the reduction of the adverse effects of stress.



# Seed organisation strengthens communication throughout Africa

Monique Krinkels

26 It was a memorable moment this spring. At the yearly congress in Bamako, Mali, participants celebrated the 10th anniversary of the African Seed Trade Association. Just a decade of co-operation has resulted in a sea of change in the relationship between companies from all over the continent.

• **“AFSTA was formally** founded in March 2000 in Pretoria, South Africa”, Secretary General Justin Rakotoarisaona explains. “From the onset, the objectives are to promote the use of improved quality seeds in Africa, to strengthen the communication within the African seed industry and to promote regulatory harmonisation throughout Africa. After 10 years of existence, AFSTA has made significant progress toward achieving these objectives”, is his conclusion.

## Increased membership

A range of African and international stakeholders commenced discussions as early as 1997. They felt the need to have a regional representative body for the seed industry, which could also serve to promote the development of private seed enterprises. During the inaugural congress in Pretoria, Kenya was elected as host country for the Secretariat. “The number of members has increased to 86”, according to Justin Rakotoarisaona. “Among the members are 18 African seed associations, 5 non-governmental organisations, such as the West Africa Seed Alliance, 33 African Seed companies, three service providers, amongst others Bayer, and several non-African organisations and companies.”

• “We interact with regional, governmental and non-governmental organisations involved in seed activities in order to promote the interests of the seed industry, to stimulate activities that lead to regulatory harmonisation throughout Africa to facilitate movement of seed, and to facilitate exchange of germplasm within the continent, subject to national laws and international conventions.” The result is that the communication between the seed stakeholders has been improved and doing seed business in Africa has been facilitated due to a better network built up during various seed forums organised by AFSTA. Furthermore, AFSTA lobbies the public authority for the well-being of the African seed industry. The organisation helps to create national seed trade associations and explores opportunities to educate African seed stakeholders on intellectual property rights and modern biotechnology, as efficient tools to improve agricultural productivity in Africa. To attain their goals, AFSTA has established four technical committees: Strategic partnerships and donor relations, chairman: Lloyd Le Page; Harmonization and rationalization of seed regulations and policies, chairman: Obongo Nyachae; Promotion

## FELAS

Founded in 1986, the Federación Latinoamericana de Semillistas (FELAS) represents its members at Latin American and world-wide level, promoting the interests of the seed industry and the progress of agriculture in the continent. Every two years, FELAS organizes the Pan American Seed Seminars, meetings that are becoming more important, not only from the technical and business point of view, but also as forums where Latin-American countries discuss and analyse policies related to the seed industry. These meetings are no longer regional, since participants come from around the world.

## APSA

The Asia and Pacific Seed Association (APSA), a derivative of the Food and Agriculture Organization (FAO) of the United Nations, was established in 1994 with the aim of promoting quality seed production and marketing in the Asia and Pacific region. Today, APSA is the largest regional seed association in the world. It has strong links with international organizations such as FAO, CGIAR institutions, ISF, ISTA, UPOV, the OECD and the World Trade Organization. APSA members include national seed associations, government agencies, public and private seed companies, and associate members.

## CASA

In December 2006, in the town of Bishkek in Kyrgyzstan, a new regional seed association was established, the Central Asian Seed Association (CASA). It was established by the Seed Association of Kyrgyzstan and the newly formed seed association of Tajikistan, and seed industry representatives of Kazakhstan and Uzbekistan. The founding of CASA was supported by the Swedish Sida funded projects ‘Support to Seed Sector Development in the Republic of Tajikistan and Kyrgyzstan’. The Svalöf-Scanagri consortium is providing technical assistance.



and appreciation of the use of modern biotechnology, chairman: Kinyua Mbijewe; and Intellectual property rights, chairman: François Burgaud.

### Harmonisation

Harmonisation is one of the key issues in Africa. Differences in seed regulations and policies seriously harm seed trade. The Regional Economic Com-

munities such as the Southern Africa Development Community (SADC), the East African Community (EAC) and the Economic Community of West African States (ECOWAS), embarked on harmonising the regulations concerning seeds among their member states. "This harmonisation process, in which AFSTA has actively participated, has reached a certain milestone. Most recently, the Common Market for

#### ESA

In 1961, COSEMCO (seed trade), in 1964 ASSOPOMAC (potato breeders), in 1970 AMUFOC (forage seed production) and in 1977 COMASSO (plant breeders) were founded. In 1998, the organisational structure of the European Seed Associations was created as a common umbrella for the still existing four European associations, as well as representing a number of individual vegetable seed companies. The new European Seed Association (ESA) was founded in November 2000 and merged the former members, i.e. associations as well as individual companies, into one single EU-wide organisation. By Royal Decree on 2 April 2002, ESA has been granted the legal status of non-profit International Association (AISBL) following Belgian Law.

#### EESNET

The Eastern European Seed Network (EESNET) is an initiative from the Czech Seed Trade Association (CMSSA) who organized a meeting of countries from the region. This meeting was held in 1998 and had a general topic - to get to know each other. In 1999 and in 2000, additional meetings were held and the first Annual Meeting of EESNET was organized in Prague on 27-28 November 2001. The activities of EESNET take place at several levels: day-to-day contacts between the focal points, an annual meeting and a website. The present participation in EESNET is as follows: Czech Republic, Slovakia, Lithuania, Serbia and Ukraine. The participation of Russia and Belarus is now being prepared.

#### SAA

The Seed Association of the Americas (SAA) was created in 2005 as a non-governmental organization that fully represents the interests of the seed industry in the Americas. Its goal is to educate and support development, marketing and free movement of seeds within the Americas and to play an advocacy role in seed legislation and regulation issues so as to ensure plant property rights. At this moment there are nine members: Argentina, Brasil, Canada, Chile, Mexico, Paraguay, United States, Uruguay and Venezuela, represented through their national seed associations and seed companies. The SAA seed congress is organised biennially and the next congress will take place in 2011.

# Seed organisation strengthens communication throughout Africa

28

• Eastern and Southern Africa (COMESA) has also  
• planned to undertake harmonisation of its seed  
• regulations and policies within its nineteen member  
• states”, says Mr. Rakotoarisaona. “Ultimately, we  
• hope that this will encompass the whole continent.”  
With this initiative of these RECs to harmonize their regulations and policies, the seed market size in Africa will be larger. “It will justify a significant investment in the African seed sector. Indeed, it is hoped that seed movement and the seed business environment will continue to improve. AFSTA is determined to contribute as much as possible to the promotion of the seed sector in Africa during the next decade and, in October 2010, plans to elaborate its strategic plan, which will spell out its action plan in pursuing its objectives. The latest achievement is the Memorandum of

Understanding of the West Africa Seed Alliance (WASA). It was signed in October 2009 in Bamako, Mali, between AFSTA and the following organizations: the United States Agency for International Development (USAID), the Alliance for a Green Revolution in Africa (AGRA) and the Economic Community of West African States (ECOWAS). The main objective of WASA is to promote a sustainable commercial seed industry focused on ensuring that small-scale farmers in West Africa have affordable, timely and reliable access to high quality seeds and planting material. WASA will work closely with West African governments and regional organizations to implement policies that encourage private sector investment in local seed production, which will stimulate the increased adoption of improved high-quality seed and complementary inputs.

Enza Zaden is one of the world’s leading, independent breeders of innovative vegetable varieties; with its headquarters located in Enkhuizen, in ‘Seed Valley’, the heart of the Dutch seed industry. Our business is to create new vegetable varieties for professional growers, this done with the expertise, effort and creative enthusiasm of 1.200 employees working in all continents of the world. In total Enza Zaden works in twenty vegetable crops, of which tomato, pepper, lettuce, cucumber and onion are the major ones. Enza Zaden is today the market leader in cocktail tomatoes, greenhouse peppers, iceberg lettuce and endive.



[www.enzazaden.com](http://www.enzazaden.com)



## Adventitious Presence

Monique Krinkels

Last year, 14 million farmers planted 134 million hectares of biotech crops in 25 countries. And the pace at which farmers switch over to genetically modified crops quickens as more countries acknowledge that biotechnology is the key to food self-sufficiency. Logically, the likelihood that unapproved GM crops are accidentally introduced into the environment is increasing.



# Costs to prove GM-free status hard to bear

29

So far, the number of approved GM varieties in Europe is limited. In Spain, Czech Republic, Portugal, Romania, Poland and Slovakia genetically modified plants are grown on nearly 100,000 hectares. But as food and feed comes from all over the world to Europe, it is inevitable that genetically modified and conventional crops cross paths. As a result, minute amounts of GMOs can be introduced into the environment during seed production, cultivation, harvest, transport, or processing. The adventitious or technically unavoidable presence of GMOs is tolerated in the EU up to a maximum of 0.9%, but only if the risk analyses for that specific GMO has been favourable and the GMO has market approval. For the remainder, a zero tolerance applies. The consequences of the latter are enormous.

### Certainty

“Statistically, the problem of adventitious presence of unapproved GM crops can be solved, but it has massive consequences”, says Peter Bruinenberg, research manager Agro at AVEBE and chairman of the commission biotechnology of Plantum NL. “The core of the problem is the question how certain we want to be that a batch of seeds, crops or final products is completely free of GMOs. It is all about statistics. There is a consensus that the sample number must be at least 1,500 per batch. If in such a sample no GMOs are detected, we can be 95% sure that the adventitious presence of GMOs is less than the detection threshold of 0.1%. If the accepted threshold of adventitious presence is 0.9%, a sample of 300 is sufficient to be 95% sure that the batch is GMO free. Below 0.9%, a batch does not need labeling according to the EU novel food legislation.” For seed crops such as maize, cereals and soybeans, the cost of samples of 300 to 1,500 is high. It is estimated that prices would rise by as much as 50%. “But for potatoes and final products such as cucumber, tomato and apple, the situation is worse. A sample of 1,500 is an enormous quantity

and may weigh as much as 200 kilos. Costs would soar, especially if clients demand DNA-testing, without taking other methods into account to establish the GMO free status of a batch.”

