The Partnership

news and views from Enza Zaden

ENZA ZADEN

no. 9

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Data-based breeding

Big Data has become a major technological trend in today's world of business. No big surprise there, considering that powerful analytical tools enable data scientists to visualise data and patterns whose existence was hitherto unknown.

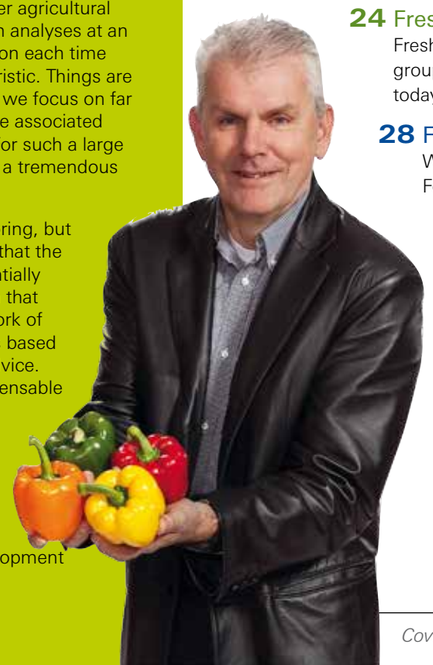
Big Data also has tremendous added value for the breeding industry. The results of extensive data analyses give breeders an impression of the chance of specific cross-breeding experiments resulting in the characteristics they want to obtain. This enables them to cross particular varieties that may initially seem odd choices.

Now that developments in biotechnology in general, and molecular biology in particular, are succeeding one another at such a tremendous speed, the amount of interesting data has grown explosively. We already know a lot about which genes in DNA, known as 'markers', are responsible for specific characteristics. And we know how to visualise those markers with PCR technology, which has made 'marker assisted breeding' possible. Breeders can now already determine in the early seedling stage which colour sweet peppers a plant will later produce. Or they can tell to which pathogens a potential new variety will be resistant. Such information is of great help in making the right selections, and consequently speeds up the overall breeding process.

It was only a few years ago that vegetable breeders began to realise the interesting opportunities offered by Big Data. Biotechnologists now make preselections for the breeders and provide advice on the plants they use for breeding. Other agricultural sectors had started to work with such analyses at an earlier stage. In those sectors, attention each time focuses on a specific single characteristic. Things are quite different in vegetable breeding: we focus on far more markers at a time, such as those associated with colour, germination, taste, etc. For such a large number of characteristics Big Data is a tremendous investment.

We don't know what the future will bring, but what we do already know for sure is that the amount of data will increase exponentially in the years to come. Does this mean that biotechnologists will take over the work of breeders? Absolutely not. Predictions based on molecular data serve merely as advice. Feedback from the breeders is indispensable for continuously finetuning the work. Because it's the breeders who ultimately have to test the new hybrids in practical trials.

Joep Lambalk
Managing Director Research & Development
Enza Zaden



Cover: Ralf Kuijpers, Crop Research Director Enza Zaden

Pumpkin mania

What Australians call ‘pumpkin’ is usually referred to as ‘winter squash’ in the UK and the USA. But the vegetables concerned are the same in all parts of the world: Cucurbita maxima, Cucurbita moschata or crosses between the two. And there’s no doubt about it: this vegetable is certainly on the up and up.

“The demand for pumpkin is growing in Europe and the US,” says Enza Zaden’s Crop Research Director Ralf Kuijpers. It is a versatile vegetable that can be easily used to create either savoury or sweet dishes. Pumpkin is also very good for you, and ideal for organic cultivation, so it’s entirely in line with today’s trend towards organic, healthy food.

Pumpkin in different parts of the world

Different types of pumpkin feature on menus all over the world, from the Kabocha in Japan to the Tetsukabuto in Argentina, and from the Butternut in the States to the Grey in South Africa. But appreciation of the product does vary from one region to another. “In Japan the Kabocha has been very popular for many years,” says Marketing Specialist Hans Verwegen. “The Japanese rank among the greatest pumpkin consumers worldwide, enjoying an average of around three kilos per person per year. The product has a long history in Australia, too. Europeans, on the contrary, consume less than 0.7 kilo per person.” Pumpkin made its way into the organic sales channel of northwest Europe around thirty years ago, along with squash (courgette), another member of the same family. Nowadays about fifty percent of the households in northwest Europe buy squash, but only about twenty percent consume pumpkin.

French cuisine

The past few years have seen things change quickly in Europe, in particular as far as the pumpkin types Butternut and Red Kuri are concerned. Especially in Germany and France the demand started to grow rapidly three years ago. In Germany, where pumpkin was until then largely restricted to the niche market of organic produce, it now ranks among the vegetables whose popularity is growing fastest. In 2014 the total harvest exceeded 20,000 tons.

French shops have traditionally sold the local type Musquee du Provence, but, as in many other European countries, Red Kuri is becoming increasingly popular here. “The past few years the French seem to have discovered the good flavour of pumpkin in general, and Red Kuri in particular,” is how Hervé de Saint Pierre, General Manager of Enza Zaden France, explains this growth. “Red Kuri’s chestnut-like flavour goes well with French cuisine. A major added advantage of this variety is that its skin can also be consumed. And being smaller than the traditional Musquee de Provence, the fruit is also entirely in line with the desire for convenience.”

Breeding

The growth in pumpkin concerns primarily the Butternut and Red Kuri types. The latter does well in Europe while the former is the absolute number one in the global cultivation and consumption of pumpkin. Kuijpers: “We expect this increasing popularity of pumpkin to continue mostly in these two types, at the expense of the larger types in the more traditional cultivation areas. In South Africa, for example, the production of the large Grey pumpkin is decreasing, and we see a shift towards smaller pumpkins such as Butternuts. So we are developing varieties of this type specifically for this region. We’re also looking for alternatives, for example smaller fruits of the local varieties. “

But breeders face other challenges besides developing smaller variants of the local types of pumpkin. Retailers want to offer their customers uniform fruits of a good colour. And consumers want to be able to enjoy the vegetable at other times of year, and not just in autumn, as is now the case. Kuijpers: “Production, reliable harvests, shelf life and uniformity are important selection criteria in our breeding programme. Reliable harvests we aim to achieve with a wide range of resistances, for example to powdery mildew, geminiviruses and potyviruses. But the flavour and texture of the flesh are also priorities. After all, flavour is the main trigger for consumers to buy pumpkin. Future breeding efforts will focus ever more on flavour and specific substances such as beta-carotene and starch.” Beta-carotene is an important substance because our body converts it into vitamin A. Starch on the other hand is good for the fruit’s taste, because it is converted into sugar after the pumpkin has been harvested, giving it a sweetish flavour. Kuijpers: “Modern breeding techniques such as marker-assisted selection are also of help to us in selecting these characteristics in our pumpkin-breeding programme.”

Why do people buy pumpkin?

In a survey carried out in 2014, Australian consumers were asked to give their main reasons for buying pumpkins.

1. Great taste
2. Add variety
3. Healthy
4. Good nutrition
5. Easy to cook

Squash versus **pumpkin**

Pumpkin and squash (courgette) are close relatives. The French word 'courgette' is indeed the diminutive of the French word for pumpkin: courge. If you allow a squash to keep on growing, it will become as large as its big brother. But it won't acquire the thick skin or sweet flavour of a pumpkin. Whereas pumpkin is sold in many different varieties and sizes in Europe, things are different in the case of squash, of which mostly the green variety is sold, and in summer it is often harvested in the region, hence the name 'summer squash'.

Plenty of opportunities

There are still countries – especially Anglo-Saxon ones – where the name pumpkin is associated primarily with Halloween. "But that are certain varieties of Cucurbita pepo," says Hans Verwegen. "Cucurbita maxima and Cucurbita moschata, which at Enza Zaden we also regard as 'pumpkin', is an incredibly versatile product offering today's consumers a lot of added value, and great opportunities for retailers. And not only in autumn."

