Dutch seed breeding

Architects of global sustainable food supply

November 2019
Introduction

Dutch seed breeders are the world’s largest exporters of seed and are famous for their quality and innovation. Our tiny country is seen as one of the most important players in feeding the world. The strong connections between our farmers, research institutes, companies and the government mean that the Netherlands is ideally positioned to contribute to the development of a sustainable worldwide food chain.

At the same time, regulations are constantly developing and societal concerns regarding our current methods of food production are growing. This raises the question: how can we, as the largest seed exporter, maintain and improve our market position, while responding to society’s environmental concerns?

In response to this question, drawing on our worldwide network and our extensive experience, we have identified a number of key themes which will define the future of the Dutch seed breeding industry. In addition we assessed the European and Dutch market and considered potential solutions which may allow Dutch seed breeders to prosper and grow.

We believe that drawing on diverse perspectives and knowledge when thinking about these themes is key to the solution. This publication provides a brief overview of our findings and is aimed at opening the discussion on the future of seed breeding in the Netherlands.

Michael Regouw
Head of KPMG NL’s Agriteam
Introduction

Key themes

Rising world population
Global vegetable seed demand is set to grow by approximately 9.4 percent yearly as a result of the rising world population.

Interdependencies between stakeholders
Responding to society’s needs, regulators are creating both favourable and unfavourable business conditions by providing subsidies and imposing restrictions.

Organic farming
Dutch farmers have been shifting towards organic farming, driving an increase in the demand for organic seeds.

International expansion
To leverage favourable climate conditions and proximity to new markets, Dutch seed companies are expanding internationally.

Focus on sustainability
Sustainability initiatives are resulting in new and better seed varieties for which there is high demand. However, this requires greater R&D investments.

Impact on industry

Impact:
- Positive
- Neutral (could be both negative and positive)
- Negative.
Seed breeding at a glance
The Dutch seed industry comprises all the steps in a typical seed breeding value chain. Seed breeding companies generally integrate the steps from breeding to growing. Compared to other European and global seed breeding countries, a significant concentration of seed breeding activities takes place in the Netherlands. To illustrate, Dutch companies hold more than 30 percent of all European PBRs and 60 percent of vegetable seeds PBRs. The majority of the multiplication work (i.e. producing and growing) is outsourced to growers in other countries which have lower labour costs and/or a more favourable climate. Propagating materials are shipped back to the Netherlands, repackaged and exported.
Seed breeding at a glance: Industry performance globally and in Europe

The European and Dutch seed market is on the rise, led by growing demand for food and feed

Europe seed industry\(^{(a)(b)(c)}\)

Europe is third in the global seed market based on revenue...

... with revenues likely to grow over 2016E-25F with 6.3% driven by rising demand for food and feed.

Europe seed market (€bn)\(^{(d)}\)

The European seed market continues to be dominated by maize, soybean and vegetable\(^{(e)}\) seeds; the majority of seeds are non-GM.

Maize, soybean and vegetables are the major seed categories by value and are expected to be growth drivers over 2017E-25F with forecast CAGRs of 8.1%, 6.4% and 3.4% respectively.

GM seeds make up only a small portion of the European seed market, as their cultivation is banned in the region with the exception of the cultivation of GM maize. GM maize is predominantly cultivated in Spain and Portugal.

Note: 
- (a) Sourced from Grandview Research report; 
- (b) Currency converted from USD to EUR with a basis spot rate of 0.87958 as at 4 March 2019, sourced from OANDA.com; 
- (c) Seed market comprises non-GM/conventional and GM seeds sold in the market; 
- (d) CAGRs calculated on actual value and may differ slightly from the presented value, due to rounding; 
- (e) Vegetable seeds here include seed potato sales; 
- Sum total of percentages may not add up to 100 percent due to rounding.
The Netherlands is among the top 5 players in the European seed market and the top 3 for the vegetable seed segment, owing to leading research capabilities and a favorable business environment.

Ranking of European countries by production of overall seeds\(^{(a)}\)

<table>
<thead>
<tr>
<th>Rank</th>
<th>Country</th>
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<tbody>
<tr>
<td>1</td>
<td>France</td>
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<tr>
<td>2</td>
<td>Germany</td>
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<tr>
<td>3</td>
<td>Italy</td>
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<tr>
<td>4</td>
<td>Spain</td>
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<tr>
<td>5</td>
<td>Netherlands</td>
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</tbody>
</table>

Ranking of European countries by production of vegetable seeds\(^{(b)}\)

<table>
<thead>
<tr>
<th>Rank</th>
<th>Country</th>
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<tbody>
<tr>
<td>1</td>
<td>France</td>
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<tr>
<td>2</td>
<td>Italy</td>
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<tr>
<td>3</td>
<td>Netherlands</td>
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<td>4</td>
<td>Denmark</td>
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<tr>
<td>5</td>
<td>Poland</td>
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</table>

Note: \(^{(a)}\) According to OECD (2012 data) and Technavio report (2015 data); \(^{(b)}\) According to Technavio report (2015 data); \(^{(c)}\) According to Technavio report and ISF (2015/16 data).
The Netherlands is a leading exporter of seeds (by value), driven by the export of high-value (and relatively low-volume) vegetable seeds to countries such as Germany, France and the US. It is able to produce large quantities of seed with a lower domestic consumption vis-à-vis other leading global producers.