### The consequence

Mr. Bruinenberg uses potatoes as an example. “Seed potato production starts with a small number of so-called stems. It takes years before more than 10 hectares of a variety is grown. Say you want to establish the purity of the batch when you have a hectare of seed potatoes. You would need to test a sample of 1,500 specimens. While you may use clever pool strategies, in the end, every potato has to be tested to prevent low level mixing with GMOs. The costs of DNA extraction and PCR test, including service charges and guarantees, are at least € 2.50 to € 5.00 per tuber. Laboratory costs would therefore amount to € 3,750 to € 7,500 per hectare.” But that is not all. “A batch of one hectare means about 35,000 kilos of seed potato. The 200 kilos of the sample that are destroyed during the testing are worth € 60 to € 200, depending on the seed quality. The actual value of a hectare of seed potato is between € 10,000 and € 15,000. To cover GM analyses costs the price of seed potatoes would need to rise by 30-60%. It would dupe not only the potato farmers throughout Europe, but also hamper seed potato exports. All the while the problem of adventitious presence remains purely a theoretical one. “Producers of seed potatoes are able to prevent adventitious presence of GMOs using phenotypical characteristics. We can guarantee 0% adventitious presence or at least a level far below 0.9%. Obligatory GM analysis is therefore superfluous, so we hope that the European Commission acknowledges this problem and comes up with an alternative solution.”

# Afrisem creates a win-win situation

Monique Krinkels

30 Breeding hybrid vegetable varieties adapted to the circumstances in Africa and producing reliable and affordable seeds are the goals that Rijk Zwaan and East West Seed Company have set. As 'wazalishaji mbegu bora' (breeders of good seeds), their new company, Afrisem, will guide African growers to the next level of horticulture.

## Rijk Zwaan

Rijk Zwaan is one of the top ten global vegetable seed companies. It is an independent family business, with 86% of the shares in the hands of three Dutch families: Zwaan, Van Doornmalen and Tax. The company has 1600 employees, of which half are working in the Netherlands. Rijk Zwaan has more than 850 varieties in thirty different vegetable crops sold in over a hundred countries worldwide.

• **Vegetable production** provides a way out of poverty for smallholder farmers and the landless. It generates more income and jobs per hectare than most other agricultural enterprises. At the same time, it will improve the diets of the Tanzanians. In Africa, the consumption of vegetables is less than 50 kilo per person per year, while it is the most sustainable strategy to overcome micronutrient deficiencies. For Rijk Zwaan and East-West Seed Company that was sufficient reason to start a vegetable seed company in Arusha, Tanzania. Afrisem creates a win-win situation for local growers, by providing income as well as healthy food.

## Growing technology

For the last ten years, Rijk Zwaan has been active in Arusha. It is the location where the daughter company Q-Sem propagates its tomato, cucumber and pepper seeds. Due to its favourable climate, Arusha is a centre for vegetable, flower and seed production for the European market. Despite its proximity to the equator, the elevation of 1,400 m on Mount Meru keeps the temperatures to an average of 25°C, while cool dry winds from the Indian Ocean alleviate the humidity - ideal circumstances for growing high quality vegetables and flowers. Local small-scale farmers have a hard time getting by, though. There are no hybrid seeds available to them, as the varieties propagated in the region are designed for the European market. "We became aware that none of the major vegetable seed companies has dedicated breeding in Africa for the local tropical African market. Moreover, local propagating and growing techniques were far from optimal", says Anton van Doornmalen, president of the advisory council of Rijk Zwaan. "We therefore asked René Geelhoed and Bianca van Haperen, who both have studied in Wageningen and built up extensive experience in the Philippines, to look at the local varieties and to optimise the growing techniques. Their experiments have paid off. The newly introduced growing techniques ensured that the yields more than tripled and they conveyed this to the surrounding villagers." The major changes were growing in raised beds, furrow irrigation, improved fertilizer management and the raising of seedlings. So far, over a thousand farmers have been

trained and the improvements were readily adapted.

## More than maize

But that was not the end of it. "To really make a difference, the local farmers need dedicated hybrid varieties of Africa's unique indigenous vegetables. That is why Rijk Zwaan, together with East-West Seed Company, started Afrisem in 2008", says Mr. Van Doornmalen. "Just like Asians cannot live on rice alone, African people cannot live on maize alone", adds Simon Groot, chairman of the East-West Seed Group. "They need some meat, some dairy products, but also fruit and vegetables. Aside from the consumption aspects, vegetable farming with good seeds and farming technology can provide higher incomes from relatively small holdings than maize farming. Millions of vegetable farmers in Asia with landholdings between five to ten acres now have middle class earnings, with enough profit to buy staple food, and to provide good housing and education." In 2007, René Geelhoed and Bianca van Haperen started the development of the station Afrisem. They focused on breeding programmes in tomato, African eggplant and chinense pepper varieties for cultivation in the Tanzanian highlands in the north of the country. Afrisem combines local germplasm with genetics and breeding knowledge of the two breeding companies. African eggplant, *Solanum aethiopicum*, is an indigenous vegetable of Africa and a very popular vegetable in Tanzania. The extremely hot chinense pepper, *Capsicum chinense*, is not an indigenous vegetable, but locally very much preferred because of its unique aroma. The first breeding goals are to improve the yield per plant, the fruit quality, eating quality, appearance, shelf life and resistances against local insects and diseases. The Afrisem breeders have close contacts with the local farmers, local market and consumers to ensure the new varieties will meet the local demands.

## The Farm

The managing director of Q-sem, Harald Peeters, holds the same function for Afrisem. The farm has 20 ha of land with fertile topsoil. The station consists of an office, a workshop and proper personnel facilities. The seed storage and evaluation facilities are of a high standard. The irrigation is designed in



The new tomato varieties quickly gain popularity amongst growers



31

#### East-West Seed Group

East-West Seed Company began in 1982 in Asia, with the goal of blending European-style seedsmanship with tropical vegetables. Today, the company is a multinational vegetable seed producer with a leading market position in all major south-east and south Asian vegetable seed markets. It produces, develops and sells tropical hybrid vegetable seeds that challenge existing market situations.

such a way that on the whole farm drip, sprinkler, furrow and basin irrigation are possible. “This way the local farmer’s situation can be stimulated without compromising uniformity. In order to avoid wasting breeding time, several temporary greenhouses have been installed”, explains Mr. Van Doornmalen. Training local people is an important task for the current Afrisem crew. Local Tanzanians will be trained to become market-oriented breeders. Breeders from Rijk Zwaan and East West worldwide may exchange visits with the local breeders. “And, of course, the training of the farmers continues. On the demonstration field, surrounding farmers are shown the newest varieties and latest technologies. Furthermore, farmers can be trained on this field as well as on their own fields.”

#### Profit

Starting an African seed company may not be the smartest thing to do from a commercial point of view. “It will take many years before Afrisem will break even and when we will reach the goal of making a profit it’s clear that the revenues will be invested in the company”, says Anton Van Doornmalen. “But that does not stop us investing in Africa. And that goes not only for the three families that have the majority shareholding, our employees who hold 14% of the shares, could not agree more. They are very proud that we can make a difference in Arusha.” He does not close his eyes to the many obstacles that Afrisem has to overcome. The infrastructure is poor. Despite the many tourists that visit nearby Mount Kilimanjaro, the Serengeti national Park and the Ngorongoro Crater, the roads around Arusha are bad. That makes it harder for farmers to purchase

input, but is also a barrier for marketing the produce. Furthermore, the knowledge of vegetable cultivation of most farmers is limited. This may hamper farmers to purchase the relative expensive hybrid seeds. However, farmers who have experience with hybrid varieties are convinced that paying some more money for hybrid seeds is a good investment and they are quite willing to consider new varieties. “That is where the experience of East-West Seed will pay of. They know how to teach farmers to grow improved vegetable varieties with improved growing technology. East-West Seed Company has shown in tropical Asia that market-oriented variety improvement accompanied with farmer technology support is a recipe for farmers to increase their income.”

#### Applause

The initiative is received with approval. At the opening on 22 October, Dr. David Mathayo, vice-minister of Agriculture, came to visit Afrisem. His message: the Tanzanian government will support the company in any way it can. In September 2008, former secretary-general of the United Nations, Kofi Annan and his wife, Nane Maria, visited Rijk Zwaan in De Lier, the Netherlands. Today, Mr. Annan is one of the twelve members of the Global Elders, a group of former statesmen who use their experience to solve global problems, and chairman of the board of AGRA, the Alliance for a Green Revolution in Africa. He applauded the initiative of Rijk Zwaan and East-West Seed Company and expressed the hope that more professional seed companies would follow this example. After all, it makes a real difference if an African farmer is able to produce high quality vegetables that can be sold on the local market.



# EU makes way for traditional varieties

Kees van Ettehoven

32 The questions of biodiversity and the conservation of plant genetic resources are gaining in interest and importance. The establishment of the Convention on Biological Diversity and the International Treaty on Plant Genetic Resources for Food and Agriculture are living proof of that. The European Union has established new legislation that regulates the marketing of conservation and amateur varieties.

Until recently, the legislation regarding the marketing of propagation material of agricultural and vegetable varieties created problems for the distribution of landraces and traditional varieties. As a result, the maintenance in situ of certain types of landraces and varieties which have been traditionally grown in particular localities and regions was threatened by genetic erosion (conservation varieties). Another type of variety that could be considered to be in danger of disappearing is the amateur varieties; varieties with no intrinsic value for commercial crop production but developed for cultivation under particular conditions.