It has for some time been customary to process pumpkins, for example in soups and baby food. Verwegen: "One of the reasons for this is that things like soup and baby food are ideal for selling as organic products, and in this respect the organically grown pumpkins of course really fit the bill. Pumpkins moreover thicken soups in a natural, healthy way, which is what today's consumers want. So we see that, besides being sold as a processed product, pumpkin is also being used ever more in the processing industry as a natural sweetening and thickening agent."

On top of all this, pumpkin is an excellent basic vegetable, and in that respect it also offers plenty of opportunities. As it makes you feel full, it can be ideally used to replace, say, potatoes or rice as the basis of a meal. "Bear in mind that in many Western countries people nowadays consume less than the recommended two hundred grams of vegetables a day. This may be partly due to today's fast lifestyle, in which people can't be bothered or don't know how to cook. Pumpkin is easy and quick to prepare, especially if it is sold pre-cut in chunks. So if you use it as the basis of a meal, pumpkin offers you an easy and quick way of making sure you consume the recommended daily dose of vegetables – certainly a lot easier than trying to achieve it with, say, lettuce."

The future of pumpkin looks very promising: the breeding programmes are in full throttle and there are plenty of market opportunities, especially for small fruits with a full flavour. Kuijpers: "And we are spotting those opportunities and making the most of them. We expect that global production and consumption will only increase in the future." ■

Havana, the **pear-shaped Butternut**

"I'm proud of our variety Havana," says Crop Research Director Ralf Kuijpers. "It's a uniform Butternut with flesh of the desired bright orange colour. Growers are happy with the variety's high production, while retailers and shippers greatly appreciate its excellent shelf life." Havana came out best in the French trials.

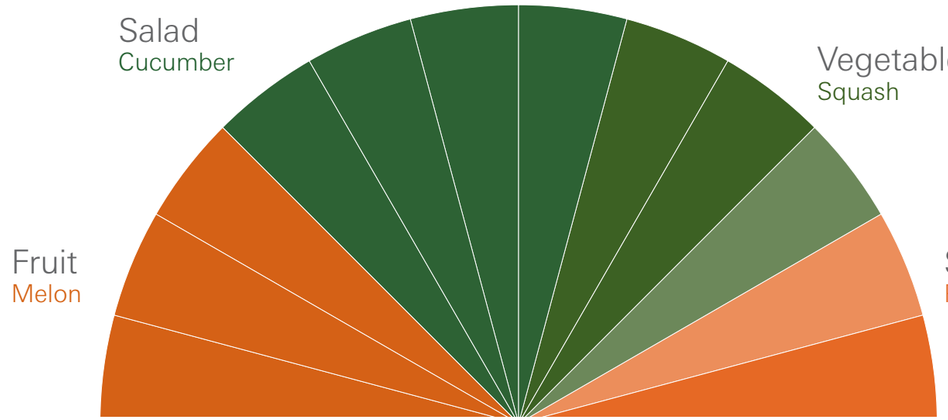
Pumpkin at **Enza Zaden** and **Vitalis**

Enza Zaden is actively involved in breeding ten different pumpkin types, i.e. all the most important varieties worldwide.

The breeding programme was launched in Australia, by the company Yates that Enza Zaden took over at the beginning of this century. Over the years, the breeding programme has been expanded with new varieties such as Red Kuri.
Enza Zaden's organic subsidiary Vitalis plays an important part in this programme, breeding and producing the seed of the organic varieties.

Kuijpers: "Our pumpkin breeders work in different parts of the world – the Netherlands, France and New Zealand – to enable us to breed in the market for the market. In 2009 we set up a breeding station in the south of China, too, where we have since then been breeding varieties that are popular in Asia. With our genetics and technology we have made great progress in breeding resistance for (sub)tropical regions."

Cucurbit family and its use



The use of the products of the cucurbit family is very versatile. These range from fruit products such as melon to staple food such as pumpkin.

Spain

Europe's **supplier**

Spain is an absolute leader as far as chain cooperation and co-creation are concerned. This the country owes largely to its short chain and strong focus on export. In fact, export is so important to the Spanish that they sometimes lose track of their own local market.

"The Spanish market? For us, that's three hundred million consumers," grins Regional Sales Director Prudencio Olivares. By this he means that the Spanish chain is an important link for Europe for the supply of fresh produce in the winter period, especially in northwest Europe. In this respect the local market is a mere province within a much larger whole.

Internal partnership

Like no other country, the Spanish vegetable chain knows precisely how to switch between a wide range of wishes and needs. Olivares: "It is essential for us to properly understand those wishes and needs of the various European markets, to enable us to respond to them adequately. Enza Zaden has local representatives in all the major export countries, who continuously analyse their own markets, which they consequently know inside out. The exchange of that knowledge gives us extra clout in the European market."

Co-creation

This important role as Europe's supplier is one of the factors that have led to paper-thin lines between growers, shippers and marketeers. The desire to continue to meet the constantly growing demand of all those consumers caused the farms to grow to such an extent that it became more practical for them to act as shippers, too. The same happened in the field of marketing, which the growers likewise started doing themselves. All in all

Consumption of **traditional** types versus **export** types

All what is produced in Spain can also be found in the Spanish markets, including the Long European Type (LET) cucumbers and blocky peppers. “But as a Mediterranean country, local traditions are important,” says Regional Sales Director Prudencio Olivares. “Vegetables are also integrated in the local culture and our way of cooking. Therefore, the consumption of traditional vegetable types is considerable larger than the export types that Spanish growers grow for other European countries.”

An example of this is the LET cucumber of which the consumption in Spain is very low. The locals definitely prefer their traditional Spanish range: the short slicer types, which – according to Olivares – also taste better. And the same goes for sweet pepper: “The Spaniards mainly consume the Lamuyo and Conical type, and generally they eat them cooked. Although blocky peppers can be found locally as well, the consumption is very low as is the case with LET cucumbers.”

The only exceptions are the tomato range and iceberg lettuce. Olivares: “For us, tomato is the king of the vegetables and all types can be found in Spain. Iceberg used to be grown solely for export purposes, but now this type has become important for us too. Mostly for its convenient price, not for its taste. The Romaine lettuce – in all its formats and sizes – and in the North the Batavia lettuce are our traditional local types. However, we see the consumption of bagged leaf type mixtures increase, probably as these bags meet today’s trend for convenience.”

this led to a very short chain, consisting largely of a handful of very large parties. Olivares regards those parties less as customers, as in the past, but above all as partners. These large, multifunctional chain parties and their cooperation with the seed company, in which they each benefit from their own expertise, has resulted in an interesting market approach: co-creation.

Another factor behind this co-creation is the consumer’s position. Now that the chain has become so short, seed companies and their chain partners together approach the ultimate customers: the consumers. According to Olivares we should now be asking ourselves not who the consumers are, but what they are like. “In this respect the internal partnership within Europe is a great advantage, enabling us to observe consumers together, to analyse them and find out what motivates them. Together with the growers/shippers we then develop product programmes for which we believe there is a need. The consumers’ buying behaviour tells us whether we’re doing the right thing. It’s the chain that leads to consumers.”

Emotion

In co-creation all the chain parties, from seed companies to shippers and marketeers, join forces in order to offer consumers products that meet their wishes and needs. Olivares adds that it’s not the intention to influence the consumers. “The seed companies’ role is to take the initiative on the basis of the results of the observations and analyses of consumers, and to translate those results into new innovations. If our chain partners share our faith in a new concept we develop the programme in greater detail together with them, after which the growers/shippers grow and pack the product and ship it to European retailers.”

In this revolutionary way in which the Spanish chain approaches its consumers, the consumers are regarded as users. After all, there’s no scarcity of goods in the countries for which Spain produces, and consumers can decide for themselves what products they buy. A consequence of this wide range of available vegetables is that emotion plays a far more prominent place in the consumers’ choices.