In 2017, the Netherlands was the largest exporter of both total seeds...

...and vegetable seeds, globally...

...Although it made a lower contribution to field crop seed exports.

In particular, global seed potato exports (by value) are dominated by the Netherlands with a contribution of more than 50 percent in 2017.

Furthermore, the Netherlands is also the world’s largest importer of various seeds (by value), similar to its export market positions. This is largely attributed to large quantities of re-exporting, as seeds cross borders multiple times during the value chain.
Comparison of Dutch seed exports and imports by value (€bn), 2013-17

<table>
<thead>
<tr>
<th></th>
<th>2013</th>
<th>2017</th>
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<tbody>
<tr>
<td>Vegetables (excl. seed potatoes)</td>
<td>1.12</td>
<td>1.43</td>
</tr>
<tr>
<td>Exports</td>
<td>0.37</td>
<td>0.46</td>
</tr>
<tr>
<td>Imports</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Field Crop Seeds</td>
<td></td>
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</tr>
<tr>
<td>Exports</td>
<td>0.52</td>
<td>0.47</td>
</tr>
<tr>
<td>Imports</td>
<td>0.02</td>
<td>0.03</td>
</tr>
<tr>
<td>Seed Potatoes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exports</td>
<td>0.30</td>
<td>0.31</td>
</tr>
<tr>
<td>Imports</td>
<td>0.27</td>
<td>0.38</td>
</tr>
</tbody>
</table>

Source: International Seed Federation, UN Comtrade

Note: (a) Total Dutch seed trade comprises vegetable seeds (including seed potatoes), field crop seeds and flower seeds. Since the contribution of flower seeds is minuscule in comparison to other seeds, it has been excluded from our analysis; (b) Currency converted from USD to EUR with a basis spot rate of 0.87958 as at 4 March 2019, sourced from OANDA.com; (c) Sourced from International Seed Federation; (d) Includes trades worth more than USD 1 million; (e) Vegetable seeds comprise the seeds of various vegetables such as (but not limited to) cabbage, broccoli, tomato, pepper and beans; (f) Sourced from UN Comtrade; (g) Field crop seeds include the seeds of pulses, cereals, industrial crops and forages.
The Dutch seed market appears to be dominated by a few large players.

The Dutch seed market is dominated by a number of large players comprising both domestic companies and Dutch branches of multinationals, with a focus on the vegetable seed segment. These large players have an extensive presence globally. Besides their presence in the Netherlands, they are widely present in Europe and North America, and most of them also on the other continents. Their seed portfolios mostly comprise vegetable seeds(a), with some also including grain and oil seeds. Their yearly revenues vary around €350 million, which is invested heavily in their R&D capabilities i.e. up to 40 percent of their yearly revenue, with domestic companies being the largest spenders.

Domestic companies are typically (originally) family-owned businesses or cooperations. They hold leading positions in both the Dutch and the global vegetable seed markets.

In addition, there are various small and medium-sized companies operating in separate parts of the value chain.

Dutch branches of multinationals(b)

- Monsanto Holland BV;
- Syngenta Seeds BV;
- BASF (Nunhems Netherlands BV);
- DuPont International BV;
- Takii Europe BV.

Domestic companies(b)

- Rijk Zwaan Holding BV;
- Enza Zaden Beheer BV;
- Bejo Finance BV;
- Barenbrug Holding BV;
- Hazera Seeds BV;
- HZPC Holland BV.

Note: (a) With the exception of Barenbrug Holding BV which specialises in grass.
(b) The list of players is indicative and not exhaustive.
Key drivers in the Dutch seed breeding industry
Rising world population

The Dutch seed market is being driven by the growing global demand for vegetable seed, the area which contributes the most to the Dutch seed market in terms of value. This growing demand is being driven by global population growth in countries such as China and India, and an increasing average age around the world. This, combined with stable or in some places shrinking agricultural land (e.g. due urbanisation), means there is a significant need for the development and production of vegetable seed varieties with higher yields and nutritional value. As a result, the global vegetable seed market is expected to grow by more than 9 percent from 2017 to 2023.

Global vegetable seed market (€bn), 2017-23F

“Achieving growth in a research-intense business such as the seed breeding industry requires process efficacy. We have learned from our experience in the pharmaceutical industry that, among other things, it is critical for companies to have the right balance in their portfolios between scientifically interesting and commercially interesting products and to have a transparent development process.” – Jochem Floor, senior manager, KPMG Operating Strategy
Interdependencies between stakeholders

Responding to societal needs and technological developments, the European Parliament and the Dutch government have a large impact on the Dutch seed market, with both supportive and restrictive initiatives. Supportive initiatives include subsidies and research support, which stimulates private investment in the market. Moreover, according to the World Bank, the Netherlands is a global leader in terms of favourable seed regulations. This ranking is based on parameters such as ease of registration for new varieties, availability of plant breeders’ rights, and quality of seed control measures. One example is the Dutch government supporting programmes in which seed companies work alongside researchers from universities such as Wageningen University & Research to develop new crop varieties.