## Plant genetic resources

It was felt that such varieties should be grown and marketed, even where they do not comply with the general requirements as regards the acceptance of varieties and the marketing of seed. In addition to the general aim of protecting plant genetic resources, the particular interest of preserving these varieties lies in the fact that they are suitable for growth under particular climatic, pedological or agro-technical conditions (such as manual care, repeated harvesting). Landraces and regional varieties (conservation varieties) are threatened because they do not fulfil the

criteria which are applied for testing such varieties for entry in the National Lists of the member states, e.g. they do not fulfil the uniformity requirements and/or fail the vcu (Value for Cultural Use) requirements. Amateur varieties are threatened because the financial income for the producers of these varieties is often very small, relative to the small quantities that are marketed. With such incomes, the costs for a normal DUS (Distinctness, Uniformity and Stability) test are too high. Since a high level of biodiversity is valued in the European Union, applied legislation was established to enable both conservation varieties and amateur varieties to enter the National Lists and, consequently, the EU Common Catalogues. Under this legislation, a balance is reached between the severe criteria for 'normal' varieties, which can be marketed in the whole European Union after listing without restriction, and the more lenient criteria for conservation varieties and amateur varieties, that allow restricted marketing.

## New legislation

Two new directives, one for agricultural species and one for vegetable species, were established. In these directives, a number of deviations are described

### Quantitative restrictions for the marketing of seed of vegetable conservation varieties

Maximum number of hectares per Member State for production of vegetable per conservation varieties

Allium cepa L. - Cepa group  
Brassica oleracea L.  
Brassica rapa L.  
Capsicum annuum L.  
Cichorium intybus L.  
Cucumis melo L.  
Cucurbita maxima Duchesne  
Cynara cardunculus L.  
Daucus carota L.  
Lactuca sativa L.  
Lycopersicon esculentum Mill.  
Phaseolus vulgaris L.  
Pisum sativum L.(partim)  
Vicia faba L.(partim)

Allium cepa L. -  
Aggregatum group  
Allium porrum L.  
Allium sativum L.  
Beta vulgaris L.  
Citrullus lanatus  
(Thunb.) Matsum.  
et Nakai  
Cucumis sativus L.  
Cucurbita pepo L.  
Foeniculum vulgare Mill.  
Solanum melongena L.  
Spinacia oleracea L.

Allium fistulosum L.  
Allium schoenoprasum L.  
Anthriscus cerefolium  
(L.) Hoffm.  
Apium graveolens L.  
Asparagus officinalis L.  
Cichorium endivia L.  
Petroselinum crispum (Mill.)  
Nyman ex A. W. Hill  
Phaseolus coccineus L.  
Raphanus sativus L.  
Rheum rhabarbarum L.  
Scorzonera hispanica L.  
Valerianella locusta (L.) Laterr.  
Zea mays L.(partim)



in the situation for 'normal' varieties. When the conservation varieties and amateur varieties fulfil these more lenient criteria, they will be added to the Common Catalogue with a special reference. Material may be marketed with certain restrictions to the region of marketing (conservation varieties) and/or the maximum quantity. Special information has to be mentioned on the labels to inform the grower.

### Definitions

*Conservation in situ*: the conservation of genetic material in its natural surroundings and, in the case of cultivated plant species, in the farmed environment where they have developed their distinctive properties.

*Genetic erosion*: the loss of genetic diversity between and within populations or varieties of the same spe-

cies over time, or reduction of the genetic basis of a species due to human intervention or environmental change. 33

*Landrace*: a set of populations or clones of a plant species which are naturally adapted to the environmental conditions of their region.

*Amateur variety or variety developed for growing under particular conditions*: a variety with no intrinsic value for commercial crop production but developed for growing under particular conditions. A variety shall be considered as having been developed for growing under particular conditions if it has been developed for growing under particular agro-technical, climatic or pedological conditions.

### DUS

Provisions as regards distinctness, uniformity and stability (DUS criteria) may be decided by the Member State, provided the characteristics shall apply which are referred to in:

- the technical questionnaires associated with the test protocols of the Community Plant Variety Office (CPVO), or the technical questionnaires of the Guidelines of the International Union for the

Protection of New Varieties of Plants (UPOV).

- for the assessment of uniformity for cross-pollinated varieties, the normal rules apply (relative uniformity related to the group of conservation or amateur varieties). For self-pollinating varieties, where the uniformity level is established on the basis of off-types, a population standard of 10% and an acceptance probability of at least 90% shall be applied.

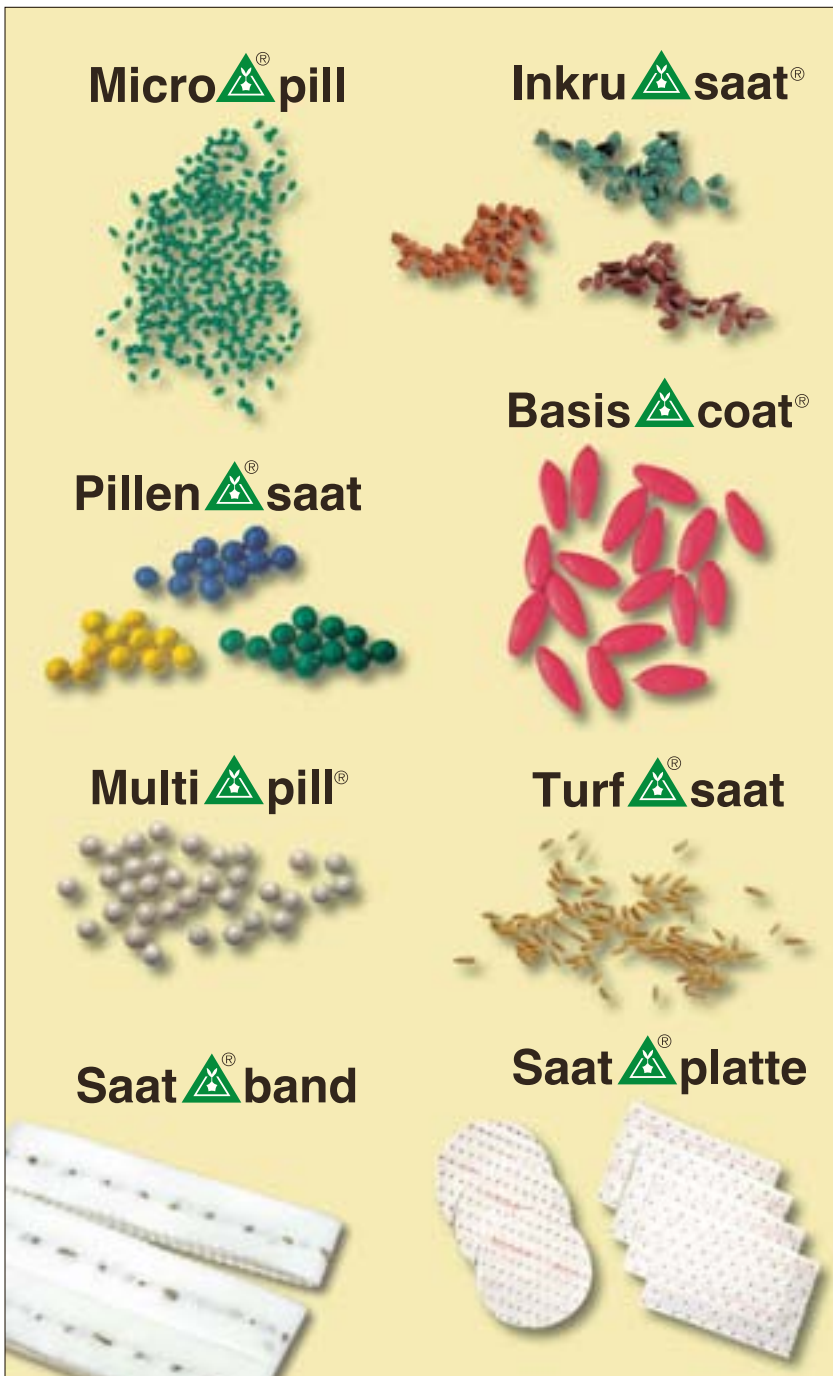
### Requirements

No official examination shall be required if the following information is sufficient for the decision on the acceptance of the conservation varieties:

- the description of the conservation variety and its denomination;
- the results of unofficial tests;

# Seed at its best

34



SUET Saat- und Erntetechnik GmbH offers neutral and independent contractual services for all species of seeds

- Processing
- Pelleting
- Film-coating with Insecticides, Fungicides or biologically active ingredients
- Seed tapes and other seed forms also with Certification and worldwide logistics.

Our development, process installations and procedures meet the highest standards of quality, safety and environmental protection, with official authorization also for genetically modified (GM) seeds.

We also offer tailor-made

- Products for use in organic farming
- Pelleting and film-coating technology
- Coating material and suspensions

**SU  ET**

SUET Saat- und Erntetechnik GmbH

PO Box 1780 – D-37257 Eschwege

Phone: +49 (5651) 927-5

Fax: +49 (5651) 927-324

<http://www.suet.de>

E-Mail: [info@suet.de](mailto:info@suet.de)



For amateur varieties  
the EU has established  
more lenient criteria



- knowledge gained from practical experience during cultivation, reproduction and use as notified by the applicant to the Member State concerned;
- other information, in particular from the plant genetic resource authorities or from organisations recognized for this purpose by the Member States.

**Exclusion of acceptance:** Excluded are varieties that are already listed in the common catalogue of varieties, or if they have been deleted from that common catalogue within the last two years, or if it is protected by plant variety right, or an application for such a right is pending.

**Denomination:** The normal denomination rules apply. However, if the denomination was known before 5 May 2000, derogation from these rules is possible.

**Region of origin:** Conservation varieties are linked to a region; the region of origin. Maintenance, production and marketing should take place in these regions. It is possible to nominate additional regions for production and sales.

**Quantitative restrictions:** Each Member State shall ensure that, for each conservation variety, the quantity of seed marketed per year does not exceed the quantity necessary for producing vegetables on a given number of hectares. For amateur varieties, the quantitative restriction is given by defining the maximum net weight of the small packages.

**Labelling:** In principle, the normal labels may be used, provided they include the words 'certified seed of a conservation variety' or 'standard seed of a conservation variety'; and the region of production is added for conservation varieties. For amateur

varieties, the words 'variety developed for growing under particular conditions' shall be added.