Concepts

So how does that work – developing concepts that will appeal to consumers’ emotional experience? Olivares points out that western consumers are primarily interested in good quality at a reasonable price. Quality and price are important pillars, and people are prepared to pay a little more if they can be certain that they will obtain a product of high quality, characterised by, say, a good flavour. It’s a matter of responding to that desire: “Loads of good varieties with excellent flavour are already available on the market; there’s no problem in that respect. What we do is to combine all those good products in a single programme, so that consumers will know what they’re buying. We sell trust. If quality prompts a good experience, that’s what consumers will remember. They will later think of that experience, and not the price. And so they will buy the product again.”

Concepts that **appeal** to **emotional** experience

Let's take a look at two successful concepts developed in Spain: Tribelli® and TomAzur®. The basic idea is simple: combine all varieties that meet specific demands from the chain – such as flavour and presentation – in a single programme. Olivares: "We respond to the chain’s desire of knowing what they're buying. We sell this trust."

Tribelli®

Tribelli® stands for the deliciously sweet pepper varieties in three colours. They are grown in Spain, but they are also sold in northwestern Europe. The chain partners in, for instance, UK, Germany and Scandinavia, are closely involved in the brand development.

TomAzur®

The tomatoes sold under the TomAzur® brand name make it clear to all the links in the chain that these tomatoes have three distinguishing characteristics: quality, flavour and presentation. The entire chain is therefore assured that the tomatoes meet these quality requirements. TomAzur® is sold in Spain, where they are also grown, and in northwestern Europe, just like Tribelli®.

Challenges

There are still numerous challenges for now and the future. Breeding processes proceed faster and faster and ever more efficiently, but it still takes at least six years to develop a new variety. And that in an age and market in which retailers, especially supermarkets, are making more and more demands. Speed has become a decisive factor. Decisions are taken quickly, and then there’s no time to wait for years. Olivares: “When we’re confronted with a specific demand or problem we always try to find a solution in the varieties that are already available. The wider the range of available varieties, the greater the choice and the possibility of finding a satisfactory solution. So we try to keep our range as wide as possible.” But what if things are the other way round, and a retailer asks a grower to grow a specific product and then cancels the order? The grower will then be stuck with products he can’t sell. “Good cooperation and co-creation are necessary to minimise such risks. As a seed company we observe the consumers in all the European markets to which Spain exports. If we then together ensure programmes with a constant quality we can build confidence and commitment.

This will only become more important in the future. Olivares expects that the chain will become even shorter, and that the role of consumers will increase, partly through social media. “That’s why we’ve already started to work with social media, but for us they are still tools for getting to know a market, and to understand and inventory consumers’ wishes and needs. The Internet may come to play a key role in the future.” ■

20 *years* TASTY TOM

2015 was a special year for Enza Zaden. It was precisely twenty years ago that a cocktail tomato was introduced that was to make history for its unsurpassed taste: Campari. And it was this same variety that also prompted the birth of the growers' association Frutanova U.A., which introduced it on the markets of Germany, the Netherlands and the UK under the name of Tasty Tom. Campari grower and talented PR man Ton Janssen from Venlo looks back on two decades of steady growth, with still plenty of promising prospects for the future.

"It's quite exceptional for a tomato variety to remain so popular for so long when you consider that every new year sees the introduction of new varieties that are in certain respects improvements on their predecessors," says Ton Janssen. "We also faithfully inspect all trials and test varieties every season to find a worthy successor to Campari. But so far our search has been unsuccessful. It is, and will always be, a unique tomato, honouring its name Tasty Tom. It still always comes out best in its segment in blind tasting tests. Taste reigns supreme, and we hope things will stay that way."

Strong brand

Back in 1994, Janssen was the first grower to test the variety on a small scale and be thrilled by the results. Together with some colleagues, including his present partners Hans, Gerard and Eric Vereijken, he initiated negotiations with Enza Zaden about exclusive cultivation rights. "That was still quite uncommon in those days," explains the tomato grower. "But for us it was an absolute prerequisite. Without exclusive rights you can't develop a strong brand, and that's precisely what we wanted to achieve with this tasty variety. Fortunately Enza Zaden agreed, and granted us a cultivation licence for northwest Europe. I think we both benefitted an awful lot from that. Tasty Tom is now a household name in the Netherlands and Germany. I doubt whether Campari could have remained so successful for so long if it hadn't become such an instantly recognisable brand."

Guaranteed success

In no time the grower's modest farm was planted with Campari in a total area of two hectares, and every effort was made to develop the brand and make it widely known. Having a great gift of the gab, Janssen was just the man for the task of expressing his enthusiasm about the brand in a marketing campaign. "I have no difficulty whatsoever promoting this wonderful product," he says. "I live close to the German border and speak the language fluently, which is of course very convenient. But it's the tomato itself that steals the show. Wherever I go – talk shows on German television, consumer trade fairs, wholesale markets, greengrocer's shops or supermarkets – all I have to do is invite people to taste the tomatoes and decide for themselves. The little red gems are a guaranteed success every time."

In his office above the packing hall the grower presents some recent enthusiastic messages sent by consumers via the website and social media, to add extra weight to his words. Every month the Tasty Tom growers receive an awful lot of praise for their product's wonderful taste. "Especially German consumers are very quick to respond by e-mail, and they are thrilled to bits," says Janssen. "That's brilliant!"

Specific tasks

In 1995 the Campari growers set up their own growers' association so as to be able to follow an entirely independent course. And although the composition of Frutanova has changed slightly from time to time, its overall acreage of Campari has steadily grown over the years, from 6 hectares in 1995 to today's 62 hectares. Vereijken Kwekerijen is responsible for more than half of that area, while the colleagues Roland Gielen, Wim Peters and Ton Janssen grow the rest. The policy is formulated jointly, but the entrepreneurs also each have a specific task of their own within the association. Janssen is the chairman and responsible for the association's PR, while Hans Vereijken formulates its annual plans in his capacity as secretary. Gerard Vereijken supports the sales activities, Eric Vereijken organises everything associated with cultivation, Wim Peeters is the treasurer and Roland Gielen is responsible for quality matters and varietal trials. "We employ another two staff members on a permanent basis: Ine van Kleef for marketing and PR, and Daan Oehlen for supporting our projects," concludes Janssen.

Year-round cultivation

At first, the sale of Tasty Toms was restricted to greengrocers in the Netherlands and wholesale markets in Germany, but over the years the range was expanded to include various supermarket chains in the Netherlands, Germany and the UK.

A few years ago the growers started producing the tomatoes with lighting, so as to be able to supply them to retailers and consumers all year round and guarantee the continuous supply that is so essential for retailers. "The lighting enables us to produce plenty of tomatoes in the winter, too," explains Janssen. "The electricity is sustainably generated by combined heat and power stations, with the released thermal energy being exploited directly for the crops or temporarily stored in water buffers."

Close cooperation

Janssen goes on to discuss the association's relations with Enza Zaden. "In twenty years' time our relationship has become very close," he says. "The company has supported us well at fairs and in promotional activities, and on several occasions we have accompanied Enza Zaden's Crop Specialist Wim Buijks and Crop Sales Manager Maarten van den Heuvel on trips abroad, both within Europe and to North America. Campari is now a household name in Canada and the US, too. It's interesting and very informative to see how things are handled in different markets."

"Growers' association **Frutanova** has been benefitting from **Campari**'s success for twenty years"

Brand extension?

As successful as Campari may be, the search for even better varieties still continues. Janssen has not yet found a good red successor. Even so, Frutanova is on the eve of a new market introduction, which will officially take place at the Fruit Logistica in Berlin: a yellow cocktail tomato, also from Enza Zaden's kitchen. "It's every bit as good as Campari," says the grower, who makes no attempt to disguise his enthusiasm. "I'm not at liberty to disclose its name, but I can't wait to see how consumers will respond when they taste this tomato." ■

Picture: The Tasty Tom growers. From left to right: Wim Peters, Eric Vereijken, Hans Vereijken, Gerard Vereijken, Roland Gielen en Ton Janssen.