On the other hand, initiatives have been introduced which can be considered restrictive, such as the strict regulations governing CRISPR technology. Under the new rules, seeds produced using CRISPR and other new breeding technologies will have to undergo an extremely costly and time-consuming approval process, placing Dutch and EU seed breeders at a disadvantage to outside competitors. This may lead to the relocation of breeders to other countries outside the EU.

So regulators can have both a positive and a restrictive influence. The challenge is for the Dutch seed breeding industry to remain a global frontrunner while meeting the concerns of all its stakeholders, including society as a whole.

“Online shared platforms can help bring together the ideas and interests of different stakeholders in a value chain. Some questions are just too big and too relevant to be solved on your own. Some challenges across the value chain require leaders to have the vision and guts to solve them together.” — Ank van Wylick, partner, KPMG’s Innovation team
Focus on sustainability

The Netherlands is a front-runner in sustainable agriculture, due to its prominent research institutes and major seed breeding companies which lead innovation in the industry. In addition, the Dutch government provides strong support to sustainable agriculture by providing subsidies and education to farmers, to help them adopt the latest and best agricultural practices.

Some of the key initiatives undertaken by Dutch seed players towards achieving sustainability include sustainable seed coating, organic farming and hydroponics (wherein seeds are grown in nutrient-rich water). These initiatives are aimed at sustaining and improving soil quality and reducing the use of pesticides and fertilizers.

“Our clients want us to help them define effective and efficient strategies to make an impact on the UN’s Sustainable Development Goals (SDGs). We have specific experience in linking goals to measurable performance. We believe this leads to supply chain transparency and ultimately the achievement of the SDGs” – Jerwin Tholen, partner, KPMG Sustainability
Organic farming

The Dutch agriculture industry is witnessing a move towards organic farming as the demand for organic food continues to grow. The number of Dutch farms switching from conventional farming to organic farming doubled in 2016 from 2015. The current growth in the number of farms switching is being stimulated by the higher margins on organic food. An increased uptake of organic seeds by the farmers is inevitable as further growth of fifteen percent of the organic food and beverage market is expected over the next five years.

Dutch organic farming area (in hectares)
2012-17

![Graph showing organic farming area in hectares from 2012 to 2017 with a compound annual growth rate (CAGR) of 3.2%.

“One of the challenges of organic farming is that it needs to lead to yields comparable to those of conventional farming. With a growing global population, it is vital that organic farming does not compromise the world’s food supply. We help companies in the food chain find a balance between being organic and focusing on high yields at the same time.” – Arnoud Walrecht, director, KPMG Sustainability

International expansion

Dutch seed companies are expected to continue expanding their plant breeding and R&D activities outside the Netherlands, to leverage favourable climate conditions, proximity to new markets and low labour costs. They do this by starting own businesses abroad or by acquiring businesses. For example recently, Enza Zaden opened its first R&D and breeding centre in Malaysia, and Rijk Zwaan constructed a new research centre in China and purchased land for breeding trials in Brazil. At the same time, Syngenta acquired a business with a large presence in South American countries, searching for synergies with their own product portfolios.

“Companies tend to make overly optimistic assumptions regarding synergies prior to an acquisition. This is especially the case with trans-border acquisitions, where there is generally less familiarity with the target company and context. To overcome this, we have assisted many seed breeding and other agricultural companies in challenging their key assumptions regarding acquisitions in the due diligence phase and have validated their business cases at an early stage” – Erwin Kok, partner, KPMG Transaction Services
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Please also visit our KPMG NL Agri website.
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Glossary

**Commercial seed market** – The commercial seed market referred to in this publication is the part of the seed breeding market excluding farm-saved seeds and including all seeds intended for commercial use.

**E** – ‘E’ behind a year denotes estimated historic figures.

**F** – ‘F’ behind a year denotes forecasted figures.

**Field crops** – Field crops refer to crops other than fruits and vegetables which include pulses, cereals, industrial crops and forages.

**GM** – Genetically modified.

**GM seeds** – GM seeds are bred in a laboratory using modern biotechnology techniques such as gene splicing. Scientists modify a seed’s DNA to ensure the resulting plant has the desired characteristics.

**Non-GM seeds** – Non-GM seeds are cultivated through pollination. They can be bred two different ways: as hybrid seeds or as open-pollinated seeds.

**Organic seeds** – This refers to how plants and seeds are grown. Seeds labelled as organic must be bred and processed in strict accordance with the standards in the respective jurisdiction. Broadly speaking, these are seeds that have come from plants grown strictly the use of synthetic fertilizers and pesticides.

**PBR** – Plant breeding rights.

**Seed breeding** – Refers to the process of developing new varieties of seeds/plants by changing traits of existing seeds/plants.

**Seed breeding industry** – Comprises activities from the creation/development of new varieties of seeds, to the production, packaging and sale of seeds.