### **Agricultural conservation varieties**

Each Member State shall ensure that, for each conservation variety, the quantity of seed marketed does not exceed 0.5% of the seed of the same species used in that Member State in one growing season, or a quantity necessary to sow 100 ha, whichever is the greater. For the species *Pisum sativum*, *Triticum* spp., *Hordeum vulgare*, *Zea mays*, *Solanum tuberosum*, *Brassica napus* and *Helianthus annuus*, that percentage shall not exceed 0.3%, or a quantity necessary to sow 100 ha, whichever is the greater.

However, the total quantity of seed of conservation varieties marketed in each Member State shall not exceed 10% of the seed of the species concerned used yearly in the Member State. In cases where this leads to a quantity lower than necessary to sow 100 ha, the maximum amount of seed of the species concerned used yearly in the Member State may be increased in order to reach the quantity necessary to sow 100 ha.

# EU attempts to reduce red tape and decrease bureaucracy

John van Ruiten

36 Within the general EU policy of creating 'better regulations', the legislation surrounding the marketing of propagation material and the phytosanitary directive are now also subject to a process of evaluation and improvement.

'Better regulations' is one of the key priorities of the European Commission. It is a major effort to improve the quality of existing rules. It wants to achieve important goals, such as ensuring a fair and competitive market, protecting health, providing safety, stimulating innovation and preserving the natural environment. It also aims to reduce 'red tape' and decrease unnecessary bureaucracy. Politicians have given the EU Commission the task of providing better regulation by also making the decision-making process more accessible and involving a broad range of stakeholders in policy development.

## Marketing directives

At this time, the EU has twelve directives on the marketing of seed and plant propagating material (see table). The oldest ones, in agricultural species and forestry, originate from 1966. The most recent ones are the directives developed in the early 90's, on ornamentals, fruit crops and young vegetable plants. The directives are aimed at safeguarding the identity, quality and health of propagating material that is marketed. The main elements are suppliers' registration, variety registration, supervision and control and certification/labelling.

In 2007, the EU ordered an external consultant, FCEC (Food Chain and Evaluation Consortium), to start reviewing and evaluating the existing legislation. Through a process of questionnaires, interviews and meetings, the consultant FCEC produced an evaluation report in 2008. Based on that report, presented on 18 March 2009 to competent authorities and stakeholders, the EU Commission formulated an Action Plan. The overall aim is to go from these twelve directives to one single horizontal Seed Law. It also aims to create better harmonization of the implementation in the Member States. And the Commission wants to simplify the system in order to reduce administrative costs (both for authorities and for companies). Furthermore, the Commission wants to improve the link between EU regulations and global/international standards (like OECD), and wants the EU to play a key role in the global setting of standards. Of course, the most important objective of this legislation remains: to ensure the availability of good Seeds and Planting Material, that meets the expectations of users and

that promotes the competitiveness of EU companies.

## Proposals

This spring, the EU Commission is developing proposals for this legislation. What is very important in the process is that a so-called 'impact assessment' is required before a final legislative proposal can be made.


It is expected that various 'new topics/proposals' will be reviewed, such as:

- crops of minor importance in MS/EU are regulated differently (fewer requirements);
- introduction of FVO (Food and Veterinary Office) audits to stimulate the harmonised implementation in MS;
- other possibilities for carrying out DUS/VCU tests (possibly under supervision and/or at other locations);
- introduction of a formal link with EU policy such as human health, food safety, plant protection products, plant health and biodiversity;
- a proposal to include public health criteria into variety registration (eg. safeguarding mycotoxins);
- to intensify the role of CPVO (Community Plant Variety Office in Angers) also for registration of non PBR protected varieties;
- online common catalogues and databases.

Stakeholders are invited to participate in the present 'creation of proposals' in a specific working group. It is expected that at the end of 2010/start of 2011, legislative proposals will be published/presented.

## Plant health regime

In 2009, the Commission also started the evaluation and modernisation of the Common Plant Health Regime (CPHR). Essentially, the most important legislation is the EU phytosanitary directive 2000/29. This directive regulates the healthy movement of seeds/plants and plant products. Within the EU, 'plant passport' requirements form the basis of safeguarding the prevention of harmful organisms being transmitted. The plant passport is an official document, usually provided by the supplier, but issued under the responsibility of the phytosanitary authority. It states that the material mentioned on the passport has come from a production location that has been found to be free of



harmful organisms. The directive also regulates the import of plants into the EU from third countries. The Commission again gave consultant FCEC the task of carrying out the evaluation. They started in summer 2009 and it is expected that the report of FCEC will be completed and presented to both the Commission and to stakeholders in the autumn of 2010. The evaluation should cover both the general directive and also specific EU phytosanitary emergency measures and specific control directives. The FCEC should also be fully aware of the requirements for coherence with legislation on Seeds and Planting Material

### Evaluation

Recently, on 23-24 February 2010, FCEC presented its 'interim evaluation results' in a Brussels Conference on 'Modernising CPHR in view of globalisation and climate change'. Many topics were on the table for discus-

sion. The most important topics that were presented and that will, therefore, possibly lead to further action (future legislation) were:

- inclusion of more invasive alien species with impact on environment and also on animal/human health; deciding on the list of HO's (harmful organisms). Priorities in inspection and eradication programs (focussing on major threats) have to be made regarding the limited resources of governments for phytosanitary programs;
- introduction of RNQP's (Regulated Non Quarantine Pests) into legislation (either Seed Law or Phytosanitary Law);
- strengthen the measures in relation to imports by more collaboration with exporting third countries, intensified import inspections, post-entry quarantine and/or post-entry inspections;
- developing better programs for harmonised surveillance for priority/major HO's in the EU;
- harmonization of the plant passport document/logo and the inspection system when issuing these passports;
- using more pro-active PRA's (Pest Risk Assessment) to decide on policy about potential threats;
- coming to more rapid notification, early action and appropriate prompt eradication and surveillance plans when new organisms have entered the EU;
- developing a system with more incentives for private operators to improve both awareness and cooperation in phytosanitary policies.

It is expected that in 2011 and 2012, both an action plan and legislative proposals will be developed by the EU Commission. In 2012/2013, an impact assessment will be made. A new Phytosanitary Law might be expected by 2014. Considering the points discussed at the conference, it is to be expected that there will be a future expansion and intensification of phytosanitary programs and policies.

### EU directives on the marketing of seeds/planting material

66/401	on the marketing of fodder plant seed
66/402	on the marketing of cereal seed
68/193	on the marketing of wine plant propagating material
92/33	on the marketing of vegetable plants
92/34	on the marketing of fruit plants (will be renewed in 2012 : Directive 2008/90)
98/56	on the marketing of ornamental plants
99/105	on the marketing of forest reproductive material
2002/53	common catalogue of varieties of agricultural species
2002/54	on the marketing of beet seed
2002/55	on the marketing of vegetable seed
2002/56	on the marketing of seed potatoes
2002/57	on the marketing of oil and fibre plant seed

The full text of these directives can be found (in all EU languages) on the website EUR-Lex



# Making genomic breeding affordable for more companies

Charles Frink

38 **Genetwister Technologies, located in Wageningen, the Netherlands, specializes in genomic breeding and green biotechnology of agricultural and horticultural crops. Propytha spoke with Douwe de Boer, co-founder and managing director of Genetwister.**

• **Genetwister Technologies** uses expression profiling and functional genomic approaches, in combination with proprietary software, to identify and isolate genes involved in various physiological and developmental processes. These genes are used as biomarkers for genomic breeding, as tools in green biotechnology and are used to create diagnostic tests. The company was founded in 1998.

*Your competitor, Keygene, was founded in Wageningen in 1989 by a consortium of vegetable seed companies. Starting out nearly a decade later, did Genetwister initially focus on vegetable breeders?*  
“From the beginning, in 1998, we worked with vegetable breeding companies, but this was not the primary focus. We initially focused on the full range of horticultural crops, which of course includes vegetables. Vegetables have remained an important product, but we have increased the number of projects with field crops. These include sugarcane and especially energy crops, such as crops for biodiesel. Our strategy has been to develop across the entire range of crops.”

*The costs of genomic breeding, where genetic tools are used in conventional breeding and selection, are still dauntingly high for many breeders. Due to rapid advances in technology, will there be a price drop that will give smaller breeders access to these tools?*  
“The costs of genomic breeding are indeed high, but it is a matter of opinion if they are ‘dauntingly high’. We not only try to make the technology accessible for smaller breeders, but also for crops with a smaller market and ‘difficult crops’, i.e. crops that have not been compatible with genomic breeding until now. We are involved with various projects specifically in order to make genomic breeding more affordable.”

*What are these smaller crops?*  
“We work a great deal with ornamental crops. By definition, ornamentals are crops with a smaller market, and here as well, we attempt to develop a marker-driven approach. In the vegetable segment there are also many smaller crops to which genomic breeding can now be applied; everything is getting cheaper and alternative approaches have been developed. I cannot discuss the projects in too much

detail, because much of this information is still confidential, but they do concern smaller crops.”

*Could you cite a unique selling point, philosophy or approach that distinguishes you from competitors, such as Keygene?*  
“From the outset, we focused on gene activity, or what is usually called transcriptomics or functional genomics, and have developed applications and software based on these approaches. By implementing this approach, we can tackle certain genetic problems more easily. For example, we can deal with crops having very large genomes, for which genetic modification is less suitable. We have always worked with ornamental crops, some of which have very large genomes. Another important distinction is that we focus on a variety of crops, not only vegetables. This enables us to compare crops and choose elements from the approaches used for various crops. As a result, the approaches and expertise gained for one group become increasingly useful for other groups. Finally, because we concentrate on developing lower-cost technologies, we can expand our range of clients and do not have to focus exclusively on the largest customers.”

*Who are your main clients?*  
“Our main clients are plant breeders, but we also have clients in primary agricultural production, both food and non-food, and we are involved with companies in processing and trade. Clients from the production chain have different needs than breeders. For example, traders want to have marker discovery for diagnostic purposes, while breeders primarily want technologies to be developed for genomic breeding. We have clients across the entire production chain: food crops, ornamentals and industrial crops.”