PCR, the basis of today's research

Developments in biotechnology are going fast, very fast. New techniques for speeding up the breeding process and making it more efficient are introduced one after another. But at the same time some techniques that were developed dozens of years ago are still being used today. In fact, their use is actually intensifying. One of those techniques is PCR.

PCR, short for Polymerase Chain Reaction, was introduced around the end of the last century and is being used increasingly often today. "'Polymerase' is the enzyme that produces DNA," explains Gert-Jan de Boer, Manager of Molecular Biology & Biochemistry. "We need it to determine the genetic characteristics of a plant, for example its resistance to a disease or the colour of a sweet pepper or to determine whether the seeds produced are indeed from the intended variety." This is done by studying the specific DNA fragments that contain the genetic information for those characteristics – which are known as 'markers'. This is essential for breeders, because it enables them to make selections at young plant stage.

Amplification

But what's the role of PCR in this? You need large amounts of DNA to be able to detect differences in an organism's DNA. Hardly any of the methods and equipment that are currently available for reading DNA or spotting differences is sensitive enough to work with only DNA from a cell. PCR enables us to amplify sufficient copies of the DNA fragments in which we are interested.

Copying

What we need for PCR is relatively simple: the individual DNA building blocks, an enzyme that copies DNA (the DNA polymerase) and two synthetic DNA fragments marking the beginning and end of the segment that we want to copy. They serve as the starting point for the copying process and are known as 'primers'.

DNA consists of two complementary strands, which can be separated by raising the temperature to just above the temperature at which these strands separate. By then lowering the temperature to the point at which the primers specifically bind, and once again raising it to the point at which the polymerase enzyme becomes effective you can double a DNA molecule. So you then have two copies, but bear in mind that if you double one original, say, thirty times, you'll end up with 1,073,741,824 copies.

Problem

It all sounds so simple today, but when this technology was developed, there was one problem that needed to be solved: boiling causes the polymerase to become inactive. That's not surprising, because the same happens while boiling an egg for breakfast. What was needed was a thermostable polymerase, which was found in a bacterium – Thermus aquaticus – that lives in hot springs. The so-called 'Taq' polymerase was isolated from the bacterium and this enzyme is most effective at a temperature of 72 degrees Centigrade.

So the ultimate process comprises three steps: separating the DNA strands by raising the temperature to above 90 degrees Centigrade, cooling the reaction to a temperature between 50 and 60 degrees to effect the binding of the primers serving as the starting point for the copying by the polymerase, and finally raising the temperature to 72 degrees to enable the polymerase to do its job. Then the whole cycle is repeated, starting again with the boiling.

Speeding up the breeding process

De Boer: "Almost all of our breeders use DNA tests to monitor hereditary traits for the purpose to enable us to develop new varieties more quickly. Those DNA tests are carried out using the PCR method. The number of DNA tests we carry out is rapidly growing. A few years ago it was still a few million tests, but that figure has since then increased at least tenfold and will increase even more in the years to come." ■

Kerry Mullis
The term PCR was coined by an American, Kerry Mullis, who received the Nobel Prize for it in 1993. In those days he was working for the company Cetus, which sold the patents to Roche for a few hundred million dollars. How Kerry Mullis arrived at his invention is described on his website: http://www.karymullis.com.

Marker assisted breeding

PCR has made 'marker assisted breeding' possible. "This involves combining conventional breeding – i.e. crossing two parent plants – with DNA fingerprinting," explains Mike Heimerikx, Supervisor for Implementation & Application of Molecular Biotechnology. "So we make use of everything that is naturally already contained in the plant."

By using PCR to multiply DNA to the required extent, biotechnologists are able to 'read' the DNA with various methods. DNA fingerprinting involves producing DNA profiles of the desired plants. Say a breeder would like to transfer a specific characteristic of a red sweet pepper, for example a particular resistance, to a yellow sweet pepper. He will then cross the red sweet pepper plant with a yellow one. Some of the descendants will then produce yellow peppers with the desired resistance, but which ones are they? Because there will also be descendants that produce red peppers, or descendants without the desired resistance.

Heimerikx: "DNA fingerprinting enables us to determine which descendants have the desired characteristics, or markers, when they are only a few weeks old. Plants that don't have those characteristics can then be eliminated, and the breeder no longer needs to wait for all the plants to grow and produce peppers. This greatly speeds up the breeding process."

Present selections still tend to focus on one marker, so a single characteristic. In the DNA of red and yellow sweet peppers it's only one different letter in the marker that determines the pepper's colour. Heimerikx: "We are linking ever more characteristics to DNA markers, which is steadily increasing our understanding of how plant development and response to the environment is genetically controlled. The methods for reading DNA are rapidly improving, enabling us to often read large parts of the DNA code instead of just one marker which enables us to investigate several markers of a plant in one go."

In the DNA code of red and yellow sweet peppers, the marker that determines the pepper's colour only differs by one letter. Left is the marker of the red sweet pepper and on the right the marker of the yellow one.

Fruit Logistica Berlin 2016

From 3-5 February 2016 the Fruit Logistica in Berlin takes place. As every year, Enza Zaden is present at this leading international meeting platform of the fresh produce trade. The theme of our booth this year is 'healthy teamwork'.

Healthy teamwork is important to achieve collective success. More and more, parties in the chain need to co-operate to create successful products and concepts. Enza Zaden is strongly committed to creating added value in the development of our new vegetable varieties. At our booth we will show you our latest concept developments but also a wide presentation of our global varieties. And you cannot only see them, but you can also feel, smell and taste them. Our chef will prepare the nicest healthy dishes like little snacks, tasteful sandwiches and refreshing smoothies.

Come visit us at booth C-09 in Hall 1.2.

Hall 1.2
Booth C-09
3-5 February

The Partnership **survey**

To get to know what our readers think about The Partnership, Enza Zaden started a survey in August 2015. Some highlighted results:

Survey period: August 2015 – November 2015
Participants: 70 (75% male, 25% female)

- 94% scored the overall impression good to excellent;
- 55% of the respondents keep The Partnership for reference after reading it;
- 85% scored the content of the articles 4 to 5 on a scale of 1 (low) to 5 (high);
- 87% says The Partnership is informative enough.

We also asked some question about the social media activities of our readers.

- 70% is active on social media (for private or business matters, or both);
- Facebook, LinkedIn and YouTube are the most popular social media platforms.

We thank all the participants for their opinions on our magazine The Partnership. This is very valuable to us and we will continue to improve the magazine.

Amongst all participants we raffled an iPad Air. The winner has received the prize.

Resistance breeding supports market growth of fresh potted herbs

Cooking is hot, and fresh herbs are part and parcel of that trend. In the western world the demand for herbs in pots has been steadily increasing for many years now. No surprise there, because what could be easier and more satisfying than snipping a fresh bouquet garni on your own window ledge, balcony or patio? Enza Zaden supports this development by offering both growers and end users herb varieties that are less susceptible to diseases.

In the western world more care and attention is being paid to food and cooking. Some people enjoy spending a lot of time on culinary exploits, but that is of course not necessary. An easy, quick meal can also be raised to a higher, tastier and healthier level in less than no time with a few fresh herbs. And if you don't have a traditional herb garden it's very convenient to have the herbs you often need close at hand at all times in the form of potted plants. With their vibrant foliage they will also bring a home to life while needing very little care – more aspects that make them appealing to an increasing population. Herbs in pots are hot!

Booming culinary and organic markets

Erica Renaud, Regional Business Manager for Vitalis and Herb Product Manager in North America, sees the growing culinary movement also in the US. Renaud: "People want fresh herbs. There is a desire for consumers to eat more nutritious, ethnically diverse and safe food products. Fresh herbs contribute to fulfilling these consumer desires, while major US retailers want year-round greenhouse grown consistent food products."