*A second competitor is PRI, also located in Wageningen. It is a public-funded research institute (part of Wageningen University and Research Centre), but takes an entrepreneurial approach. How do feel about competing with a public research institute?*  
“I would turn the question around. There are relatively few start-ups in Wageningen. This says something about the possibility of competing with a strong public research institute. If you look

Douwe de Boer:  
'We concentrate on developing lower-cost technologies, so we can expand our range of clients and do not have to focus exclusively on the largest customers'



at other universities, such institutes are not present, and you see many more start-ups. It is clearly an impediment to have a public research institute like PRI, which is essentially an unfair competitor. We have to fund our development largely from our own means. To compete with them, we have always tried to distinguish ourselves with aspects such as greater flexibility and better client orientation.”

*Plant genetics expertise has traditionally been concentrated in the Wageningen area. Is there now enough concentration and scale to make Wageningen into the Gene Valley of the Netherlands, or of Europe?*

“There is indeed a respectable concentration of companies in Wageningen that focus on genomic breeding and plant biotechnology. Wageningen certainly distinguishes itself from other regions in this respect. But it is not for me to say if Wageningen is the Gene Valley of the Netherlands or Europe. In any case, you can say that Wageningen is where plant genetics research and development is concentrated in the Netherlands, and that we also take a prominent place in Europe, although there are of course universities elsewhere in Europe that are active in this area.”

*In 2006 the Genetwister Group was established to provide structure for the many joint ventures with partners and affiliates in Africa and Asia. What are some of these companies?*

“You could describe these companies as local service providers for biotechnology. They also operate as agents for Genetwister. We have companies in these regions that acquire research projects for us. Locally, the companies earn money by providing applied research services.”

*Is your interest in Africa and Asia part of a long-term strategy?*

“Our interest in these regions is indeed part of a long-term strategy. We are already very active in many parts of Asia. We are active in India, we have a joint venture in Malaysia and we are working intensively in Thailand with one of our partners. As a biotech company, our long-term strategy is to be active worldwide.”

*What about China?*

“China is a very interesting market, but a very difficult one, much more difficult than south-east Asia and India. We are active in China with a number of projects and local frameworks of cooperation, but it remains a very difficult country in which to operate. It not only has a totally different culture, which is difficult for us to fathom, but it also tends towards isolation. With an internal market comprising one-fifth of the world population, they can apparently afford to do so. China is not yet strong in genomic breeding, but is very strong in genomics and genome sequencing. The potential in China is enormous, and this is why we have chosen to remain active there. The question is whether this strategy will be ultimately successful. We have been approached for strategic cooperation, but everything in China is concentrated at university level. The development of technologies for companies often takes place at the universities. As a commercial company, it is very difficult for us to work on product development with a university group. Moreover, in China everything tends to disappear into a ‘black hole’. You can protect your intellectual property, but holding the rights and enforcing them are two very different things.”

*Your company recently entered a strategic alliance with Bejo Zaden and the East-West Seed Group.*

*This partnership includes acquisition of shares of Genetwister and rapid implementation of genomic breeding technology in the breeding programmes of both seed companies. The partners will also join Genetwister’s advisory board. Do you see new synergies developing from this alliance?*

“These are our first strategic alliances, but we are involved with establishing a number of others, which will be announced in due course. Due to the shared knowledge and expertise from these companies, these alliances enable us to increase our development in fields such as bioinformatics, specifically in areas with market importance. As a result, we can focus our research efforts much more effectively on useful applications. Due to the alliance, we can not only continue our development, but we have also acquired the means to accelerate this development. This is the primary synergy. The advisory role of these strategic partners will give us a much clearer focus. For these companies, the advantages are obvious: accelerated implementation of specific genomic and bioinformatics applications in their operational management.”

# Snow White is not a

Jaap Kras

40 Nine years ago the Dutch company, Astée, introduced two gypsophila varieties. The Israeli company, Danziger, claimed that both varieties were essentially derived from their 'Million Star'. In 1995, the Civil Court in The Hague, the Netherlands, decided in favour of Astée, and in December 2009 the Court of Appeal in the Netherlands subscribed its viewpoint. There are many lessons to be learned.

• **Breeder's rights** are all about balancing. On the one hand, it protects the intellectual properties of the breeder and the financial gains that come with it. On the other hand, the ultimate goal is to stimulate variety improvement and, therefore, the use of protected varieties in breeding programmes, the so-called breeder's exemption. The introduction of the concept 'essentially derived variety' (EDV) in 1991 should have balanced the objectives. The legislation, however, comes at a price as breeders have not stopped crossing swords over this matter.

### Source of debate

Breeders have always had the problem of spontaneous mutants. After years of breeding and enormous investments, a breakthrough in a crop is found. When the variety is introduced on the market, a farmer may find a mutant solely due to the large number of plants he grows. Another problem is that when a breeder introduces a new, successful variety, others may use it to breed a variety that only differs from the original one in a minor aspect. Today, these plants are protected by EDV-regulations. Until 1991, the introduction of a variety depended on one question only: does it fulfil the requirements to be granted breeder's rights - yes or no? Today, there are two questions to be answered: can the authorities grant the variety breeder's rights on its own, or is it an essential derived variety? In the latter case, the permission of the breeder of the initial variety is required to commercialize the new variety. This second question is a very difficult one, because all life on earth is derived from living parents. The word 'essential' has therefore become a source of fierce debate. The discussion is concentrated on the problem of how large the distance between varieties must be, before it can be claimed to be new and not essentially derived. Should a begonia that only differs from an existing variety in that the root is not yellowish brown but brownish yellow deserve independent breeder's rights? The decision of the Court of Appeal in the Netherlands clarifies the matter.

### Snow White

In September 2001, the Dutch company, Astée, brought two new gypsophila varieties on the market named 'Blancanieves' (Spanish for 'Snow

White') and 'Summer Snow'. On 9 February 2004, EU breeder's rights were granted for these two new varieties. Danziger claimed that these two varieties were essentially derived from its variety 'Million Star' (breeder's rights name 'Dangypmini'), protected by EU breeder's rights since 13 July 1998. Based on a DNA test, Danziger concluded that 'Blancanieves' was a polyploid version of 'Million Star' and, therefore, an EDV. As a consequence, Astée needed permission from Danziger for commercialization of the variety. The two parties did not agree and the case came before the court in The Hague, the Netherlands, in two lawsuits: a summary proceedings and a standard procedure. The Civil Court decided as follows: There are phenotypical differences in the colour of the leaves, the branching, the flower buds, and the flowers themselves. According to experts, 'Blancanieves' is morphologically spoken not essentially derived. There were at least five, and maybe even twelve, differences in appearance between 'Blancanieves' and 'Million Star'. The court confirmed that there were too many phenotypical differences and, therefore, it was not an EDV.

### Appeal

On 29 December 2009, the Court of Appeal in The Hague appealed against the decision in this case. The important question was the interpretation of articles 13, 6 sub a and c of the EU Plant Variety Protection versus the text of art. 14, 5 b (iii) of UPOV. The latter says: '...while retaining the expression of the essential characteristics that result from the genotype or combination of genotypes of the initial variety'. This sentence is absent in the EU legislation. The European Plant Variety Protection Act states that one of the conditions used to conclude that a variety is an EDV is that it is predominantly derived from an initial variety, or from a variety that is itself predominantly derived from an initial variety, while retaining the expression of the essential characteristics that result from the genotype or combination of genotypes of the initial variety. The Court of Appeal decided both articles should be interpreted likewise. So the question was: what is important, only the morphological conformity or also the genetic conformity? The court's answer is



# fairy tale



that for a variety to be an EDV, both phenotypic as well as genotypic conformity is required. Based on the UPOV treaty, the Court of Appeal agrees with the Civil Court and says: only one or a few differences are allowed to conclude a variety is an EDV. The argument that because of polyploidisation (interpreted to be mutation breeding) an unlimited number of differences are allowed for the new variety to be still qualified as an EDV, has been swept aside.

## Lessons

The court stated further very important things:

- The demands formulated in art. 13,6 of UPOV are cumulative. That means an EDV has to fulfil all the demands formulated in this article.
- The proof whether or not a variety is an EDV is up to the breeder of the original variety, who has to prove the claim.
- Whether or not a variety is an EDV depends not only on phenotypical but also on genotypical characteristics.
- The differences between the four AFLP analyses are enormous, which leads to the conclusion that the

results of these DNA-tests are unreliable. AFLP is per definition unfit to decide on these questions, as 230-260 markers are not sufficient. The AFLP markers are not well spread over the whole genome but form clusters, and for reliable research one has to take the whole genome into account.

- For ornamentals, morphological characteristics are essential for the value of a plant.

## More lessons

It has also become obvious from this case that going into court is expensive and time-consuming. Before the court came to this, for Astée favourable, decision, Astée went into bankruptcy in September 2009 and did not gain from its victory. It took years to come this far and if this case goes to the Supreme Court, it will take at least another year before a final decision will be made. To make things worse, Astée has not been granted any compensation for image damage or lost turnover. All in all, the conflict as to whether or not 'Snow White' is an EDV from 'Million Star' only produced losers and no winners.

# Questions, answers and exciting prospects

Geert-Jan de Klerk

42 **Nutrient media used in plant tissue culture contain all the components necessary for growth: sucrose for energy and as a source of building blocks, inorganic nutrients, plant hormones and vitamins. It is usually taken for granted that these compounds reach the target tissues in the explants (among others growing tissues) in adequate amounts. In this article it is shown that this is not self-evident and that the movement of medium components is probably suboptimal, resulting in inferior growth. Understanding the mechanisms of movement of solutes in vivo and in tissue culture offers new possibilities for enhancement of growth in vitro.**

**The rate of propagation** in vitro is usually many times higher than the rate of vegetative propagation in vivo. The high propagation rate is achieved by activation of axillary buds (breaking of apical dominance) and by enhanced adventitious regeneration of new meristems. In addition, many propagation cycles may be performed per year instead of only one or only a few. In plants growing in the field, the relative growth rate (RGR;  $g\ DW\ increase.g^{-1}.day^{-1}$ ) is 0.1 – 0.3. Because of the abundance of inorganic nutrients and water, and because of the constant high temperature, one might expect a higher RGR in vitro. However, the RGR of shoot cultures is relatively low, ca. 0.1. In lily, growth in vitro is even much less than ex vitro. This paper discusses the causes of poor growth in vitro. On the basis of this, new methods may be developed to boost growth.

## Movement of solutes

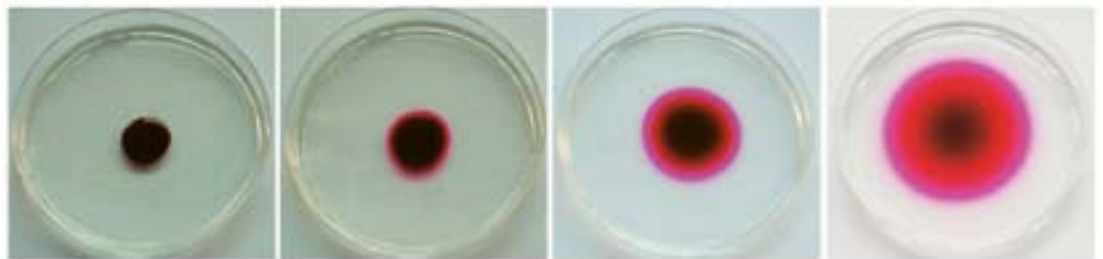
Solutes (compounds dissolved in water) move in two ways: (1) by diffusion and (2) by 'hitching' with the water flow. Diffusion is driven by random thermal agitation and is fast over short

distances, but very slow over large distances. According to Fick's law, diffusion over 1 meter takes 32 years, over 2 cm one week, and over 50  $\mu m$  2.5 seconds. Therefore, plants use water flow in the vascular tissues for long-distance transport. Polar auxin transport is a notable exception. In this case, randomness of movement – the reason for the slowness of long-distance movement – does not occur because of the location of auxin efflux carriers at the basal side of cells. The extreme slowness of diffusion relative to movement via water flow is illustrated in Figure 1. Figure 2 shows the major steps in the movement of compounds in the nutrient medium to the target tissues.

## Movement in the medium

In solidified medium without shoots, movement of solutes via water flow is negligible, but when shoots are cultured, massive water flow occurs within the solidified medium. This flow can be visualized with dyes. The water flow is part of a water-cycle from medium to shoot to headspace and back into the medium. The cycle is driven by transpira-

solidified medium



liquid medium



start

15 minutes

4 hours

24 hours

Figure 1. Diffusion of a dye, acid fuchsin, in medium solidified with agar and in liquid medium. Note the slow diffusion on the agar medium

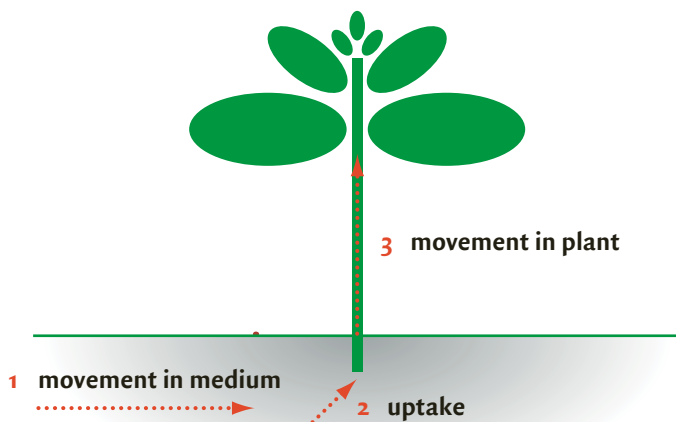


Figure 2. Translocation of medium components to the target tissues in the explant

tion from the leaves which may reach 0.2-0.6 ml per day for a cluster of 5 shoots (see below). When a medium component acts only for a short period (a few days), local exhaustion of the medium is evident. An example is auxin during adventitious root formation. Auxin only acts during the formation of root meristems, a process occurring within a few days. This period is too short for adequate replenishment of auxin taken up from the medium. Thus, for explants that are at close distance, a higher level of auxin (twice as much) is required to achieve maximal rooting than for scattered explants (Figure 3). In this respect, it should also be noted that agar is slightly negatively charged. Because of this, diffusion of bivalent cations ( $\text{Ca}^{++}$ ,  $\text{Mg}^{++}$ , etc.) is reduced. Gelrite, another common solidifying agent, is an anion with  $\text{COO}^-$  groups. Therefore, in medium solidified with gelrite, diffusion of bivalent cations is lower than in agar. It is well known that the efficiency of kanamycin (a cation), is reduced in medium solidified with gelrite.

### Uptake by the explant

Medium components reach the interface of explants and medium by diffusion and by the water flow described above. The cuticle is a major obstacle for the uptake into the explant. The cuticle consists of cutin and waxes and this makes the epidermis almost impermeable for water-soluble compounds. Thus much uptake occurs via the cut surface. Obviously uptake by protoplasts, cells and callus that are not covered by a cuticle, is much quicker than uptake by shoots. After some period of time, the cut surface is repaired

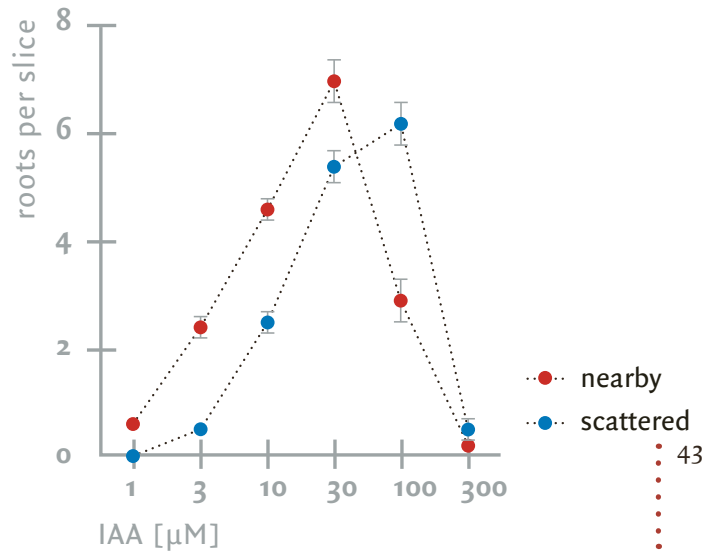


Figure 3. Rooting of apple stem slices. The slices were cultured close to one another ('nearby') or scattered in the Petri dish. Note that the 'nearby'-slices required a higher concentration of auxin in the medium to achieve maximal rooting

and wound periderm is formed. In vitro, this also lacks a cuticle. Uptake by shoots in liquid medium may occur via the leaves, presumably via the stomata.

### Transport in the explants

As mentioned previously, in plants growing in vivo, the vascular system is used for long-distance transport. The xylem transports inorganic compounds from the roots and is driven by transpiration of water from the leaves. The phloem transports organics from source to sink tissues, in particular to growing tissues. Water movement in the phloem is driven by an osmotically generated pressure gradient between source and sink (the pressure-flow model). Plants have specific mechanisms for uploading and unloading of the phloem.

In tissue culture, both inorganics and carbohydrates have to move upwards in the plant. It is probable that water flow in the xylem plays a major role. It is not known whether the phloem also plays a role. Is transport via the flow in the xylem the main transport route for sucrose and are plants sufficiently flexible to direct sucrose to the growing tissues?

As mentioned above, transpiration occurs in tissue culture but this has never been examined. We have analyzed this in a simple experiment. Shoots were placed in eppendorf tubes with nutrient medium and the tubes were transferred to a container with medium. The loss of water from the tubes was measured and found to be ca. 30  $\mu\text{l}$  per  $\text{cm}^2$  leaf per day, a small percentage of the transpiration of in-vivo plants. This is probably not enough to supply the growing tissues with sufficient nutrients as shown





Figure 4. Dahlia after a subculture on static liquid medium (left) and on agar. Note the rapid growth on liquid medium. Note also top necrosis on agar medium (indicated by arrows). Top necrosis is caused by too low a  $Ca^{2+}$  level in the tissue

• by the increased growth in liquid medium. When shoots are cultured in a low level of static liquid medium or in temporary immersion bioreactors, growth increases several-fold (Figure 4). The reason for the increased growth is not known but may very well be as a result of the uptake of nutrients by the leaves so that the distance between the site of uptake and the growing tissues is significantly reduced.

**Conclusion**

The title of this paper addresses the question of how plants can grow in tissue culture. The rationale of this question is that diffusion is too slow to supply sufficient medium components to a

shoot cultured in vitro. The answer for shoots is clear. In tissue culture a water cycle occurs: water is taken up and transported to the leaves, transpired into the headspace and then condensates back into the medium. Medium components move with this cycle to the target tissues. When components are also taken up by leaves (in liquid medium and in Temporary Immersion Bioreactors) growth is boosted. This suggests that the water cycle supplies insufficient components to obtain maximum growth. If the capacity of the cycle can be enhanced, growth will be greatly increased. PRI will initiate experiments on this.

# We are breathing tissue culture

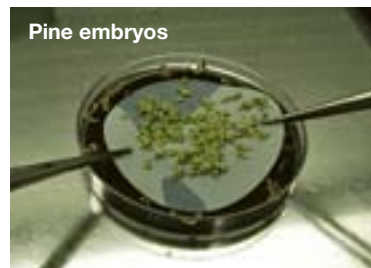


Harvesting of about 5.000 banana plantlets from one 50 l. vessel (TIB)

**Optimal client convenience**

- Stimulation of and respect for breeders' rights
- Real time information about clients' production via internet
- Deliveries according to request: in amounts, delivery time and quality
- Service provider in breeding support, stock preservation and research
- Most advanced technologies, ensuring lower prices  
Temporary Immersion in Bioreactors (TIB)  
Somatic Embryogenesis (SE);

**Breathing?** Yes, we think, we talk and perform tissue culture, being perfectionists in this technique. So one could honestly say that we are committed to and identify ourselves with high quality performance for our customers. Our portfolio stretches from ornamentals, vegetables, fruit, forestry, sugarcane, potato to pharmaceuticals. Highly qualified personnel handle your valuable products with care and passion.