Food safety plays a major role in the desire for greenhouse produced foods as they are perceived to be more safe. Herb market growth is also directly correlated to growth in the organic sector. Certified organic herbs make-up a larger percentage of the market compared to conventionally produced due to their perceived nutritional and medicinal value. The ethnic diversity of the US food palette is also contributing to herb growth as consumers experiment with more international foods using various herbs in their recipes. As a result, dozens of potted herb growers have sprouted up across the country to service regional and national retailers in recent years.

Renaud: "The largest factor in herb pot growth is the demand by the retailer for growers to supply a diverse product range year-round. With protected culture, they can supply consistent quality year-round for the booming culinary and organic markets, and market the product as US grown. For retailers that do not require US grown, the product is predominantly grown in open field production in the southwest US and Mexico. Besides the growing market, the demands of the fresh produce chain have also changed. What was traditionally expected from an herb cultivar – high yield – is no longer enough; the varieties have to be uniform, responsive to liquid fertilization, fit in a sleeve properly, good shelf-life and resistant to present and developing diseases."

Strong growth

It's not surprising that the cultivation and sale of herbs as pot plants have enjoyed a great boom in many parts of the world. What once started on a small-scale in Scandinavia is now rapidly spreading across Europe, North America and Australia. Enza Zaden's herb Portfolio Manager Klemens Holz estimates that sales of potted herbs in Germany have doubled in the past five years, from around 60 to 120 million pots. And there's still plenty of room for further growth, he adds. "Potted herbs are now widely available in northern and western Europe, and are slowly becoming more common further east, in Poland and Russia, too."

Cultural differences

Several nurseries on both sides of the Atlantic Ocean specialise in the cultivation and sale of fresh herbs and related leafy plants. Under their own brands or under private labels they supply extensive ranges of potted herbs and herbs packed in consumer units to supermarket chains and garden centres. Big names in this sector are for example Gartenbauzentrale Papenburg in Germany, Jacobs Farm / Del Cabo and Shenandoah Growers along the west and east coasts of America, and Especia (Gipmans) in the Netherlands.

Different herbs are popular in different markets with different eating cultures, but basil ranks top in most countries, followed at some distance by flat- and curly-leaf parsley and dill. Coriander is the second most popular herb in the UK. Mediterranean herbs such as thyme, lemon thyme, rosemary and oregano may be more difficult to obtain outside the summer months, but they are also becoming more common as potted herbs.
"Sales of potted mint are currently growing rapidly, but those plants are propagated via cuttings rather than from seed," adds Holz. "So that's not our territory. The herb is available in several variants and is very versatile in its use."

”Year-round production and **supply** are an absolute **must** for the **large nurseries”**

Enza Zaden employees John Cartwright, Sales Representative, and Monika Bietsch, Assistant Breeder Herbs, on the Herb & Rucola Day 2015 in Dannstadt.

Diseases affecting herbs

Many types of herbs that are grown in pots have a short cultivation cycle. Even so, their cultivation also involves risks. Under certain conditions they may be extra-susceptible to infections of leaf, root and stem diseases. Basil, parsley and dill crops, for instance, are frequently affected by Downy Mildew, Fusarium and Septoria. These fungi can cause substantial losses, especially in crops that are grown without chemical control products. And in America the focus is precisely on organic where herbs are concerned. This is less the case in Europe, where organic cultivation is more restricted, resulting in higher cost prices.

Herbs in pots must moreover remain vital throughout the sales channel, and for long enough afterwards to allow consumers to enjoy them for some time. Plants that show symptoms of diseases shortly after they have been purchased, making them less attractive or even causing them to die, will lead to disappointment among consumers.

Tightened objectives

Herbs propagated from seed became an important product group for Enza Zaden in 2001, following the takeover of Julius Wagner, a German breeding company specialising in herbs and other leaf crops. At first the emphasis was on breeding characteristics such as uniformity and an attractive dark green leaf colour. “We made a lot of progress in that field, and put Enza Zaden on the map as breeders of herbs, too,” says Holz. “Around ten years ago we tightened the breeding objectives of several herb varieties to gear them more to the needs of our customers and end users. They want plants with good resistance and year-round homogeneous, reliable production. So we now actively focus on resistance breeding by selecting and crossing specific genetic characteristics that make the plants resistant or less susceptible to common diseases. Important to us are resistance to or tolerance of the most common fungus diseases and tolerance of low temperatures, because in many countries herbs are grown outdoors or in unheated plastic greenhouses. And year-round production and supply are an absolute must for the large, specialist commercial nurseries.”

Second generation

This focus on genetic resistance has had the desired effect. Holz: “We already have basil and parsley varieties that are resistant to mildew. Last year we officially launched our first Downy Mildew intermediate resistant basil variety on the market with overwhelming success. Eleonora (E09B.11540), as this variety has been named, perfectly indicates the gap in the market for improved herb varieties. Eleonora is a great addition to our basil variety Elidia, that is resistant to Fusarium, which can cause root rot. And we have recently introduced parsley varieties with intermediate resistance to Downy Mildew: Peione and Fidelio.”

The Portfolio Manager refers to them as the herb varieties of the ‘second generation’: varieties that still have the attractive colour and a good flavour, and at the same time ensure a more reliable cultivation, and a better shelf life and keeping quality at consumers’ homes. They are ‘so to speak’ a bit more forgiving in conditions that are not ideal, which is the case mostly in the sales channel and consumers’ homes. “The coming years Enza Zaden will continue to steadily expand its range of resistant and tolerant herb varieties for sale in pots,” says Holz. “Those varieties lead to higher yields, fewer product losses at retail outlets and greater satisfaction among end users – all in all major advantages that will support the further growth of this category of products.” ■

RESISTANCE MAKES THE DIFFERENCE

The breeding efforts of Enza Zaden have resulted in a new generation of herb varieties within the parsley, basil and rucola assortment. These varieties stand out from other varieties when it comes to resistance, shelf life and harvesting.

Portfolio Manager Klemens Holz: “With the special icon we've developed, we can indicate these varieties to our customers. In that way they know immediately which varieties have these special qualities."

CSR in North America

"Our employees are proud to be part of a team that cares about the environment and the community"

The Enza Zaden North America office has received the 2015 Curbee Award from the City of Salinas. From left to right: John Barrientos, Warehouse Technician, Annajane Lowe, Financial Manager, Ton van der Velden, Regional Sales Director.

The time of widespread resource usage without any accountability has gone. Socially responsible companies choose increasingly more to invest in green technologies and to develop alternative resources.

In this era companies around the world are expected to take responsibility on how they influence the environment. "What we'd like to achieve is that our influence on the environment is as positive as possible," says Leoniek Verhage, CSR Officer at Enza Zaden in Enkhuizen. "While doing business we take people and our planet into account. This ambition has been translated into our corporate CSR targets focusing on improving the health and well-being of people by providing the world with healthy vegetables, reducing the environmental impact, and improving the living standards of people."

CSR North America

The CSR trend is also very visible in North America, where companies form strategic and tactical teams to execute their plans. A few years ago, CSR started really small at the North American office, comprising of Canada, USA and Mexico. The efforts then consisted mainly of a few small initiatives, such as waste reduction and school volunteer projects in Salinas (California) and Culiacan (Mexico). However, Ton van der Velden, CEO of Enza Zaden North America has seen the importance of and the attention for CSR grown tremendously over the last two years. This office too has established a strategic CSR team and a number of tactical teams that implement the goals like waste audits, recycling and building projects. Van der Velden: "CSR is gaining importance within our company. We see that, as Enza Zaden is becoming bigger and bigger, we have a responsibility to our community to be a good citizen. Moreover, our employees are extremely proud to be part of a team that cares about the environment, the climate and our neighbors."

The broad focus of this company has resulted in numerous projects, such as supporting community schools with gardens and lectures and organizations that promote education to students. By doing so, kids at schools are taught how to grow vegetables for instance. Van der Velden: "We feel that these projects are related to the agricultural or seed industry, and we feel that there is an immediate impact on the environment and on people."