**SBW do Brasil**, your partner in expanding business in the new upcoming, booming markets of North & South America  
**Contact** connywit@sbwbrasil.com.br  
© +55 19 3902.4041, visit our website: www.sbwbrasil.com.br



# UC Davis creates cradle for new breeders

Monique Krinkels

The north-western part of the Netherlands proudly calls itself 'Seed Valley'. With a nudge and a wink to its successful role model, Silicon Valley, it hopes to strengthen the regional economics by cooperation between companies. This year it is supporting the start of the European Plant Breeding Academy.

Of old, the north-western part of the Netherlands has been the centre of vegetable and ornamental seed production, breeding and seed technology. Since 2008, it has been nicknamed Seed Valley. When you name a region as flat as the northern part of the Netherlands a valley, there must be something more to it. It is a metonym that refers to a concentration of over 35 companies involved in breeding, producing, treating and selling seeds, cuttings and young plants.

## Namesake

For over a century, the region has been the cradle of many new vegetable and ornamental varieties and, as such, has a name to uphold. Just as Silicon Valley, the high-tech businesses in an area south of San Francisco, USA, is named after the most important compound in computer chips, Seed Valley refers to the most important product of the north-western part of the Netherlands. Five of the most important global vegetable seed producers have a branch, if not their head offices, in Seed Valley: Bejo Zaden, Enza Zaden, Nickerson-Zwaan (part of Limagrain), Seminis (part of Monsanto) and Syngenta. The Seed Valley Foundation is focused on cooperating in several fields. The member companies want to form a knowledge centre, cooperate in pre-competitive research, strengthen their economic and political

influence, and invest in attracting skilled personnel. The latter is one of the major problems all agricultural and horticultural companies are facing. Skilled labourers are difficult to come by, but academics are also hard to find. As everywhere around the globe, breeders in particular have become scarce in the Netherlands and, thus, in its north-western province.

## Hope

But there is hope that the tide is turning. In March, the newly founded European Plant Breeding Academy started a two year course in Europe. Over a period of 36 days, individuals already involved in breeding will be able to attend a course at master level and become fully trained plant breeders. This is being organised by the Davis Plant Breeding Academy of the University of California in partnership with European institutions and associations. The University of California at Davis has a long history in breeding. From the late 1940s on, it has released new varieties in numerous crops, from walnut to strawberry and from barley to grapes. In 2006, it started a part-time course consisting of six modules of six days alongside the full-time undergraduate and graduate study programmes. The programme covers genetics, statistics, and plant breeding and is designed to balance lectures, discussions, workshops and field trips with commercial breeders to enhance the experience across breeding systems, crops and countries. The principal trainers are Rale Gjuric, president and managing director of Haplotech Inc., a plant breeding service company in Canada, and Idy van Leeuwen, owner of Breedwise, a training company for plant breeding in the Netherlands. This spring, fourteen students started the course with the first six day programme in the Seed Biotechnology Centre at UC Davis Department of Plant Sciences. The other locations of the course are Angers in France, Enkhuizen in the Netherlands, Barcelona in Spain, and Gatersleben in Germany. The students are employed by Norddeutsche Pflanzenzucht Lembke (NPZ) in Germany, Chia Tai Co. in Thailand, Monsanto and Semillas Fito in Spain, Bayer CropSciences in Belgium, Deutsche Saatveredelung AG in Germany, Zeraim Gedera Ltd. and Hazera Genetics in Israel, Syngenta in France, and Boreal Plant Breeding Ltd. in Finland.



# New insecticide seed treatments prove innovative

Charles Frink

46 The main advantages of seed treatment are that minimum quantities of active ingredient are needed and the method is highly effective and safe in professional use. As with all crop protection products, however, separate approval is required for every crop – a lengthy and expensive process. This makes registration unfeasible for many crops. Syngenta Seed Care introduces new, innovative insecticide treatments.

• Syngenta's CRUISER® is the world's best-selling insecticide seed treatment brand. In the Netherlands, three formulations have been approved under the Cruiser brand: Cruiser 600 FS for sugar beet seed and for application on seeds for export (e.g. lettuce and endive for France), Cruiser 350 FS for maize seeds (registration is pending for peas and flax) and Cruiser 70 WS for fine vegetable seeds, especially lettuce and endive (registration is pending for brassicas and carrots). The latter crops require specific application technology. The combinations of these techniques and thiamethoxam are sold under the FarMore brand.

## Early season pests

Cruiser 600 FS is applied to beet seed as a top-coating during a pelleting process, resulting in a pellet containing both seed and seed treatment. The active ingredient is absorbed into the seedling during germination, and soil and early season pests (during the first 30 to 40 days of growth) are intoxicated when they try to feed on the treated crop. Seed treatment has a minimal impact on non-target organisms; this is due to the precise positioning of the active ingredient and the lower amounts applied per ha. Moreover, the exposure risk is low since only a small area of the field is actually covered with plants grown from treated seeds. Compared to crop spraying, insecticide seed treatment has many advantages for growers:

- lower risks for environmental and occupational safety;

- improved early plant stands and more homogeneous crop growth;
- accurate dosing results in low or negligible residue levels and optimal efficacy;
- the treatment remains active for 8-10 weeks after sowing;
- reduced labour; less time is needed for crop monitoring;
- reduced input; fewer chemical applications on the field.

Seed treatment also has advantages for seed houses and propagators:

- coating is a clean and modern process with safe working conditions;
- treated seed can be stored with minimal effect on germination relative to untreated seed;
- seed can be treated at any time by the seed company;
- application can be controlled precisely and the dosage is very accurate.

## Diluted

According to Henk van der Maarel, key account manager for Syngenta Seed Care, the active ingredient does not actually break down significantly, but is 'diluted' as the seedling grows. There are no restrictions (waiting times) on the sale of lettuce and endive, but there is a MRL (Maximum Residue Level) for thiamethoxam. "Many crop samples of lettuce and endive have been analysed, and up to now no more than 20% of the MRL has been found", says van der Maarel. If stored under cool conditions, the seed treat-

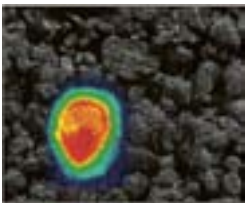
## Pant vigour

For a number of years, observations have been reported of faster emergence, greater plant stands, earlier canopy and increased root mass correlated with seed treatment with thiamethoxam. In 2006, based on laboratory and greenhouse tests conducted at the University of Berlin in Germany and the University of São Paulo in Brazil, Syngenta concluded that the mechanism behind the positive

effects of thiamethoxam lies in its ability to increase the production of plant-specific proteins. This increase in functional protein biosynthesis results in a plant with stronger stress defence capabilities. Plants treated with thiamethoxam therefore have improved ability to deal with adverse environmental conditions, such as water deficiency, heat shock, pests and elevated salt levels.

"This new research supports what growers across the globe have been experiencing for years", stated David Lawrence, Head of Research and Technology at Syngenta, "that thiamethoxam produces a more vigorous, higher-yielding crop even when there is extremely minimal insect pressure." Syngenta believes that this research could point the way to a potential new class of vigour inducing compounds.





ment remains effective and there is little effect on germination. “But the problem is always the initial quality of the seed. A batch with good vigour and germination can be stored without problems, but a batch with marginal or poor quality cannot. Germination after storage is always relative to the initial quality”, he explains. Besides the traditional filmcoating method, propagators can use two innovative seed treatment methods: Sanokote® Smart (dummy pill) and Phyto-drip. With the Smart method, the live seed is not treated. Instead, a coated ‘dummy seed’ (pellet containing dead seed) is sown next to the live seed with a second sowing unit. When the live seed germinates, it quickly absorbs the active ingredient released from the dummy. Tests have shown that this method is equally effective to that used for treated live seed. With the Phyto-drip method, a droplet of Cruiser is

companies to avoid treating large batches of seed, which could become worthless in case of broken resistance. “If Bremia resistance is broken in a variety, growers sometimes have to quickly switch varieties. This requires flexibility from the seed company. If traditional film coating is used as a seed treatment on this variety, the seed company could be saddled with a large batch of coated seed that can perhaps no longer be sold. The Phyto-drip application offers more flexibility because the seed can be treated as required”, explains van der Maarel.

### FarMore

Besides Cruiser, Syngenta offers other seed treatment products for vegetable seeds: Apron XL and the insecticide Force 20 CS (only in the UK). Syngenta recently received approval for the fungicide, Wakil XL, for disinfecting peas. Henk van der Maarel: “We currently have a number of fungicides in development for vegetable crops, which will ultimately replace the ‘old’ combination of thiram plus carbendazim. We are also working on solutions for beans. In addition, we have initiated a study with FarMore iQ, a growth regulator for tomatoes. This product yields more robust plant material.” Syngenta is marketing its portfolio of seed treatments for vegetable crops under the FarMore brand. “FarMore is the first comprehensive seed-delivered system that maximizes small-seeded vegetable production by enhancing performance and value. It is the *Vegetable SC technology platform* under which seeds treated with the various seed protection products are offered, including insecticides, fungicides, nematocides and other enhancements”, says Van der Maarel.

### New generation pesticide

The active substance in Cruiser is thiamethoxam. This is a second generation neonicotinoid from the thiancotinyl subclass. It works by blocking electron transmission (binding to nicotinic acetylcholine receptors). It is highly soluble and is easily transported into the plant, making it an excellent systemic agent. It also has an immediate contact effect. A strong preventative effect on some virus transmissions has been demonstrated as well. It is compatible with integrated pest management programmes in many cropping systems.

dripped onto each seed during sowing by the propagator. A computer controlled unit ensures precise dosage. According to Syngenta, the drip treatment does not affect germination relative to untreated seed, and the decision to treat the seed can be postponed until the last minute. Another advantage of the above methods is that it makes it possible to take account of the changing conditions during the season by selecting other varieties. Any remaining seed is untreated, so there are no problems with storage or disposal. It also allows seed

## Advantages of Scale Patently Obvious

48 Only five years ago, Monsanto took its first steps into the vegetable world. Today, with an annual revenue of approximately 800 million US\$ in vegetables alone, and a portfolio of over 4,000 varieties in twenty major crops, grown in 160 countries, it is a vegetable seed company to be reckoned with. The acquisitions of Seminis, Western Seed, Poloni Semences, Peotec Seeds and De Ruiter Seeds between 2005 and 2008 have helped to create a formidable global market leader.



### History

- |      |   |      |   |
|------|---|------|---|
| 1865 | Seminis oldest brand, Asgrow Vegetable Seeds is established   | 2000 | Monsanto merges with Pharmacia. The agricultural division of Pharmacia continues its activities under the name Monsanto, as a stand-alone subsidiary                      |
| 1901 | Monsanto was founded by John F. Queeny, who named it after his wife Olga Monsanto Queeny. The first product was saccharine. | 2002 | Monsanto is spun off from Pharmacia and becomes a separate company  |
| 1945 | Monsanto starts producing agricultural chemicals  | 2005 | Monsanto celebrates the tenth season that biotech crops were planted throughout the world. It is also the year in which the billionth acre was planted with biotech crops |
| 1945 | De Ruiter Seeds is founded  | 2005 | Monsanto acquires Seminis, Inc., with headquarters in Oxnard, California  |
| 1960 | The agricultural division of Monsanto is established  | 2007 | Monsanto acquires Western Seed and Poloni Semences, a Charentais melon breeding company based in France, and forms the International Seed Group, Inc. (ISG)               |
| 1976 | Poloni Seeds is established   | 2008 | Monsanto acquires Peotec as part of ISG and De Ruiter Seeds Group   |
| 1982 | Monsanto scientists are the first to genetically modify a plant cell  |      |   |
| 1990 | Western Seed is established   |      |   |
| 1996 | The Roundup Ready Soybeans are introduced   |      |   |
| 1999 | The Italian based seed company Peotec Seeds is established  |      |   |





# Monsanto sweeps the vegetable market

Monique Krinkels

**Until 2008**, De Ruiter Seeds was a family-owned business, founded by Wouter de Ruiter in 1945. The company became specialised in vegetable seeds in order to protect the cultivation of tomatoes, cucumber, aubergines and peppers. Today, De Ruiter Seeds is the brand name of the same products, as part of the Monsanto Vegetable Seed Division (MVS). Pepper breeder, Natalia Nagy, has seen the changes first hand since the time she joined De Ruiter Seeds in 2006. “On the one hand, the changes are huge”, she admits, “but at the same time, our goal has remained the same: to breed innovative vegetable varieties. De Ruiter Seeds was also a multinational, so that was nothing new to us. The cultural change for me, personally, is not that big, as I am a Hungarian, studied in the USA and got my PhD in Australia, so I am used to different cultures.”

## Openness

One of the major changes is the size of the com-

pany, as a result of which breeders can focus on a limited field. As a pepper breeder, Natalia Nagy is responsible only for the blocky orange and red sweet pepper varieties for heated, protected cultivation. “We work with eight breeders in Europe, Africa and the Middle East, everyone with their own specialisation. Worldwide, Monsanto has 19 pepper breeders. That creates a very powerful breeding ground for new varieties”, she says. And that is even truer for the tomato breeders, because that group is larger. The moment Monsanto took over De Ruiter Seeds, breeders were stimulated to discuss their work openly. “From the outset, monthly meetings were set up. We all speak the same language. Our cultures may be different, but our goals are the same and the technologies we use are very similar.” The technology Monsanto is renowned for, transgenics, is not the primary technology applied in vegetable crop research. “We use marker assisted breeding of course, but we have no plans to introduce transgenic vegetables on the European market. However, Monsanto researchers see benefits for certain crops like sweet corn for the US market.” The communication openness among Monsanto researchers surprised her. “The global organization enables us to share knowledge and resources across traditional businesses and across the broader corporate Monsanto R&D group. Ultimately, we will be able to supply our customers with the highest quality, best-performing varieties and hybrids on the market through our product brands.”

## Brands

Many of the companies that came together to form MVS will survive as brand names. “We have split up the product portfolio into open field crops and varieties for protected cultivation”, says Marleen van Balkom, Public & Industry Affairs Manager at MVS. “But our vegetable seed business is in the process of merging and will become one entity. That means substantial co-operation throughout the whole organisation. The increase in scale is enormous, from 900 employees at De Ruiter Seeds two years ago to 4,000 at MVS today.” De Ruiter Seeds is the main brand name for the vegetable seeds for protected cultivation, while Seminis has the open field crops under its wing.

49



**Family Crop examples**

Solanaceous	tomato, pepper, aubergines
Cucurbits	squash, cucumber, melon, watermelon, pumpkin
Root and bulb	onion, carrot, leek
Large seed	sweet corn, garden bean, dry bean, pea
Brassica	broccoli, cauliflower, cabbage, chinese cabbage, radish
Leafy	lettuce, spinach, fennel

- The advantages of scale were shown to pay off at Fruit Logistica in Berlin. Monsanto’s Vegetable Seeds Division was present with its leading vegetable seeds brands, Seminis, De Ruiters Seeds, Peotec Seeds and Western Seed. Presenting ‘Signs of Success’, MVS demonstrated the products and collaboration opportunities the company offers today.

**Growing market**

The company has close to sixty breeding stations around the world and a quarter of the 4,000 employees work in R&D departments. “The research budget for vegetables alone is 180 million US\$ per year. That is half a million per day”, says Marleen van Balkom underlining the company’s emphasis on research. “It gives a breeder new opportunities”, confirms Natalia Nagy. “I recently visited the breeding stations in South Korea and Japan. It was a very informative experience.” Her red and orange pepper varieties are not only grown in Europe but are also grown in Canada, New Zealand and Japan. “The market is rapidly expanding as the demand for fresh, year-round produce grows in North America and Europe. We foresee the same development in Asia, if the economic situation continues to change”, states Marleen van Balkom. “Consumers are looking to fruit and vegetables

as healthy choices for a healthy lifestyle and are looking to increase consumption. Monsanto is putting a lot of effort and resources into developing agronomic traits, such as harvestable yield, insect- and disease-resistance. In addition, the company is striving to improve taste and nutrition for the consumers and, for instance, shelf life for the retailers.”

**Recognition**

As Monsanto was the first to introduce GMO arable crops on the market, the company has been subject to vicious criticism for years. Recently, several books about the company have been published, amongst others ‘The world ac-

ording to Monsanto’, by Marie-Monique Robin, which describes the far-reaching political influence the company has, and ‘Uncertain peril. Genetic engineering and the future of seeds’ by Claire Hope Cummings, that warns against the decline of the reservoir of genes, which will harm farmers and scientists. Robert Paarlberg, on the other hand, predicts in ‘Starved for science. How biotechnology is being kept out of Africa’ that we will need genetically modified crops to feed the increasing world population. Whatever the opponents claim, Monsanto is very strict about compliance in general. The company applies, for instance, strict rules on human rights and is against the use of child labour. In addition, the company has a fund for corporate giving, which finances education and supplies developing countries with foreign aid. It is obvious that the company is a commercial success. The net revenues for the fiscal year 2009 were 11.7 billion US\$. Today, the company is widely recognised for what it is really worth. According to Fortune Magazine, it is one of the top 100 companies to work for in 2010, and Corporate Responsibility Magazine listed Monsanto in its ‘100 best corporate citizens’ of 2010 for the third consecutive year. Monsanto ranks number 31 overall and leads the agricultural products sector. Forbes has chosen it as company of the year 2009. In the article ‘The planet versus Monsanto. From farming pariah to seed superstar’, Forbes describes how Monsanto’s early critics said its seeds were evil, while today the charge is that Monsanto’s seeds are too good, as the company has come close to becoming a monopolist in some seed markets. According to chief executive, Hugh Grant, in Forbes Magazine: “There is a bigger than ever demand for food. There is no new farmland. The business model is that you provide more yield to growers and that you are rewarded for it.”



# Seed drying & equipment

**AGRATECHNIEK BV from HOLLAND** is specialized in drying all kinds of seed. We have more than 35 years of experience with Seed drying and processing technology

## Flat Screen Sizer for capacity and accuracy



Flat Screen sizer to calibrate seeds in 7 fractions



Flat screen sizers (5 fractions) with box tipple units



Flat Screen sizer provided with box tipple unit



Big screen surface result in high capacity and excellent accuracy



Small flat screen sizer with single feeder unit

## Drying Installations for drying automatically



Standard box drying installation



Installation for drying seed per box individually (open drying system)



Fluid bed dryer for seeds and pellets (closed drying system)



Cabinet rotation dryer



Automation of new and existing drying installations



Dehumidifier with adsorption and heat pump technology

 **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

info@agratechniek.com • www.agratechniek.com



## **TAKII SEED : HIGH QUALITY, RELIABLE, INNOVATIVE**

**A grain of seed packed with great potential turns into a plant with exceptional characteristics and eventually produces an excellent crop....  
We consider this to be “high quality seed”**

Exceeding  
the ordinary  
for 175 years



<b>TAKII SEED</b> Kyoto, Japan <a href="http://www.takii.co.jp">www.takii.co.jp</a>	<b>AMERICAN TAKII, INC.</b> Salinas, California, USA <a href="http://www.takii.com">www.takii.com</a>	<b>TAKII EUROPE B.V.</b> De Kwakel, The Netherlands <a href="http://www.takii.nl">www.takii.nl</a>
---	---	--