Reducing environmental impact

The last few years, special attention has been given to reduce the environmental impact. In fact, the North American office is leading in its region when it comes to limiting carbon footprint. Energy efficient new buildings in San Juan Bautista (California), Myakka (Florida) and Salinas (California) have been built recently. The buildings in California and Florida have even received the certification for Leadership in Energy & Environmental Design (LEED), a green building certification programme that recognizes best building strategies and practices. The buildings have been built with environmentally friendly materials, they are energy efficient, contain all the run-off water and they produce as little greenhouse gasses as possible. "This is also what is required to get the certification. It has been quite challenging to meet the expenses and comply to the rules and regulations that LEED certification brings with it. We have solved these issues by getting good advice before the construction started, by installing good solar panels, and by making good plans that shows a decent Return on Investment. This has made the decision to go for LEED also a financially sound decision."

Waste management

Diminish waste; separating it for recycling and reusing it wherever possible is an important goal in reducing our environmental impact. After all, recycled valuable material becomes available again and no new materials have to be used. Waste management may not be unique in North America, but it certainly is not common practice yet either. Van der Velden is proud that his office is ahead of the curve and recently received a reward from the city of Salinas for its efforts. "In 2014, a waste management task force was created to spearhead policies and practices to reduce our waste production and bring awareness within our organization. Our head office in Salinas was the first location to have a formal waste management assessment by BFI, the local waste company, to develop a baseline of our practices and as a measurable from which to improve. BFI identified that we had the opportunity to reduce our waste by sixty percent through enhanced recycling and composting efforts as well as alternative packaging. This year, we have also assessed our other locations in North America, and we are exploring opportunities for biological waste management and composting our food and seed waste."

Organic

What is to be expected for the near future? According to Van der Velden there is still enough to be achieved. His company is the regional leader in organic seed sales. "Fifteen percent of our total sales now exist of sales of organic seeds. We are certified in all our locations to handle organically produced seeds and are in the process of certifying a parcel of land at all three of our research stations. We promote sustainable agricultural systems, through the attendance and support of symposiums and of course by providing organic seeds of superior genetics. The next steps will be to demonstrate novel technologies and optimizing practices for sustainable and organic agriculture."

Future

The future holds some more serious CSR plans for the North American subsidiary. They range from promoting volunteer activities to food donations, and from stepping up the waste reduction and recycling efforts to providing basic health check-ups to contract labour employees in Mexico. "And we have a great initiative at Enza Zaden Mexico underway: Corredores con causa, a running event to support cancer research. I expect Corporate Social Responsibility to become a way of life with more and more activity and involvement from employees. Another good reason to be proud to be working for Enza Zaden." ■

Fresh & recipe boxes

They seem to be shooting out of the ground like mushrooms: companies that deliver food boxes – varying from simple packs of vegetables to complete meal kits – to consumers' homes or collection points at specific times. That's hard to beat in terms of freshness and convenience. New online transaction models generate new logistic flows that may severely interfere with established patterns. This may imply threats for parties that fail to go along with the flow, or opportunities for those whose aim is to get closer to consumers

The possibility of consumers subscribing to fresh vegetable or complete meal boxes is far from new. Health food stores were already offering such services back in the late 1970s and early 1980s. But it was quite some time for the concept to really catch on. That started around five years ago, and since then the trend has grown tremendously and is now extremely professionally approached. Organically and conventionally grown fruit and vegetables are both finding their way to a rapidly growing group of consumers who greatly appreciate the convenience, freshness and variation offered by the food boxes, whether they are delivered directly to their doors or await them at nearby collection points.

Especially in North America and northwest Europe, the food box is really up and coming. The number of companies that are embracing the new trend on a regional, national and even international scale is likewise rapidly increasing. Some, such as the American Blue Apron and the German HelloFresh, are growing explosively, thanks in part to wealthy investors facilitating aggressive growth strategies. Short-term profitability is not their primary aim. What they want is to quickly capture a market share in the hope that this will gain them admission to the stock market. Other, often regionally active parties, prefer to operate on a smaller scale, in a local-for-local approach. Bottom line is that the range of services has increased tremendously in just a few years' time. Today's consumers need not search long to find a supplier and a product format that meet their specific needs; they are truly spoilt for choice.

"So far, we have managed to **double** our **clientele** and **turnover** every year."

Jack Stroeken (Beebox)

New transaction models

And yet the great majority of the suppliers have one thing in common: they're all free riding on the success of the new transaction models underlying online shopping. Searching and comparing, choosing, adjusting or (temporarily) stopping a form of subscription and paying – they have all become everyday routine for a constantly growing group of consumers. In some branches, such as clothing and shoes, online shopping has become so rampant as to force many shops to close, with the resultant sorry sight of boarded-up windows along formerly bustling shopping streets.

"Things are not yet that bad in the food industry, but specialist shops and supermarket chains that hope everything will continue as it is now are bound to face hard times," says Enza Zaden's Marketing Specialist Hans Verwegen. "The same holds for other links in the chain, such as wholesalers and primary producers. Fresh food and recipe boxes have gained a firm foothold, and the companies that take the lead in this sector may rightly be termed game changers."

Interactive

In this modern, technology-driven playing field visibility is all-important. High rankings in search results and apps for smartphones are essential for growing along with the market. "At the same time this technology offers interesting starting points for market research, segmentation and further professionalisation," Verwegen continues. "Who are my customers and what do they like to eat, and what not? How do they respond to new ideas and product introductions? All this has completely altered the dynamism in supplier/consumer relations. Producers can also benefit from this development, by acting proactively and entering into a dialogue with their buyers. Many consumers are interested in the backgrounds and origins of the products they consume. Fresh food and recipe boxes, and the websites of chain partners can be ideal instruments for telling end users all about the products' backgrounds and inspiring enthusiasm in them. That's an intrinsic part of the added value."

Global cuisine, local sourcing

Jack Stroeken, Director of Beebox, fully agrees. Since he joined this company in early 2014, the supplier of organic food boxes has successfully secured 5,000 Dutch subscribers. "We're quite a bit smaller than the supermarkets and will presumably stay that way. However, as number two in the foodbox market, after HelloFresh, we have managed to double our clientele and turnover every year. We'll be doing that in 2016 too."

With more than 25 years' experience in market research and fresh marketing, Stroeken knows the importance of making clear choices. "We focus entirely on organic and fair trade, for which we are also certified," he says. "Our customers and prospects are mostly in the slow food segment. We distribute our products primarily via local franchise holders so that we're close to the consumers. Our range is best described as 'locally sourced global cuisine'. Our exotic products such as quinoa, sweet potatoes and yacon are also grown in the Netherlands. That's good for innovative growers, and also good for our subscribers, who get to consume products that are really fresh. And we're able to offer them that at an attractive price because we have no retail losses and because we also include products of less common grades in our range."
Stroeken concludes with an appeal to breeders all over the world: "Shelf life is no issue for us, so please focus more on taste and healthy nutrients. That will help us win the hearts of even more people and boost the consumption of fruit and vegetables. And that's something from which we'll all benefit." ■

"A box full of new surprises every week"

It's now more than a year ago that the Groot Kormelink family in Rotterdam (the Netherlands) took out a subscription to a meal box. "My wife and I visited a food market where we were approached by a representative of HelloFresh," says father Richard. "The concept appealed to us and we were won over by an attractive introductory offer. We're still very satisfied with the boxes."

Although his wife Marjan and their two daughters Menke and Welmoed are keen cooks, Richard himself also regularly prepares meals from the boxes that are delivered to their door every Monday evening. "We chose the option of three meals a week: one with meat, one with fish and one vegetarian meal," he explains.
The box contains all the ingredients you need for each meal, from fresh vegetables and herbs to small packets of mixed spices, rice, pasta, potatoes and eggs. Fish and meat are delivered in cool bags that you can transfer straight to your fridge. "The recipes are also included, so you don't have to do any experimenting yourself. The instructions are really easy to follow and the result is usually very tasty."

Fresh and surprising

The many separate ingredients that are to be combined into three complete meals make unpacking the fresh food boxes really exciting. And not in the last place because they often contain products and recipes that are new to the family. "It's a box full of new surprises every week," says Richard. "The past year we've eaten quite a few vegetables that we'd never tasted before and that you can't buy at our local supermarket – both 'forgotten' vegetables grown in our own country and exotic vegetables from entirely different eating cultures. The fresh food box offers us healthy, varied food; that's something we very much appreciate. What's more, the fresh products really are fresh, and that can't always be said of food bought via other sales channels."

Focus on **quality**

Angie Murray, grower and Manager within NZ Gourmet since 2003, is responsible for the success of the sweet pepper variety Special as the main red variety for export to Japan. Murray's expertise and the high light intensity in New Zealand result in record production levels with Special, equal to the highest recorded productions in high tech greenhouses elsewhere in the world.

New Zealand Gourmet (NZ Gourmet) has been exporting its own perfect tasty sweet peppers and cocktail tomatoes for many years, and its volumes keep growing. "We regularly expand our farm with a new greenhouse and we still run out of space every season. It's what you'd call a luxury problem," says CEO Paul Martin. His secret? Focusing on quality without making any compromises.

Paul Martin joined his father's small agricultural business in the early 1980s, when he was 21. "We had calves and deer for their meat and grew some tomatoes outdoors," he says. "We didn't export anything, and that made it difficult for us to expand our business."
With only three million residents, the home market offered little growth perspective. The major markets are all in the northern hemisphere, in particular in Japan and the United States. Martin: "This does imply the advantage of the opposite seasons, meaning that we're able to supply plenty of produce at times of low local production. But there were two problems: I didn't know anything about trading and we didn't have any greenhouses in which to grow vegetables worthy of export."

Flourishing trade

And so Martin went to the United States, to gain expertise and experience. Wholesalers were interested in him, but he couldn't work there without a green card. A simple, practical solution was to establish an import company in the States: NZ Gourmet, with an export business in the homeland and an import branch in the States (Gourmet Trading).

In his search for customers Martin first enthusiastically visited the top restaurants and catering wholesalers along the west coast. "There was some interest in meat from New Zealand, but what the traders wanted most of all were fresh fruit, vegetables and herbs in the winter months," Martin explains. "We started with berries, strawberries, kiwis and fresh herbs from New Zealand. They were very soon followed by asparagus, apricots and other products. I was amazed by the speed at which our trade expanded. We started looking for other production areas, in particular in Latin America."

Back to the roots

In 1989 Paul Martin gave up the everyday management of his import business and returned to
New Zealand. His father had just died, but his dream of expanding the family farm together with his younger brother Chris was still very much alive.
In the USA Martin had come across fresh sweet peppers imported by Gourmet Trading from the Netherlands, and he was impressed by their beautiful colours and quality. He was interested in growing them himself. After a modest start with outdoor crops, the brothers had their first greenhouse, with an area of 6,000 m², built in 1994. "In terms of colour, flavour and texture, sweet peppers are perfect for Japanese cuisine, which has very high quality requirements," Martin explains. "Thanks to its greenhouse crops, NZ Gourmet became the first non-Japanese company allowed to supply fresh sweet peppers to Tokyo's wholesale market."

Different cultivation method

"The red Spirit and yellow Fiesta were our first varieties," says the grower/exporter. "Since 2000 Special has been our main variety. There are more productive red varieties, but Special excels in quality and shelf life. And the Japanese are quite willing to pay well for quality."
The Martin farm's fifteen-year loyalty to this variety is unique. "We do have to grow it differently than is customary in western Europe," he adds. "Our farm is close to Auckland. In summer our day length is shorter than that in western Europe, but we have a very high light intensity. So for the first years, when our greenhouses were not yet as modern as they are now, we stuck to a higher stem density. That also resulted in slightly smaller peppers, which is what the Japanese like."

Second location with geothermal energy

A few years ago the farm stopped growing Fiësta because of virus problems. Martin hasn't yet found a suitable successor for yellow peppers. His acreage of peppers meanwhile continued to grow and is now 25 hectares. Most of those peppers are grown at the original farm in Woodhill, North of Auckland. In 2001, he established a second farm further south, in Mokai near Lake Taupo.
"There we found a unique opportunity," the entrepreneur recalls. "Taupo lies in the middle of a geologically active area with hot springs. A lot of geothermal energy is available directly at ground level and that can be very efficiently exploited as an environmentally friendly source of heat – for greenhouses, but also to meet other local heat needs. This area moreover has a fairly high unemployment rate, especially among the original Maori population. Together with two local Maori trusts we set up a joint venture enabling us to continue to grow in a sustainable way and to offer dozens of people permanent employment. It is very satisfactory that the company has evolved well under local management and is now a full member of the Gourmet Group."

Campari

The farm in Mokai has greenhouses with a total area of 11.4 hectares, 6.2 of which are used for sweet peppers and the other 5.2 for the cocktail tomato variety Campari and tomato types such as Roma, large truss and loose food service. "Campari perfectly meets the needs of our buyers in the Far East," says Martin. "It looks good and has a wonderful flavour. The availability of geothermal heat and the cold nights make Mokai ideal for growing tomatoes in greenhouses. So we'll move the sweet peppers to Woodhill."

Success factors

NZ Gourmet owes its success as New Zealand's largest producer and exporter of sweet peppers first and foremost to its focus on top quality without any compromises. What have also been of great help in this respect, says Martin, are Enza Zaden's excellent varieties and support. "I met Jan Panman in 1997, and partly thanks to Enza Zaden's cultivation advice we got the business off to a good start. We still often speak to one another."

He says he has also benefitted a lot from the remarkable, close commercial relations with his customers in Japan in particular. "New Zealand is the only country that can export sweet peppers to Japan without any problems," he explains. "Things are far more complicated and expensive for Australia, which has a lot of problems with fruit flies. An added advantage is that our country has an excellent reputation in Japan. Like Japan, it's an archipelago in the Pacific, but it's also sparsely populated, clean and unspoiled. If you're moreover capable of supplying products they like to consume, you're bound for success. There's still plenty of room for growth, and trade in the United States is also going very well. It's a pity that my father and brother, who died a few years ago, are no longer able to share this experience with me and my team, but they're certainly never far from our thoughts." ■

Partnerships in seed production

Seed production is a worldwide activity coordinated from our headquarters in Enkhuizen. For production specialists, who oversee all seed productions worldwide, it is like a big puzzle to have the right quantity and quality of seeds available at the right time. Climate changes, phytosanitary regulations, currency effects, pests and diseases all complicate this puzzle further, making a committed and professional team even more necessary.

Unlike other seed companies the major part of our seed production activities are outsourced to professional production partners. By doing so, we combine our knowledge of how to best produce our varieties with their knowledge of the best production methods under the local conditions. This close cooperation requires a partnership in which we depend on each other. It's a good relationship, open and with mutual trust. This explains why we work with most of our production partners for a long time already.

To strengthen this important relationship even further, we have appointed regional production specialists, strategically located in our major production locations. They regularly visit our production fields and closely cooperate with our production partners. They are our eyes and ears in the production areas and our feet on the ground. But they are also essential in keeping a good relationship with our production partners.

Working so closely together and yet being geographically so far apart, requires to come together at times to align and to nourish the relationship. In autumn we organised our annual production meeting where all our production specialists met in Enkhuizen to exchange information, experiences and to have fun. And we also meet our production partners regularly. We even create opportunities for them to meet their colleagues from other parts of the world to further enhance the relationships and to exchange experiences. For instance, with our GSPP (Good Seed and Plant Practices) production partners and several GSPP accredited seed companies we organised a visit to GSPP sites in Mexico and Guatemala. We were impressed with the high level of phytosanitary measurements taken and it was a good opportunity to share and discuss best practices among the participants to further improve the GSPP system at our own sites.

The world is getting more complicated on one hand with all the challenges ahead, but smaller on the other with all the modern communication techniques and better travel possibilities. This makes it easier to build international relationships. We are fortunate to work in an industry where these relationships are still valued, where true partnerships still exist and these partnerships sometimes evolve into friendships.

Manuel van Eijk has worked for 12 years in seed production and is nowadays Production Director at Enza Zaden. He stresses the importance of partnerships in the seed production process. After all, these are essential for finding the optimum balance between elements such as seed production time, quality, costs and regulations.

The Ins & Outs of Substrates

A large part of today's high-tech cultivation of food crops takes place in substrates such as stonewool and coco slabs. The use of substrates is also intensifying in less capital-intensive production systems. That's not surprising, because crops can produce more, in a sustainable manner, in a rooting medium in which conditions can be effectively controlled.

It's now more than 35 years ago that growers of fruit vegetable crops in western Europe started to use substrates as alternatives to natural soil. The many years' searching of researchers and product developers had the desired outcome. Especially stonewool proved very promising. Propagation blocks and slabs made of this material, which is highly porous but at the same time also very sturdy, offer fruit vegetables a stable rooting medium in which they will find sufficient water and nutrients throughout their entire development to ensure uninterrupted growth and high production volumes. Coco coir and perlite are also used as growing substrates, but on a smaller scale.

Hygiene

One of the main reasons why growers first started to use substrates is hygiene. The various diseases and viruses that may occur in the soil restrict the possibility of maximum production. Some countries moreover don't have the means or money to adequately disinfect the soil. This has led to a tremendous increase in the annual use of new substrates or the disinfection of used substrates, ensuring better hygiene and greater uniformity of the plants and enabling more specific, and more effective control.

Control of the root environment

The great advantage of growing crops in the currently available substrates is that conditions in the rooting medium can be perfectly controlled. Growers can adjust the substrate's water content and acidity (pH) and the composition and concentration (EC) of their nutrient solutions almost any time they find that necessary. In greenhouses, the temperature of the rooting environment can also be adjusted as required. Water content and EC are particularly important control instruments, which growers can use to give their crops a generative or vegetative impulse to promote either flowering and fruit set or the development of the foliage. Conditions in substrates can moreover be far more quickly adjusted to respond to changes in a crop's surroundings, such as a sudden change in weather.

Over the years, the range of substrates has become quite diverse, with different substrates for different crops and different cultivation strategies. They vary from relatively dry, promoting generative growth, to relatively moist, boosting vegetative development. And they also differ in terms of the available rooting volume, their period of use or stability – with some retaining their structure for less than one year and others for several years – and their resaturation capacity. All this combined with the greater expertise and experience that have been obtained over the years, and the more efficient irrigation technology has led to further growth of the already impressive increases in production that were realised with the stonewool slabs of the first generations. Crops that are several dozen percent larger than those grown in soil are now the rule rather than the exception.

Water

Soilless cultivation is subject to certain prerequisites, first and foremost being the availability of sufficient water of good quality. The volume available for the roots to penetrate is smaller in a substrate than in soil. The volume of available water is also smaller, making it absolutely essential to water a crop several times a day,especially in the case of fully developed crops in warm, growth-promoting conditions. What's more, stonewool and coco slabs are less forgiving with respect to undesired salts and microorganisms, which are often largely bound, neutralised or made harmless by antagonists in natural soil. That's impossible or far more difficult in alternative substrates.

Technical facilities

Growing crops in substrates calls for a fairly extensive technical infrastructure, with all the investments and maintenance that implies. Although the precise details and dimensions may vary per system and supplier, modern substrate systems are generally accompanied by the following basic facilities: measuring or weighing systems for monitoring the slabs' water content and the drainage percentage, an accurate trickle irrigation system, filters, a device for disinfecting the drainage water, storage tanks for contaminated and clean water, dosage units for the nutrient solutions and for acid and alkaline solutions to keep the irrigation water at the desired EC and pH, and a process computer with which the entire irrigation system can be remotely monitored and controlled.

Needless to say, such systems imply a substantial investment. As high-quality cultivation systems with modern, heated greenhouses, climate computers, etc. become ever more common all over the world and growers' capital intensities increase, the decision to switch to substrate cultivation will become easier and easier. And so substrate cultivation is becoming increasingly common also outside northwest Europe and North America.

Sustainable option

There's another aspect that makes substrate cultivation interesting, an aspect that is also becoming ever more important worldwide: the environmental aspect. It has been found that substrate crops make extremely efficient use of both water and fertilisers. In principle, they are always given a surplus amount of nutrient solution, to refresh the solution contained in the slab and keep the nutrient balance in the roots' environment at the required level. That surplus is drained from the substrate and transported to a container. After it has been disinfected, which can be realised with several methods, the water containing the nutrients can be recycled. By way of comparison: about 300 litres of water is needed to harvest one kilo of tomatoes from a crop grown in soil; this is only 10 to 15 litres in the case of crops grown in substrates in standard greenhouses, while the most modern farms with optimum irrigation and climate control consume less than 5 litres of water per kilo of tomatoes.

It's a sad fact that freshwater of good quality is becoming a scarce commodity, and that agriculture and horticulture all over the world are ever more suffering the adverse consequences of salinization. So it wouldn't be surprising to see more and more crops being grown in substrates in the years to come. The combination of high production with extremely efficient use of resources – water, fertilisers, energy – per square metre makes this a sustainable option.

Recycling waste

To facilitate this envisaged growth, growers and substrate producers will have to find solutions to the waste flows that the substrate crops may generate. Spent coir pith can usually be mixed with agricultural soil as organic matter without any problems, and will then even provide a final positive contribution to the soil's fertility. Stonewool and the plastic surrounding propagation blocks and substrate slabs should preferably be collected and recycled. This is already being done with success in western Europe and North America; other regions may have to pay more attention to this matter in the future. ■

Event calendar

JAN WEEK 4	Sweet pepper meeting (M) Auckland | New Zealand	APR WEEK 48	FASAGUA field day (FD) Villa Nueva | Guatemala
JAN WEEK 4	Orticultura technico in campo (E) Guidizzolo | Italy	MAY WEEK 20	ISF (C) Punta del Este | Uruguay
FEB WEEK 5	Fruit Logistica Berlin (E) Berlin | Germany	MAY WEEK 21	Beef tomato trials (FD) Antalya | Turkey
FEB WEEK 5	ASTA Vegetable & Flower Seed Conference (C) USA | Anaheim, CA	JUN WEEK 22	HGH exhibition «Protected crop of Russia» (E) Moscow | Russia
FEB WEEK 6	FHIA field day (FD) Comayagua | Honduras	JUN WEEK 23	Hydroponic farmers federation conference (C) Lorne, Victoria | Australia
FEB WEEK 7	Expo Agro Sinaloa (E) Culiacan |Mexico	JUN WEEK 24	House Fair Demo Greenhouse (FD) 's-Gravenzande | The Netherlands
MAR WEEK 9	AFSTA (C) Nairobi | Kenya	JUN WEEK 25	Brazil Hortitec (E) Holambra | Brazil
MAR WEEK 9	Onion field days (FD) Da Lat | Vietnam	JUN WEEK 25	Internal Melon Open Day (FD) Murcia | Spain
MAR WEEK 10	Field day Jordan (FD) Jordan	JUL WEEK 26	Organic Produce Summit (E) USA | Monterey, CA
MAR WEEK 13	Sweet pepper field days (FD) Lembang, Garut | Indonesia	JUL WEEK 29	Lettuce field day (FD) Enza Zaden R&D Station | New Zealand

C = Conference | E = Exhibition | FD = Field Day | M= Meeting

The Partnership

news and views from Enza Zaden

next edition

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Colophon

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