Grodan®

Part of the ROCKWOOL group.

Everything starts with passion

Hub Janssen
Managing Director
Grodan Group

It is with great pleasure that I present our Grodan story to you. The story is about sustainable cultivation aimed to leave the world a better place in the future.

It is the result of a journey which started with the formulation of our 'new way of thinking' and on how we can impact food systems to conserve nature and feed humanity. We involved our main stakeholders to review this way of thinking and to guide us on how best to communicate this. The result you now find in the book in front of you, a story with our vision backed up by evidence.

Our story is about passion, the Precision Growing philosophy is in our genes: higher yields while using less of the world's valuable natural resources. The impact of Grodan on people, planet and profit is distinctive and contributes to a future-proof horticulture, providing people around the world with access to healthy food today and for generations to come.

I sincerely thank everybody who contributed to the creation of this story.

I am very pleased to have been invited to introduce this booklet outlining the Grodan story.

Wageningen UR is a research institution focused on the area of 'healthy food and living conditions'. It is our mission 'To explore the potential of nature to improve the quality of life'. The world is changing radically. The world's population is growing while the population of the western world is also ageing. The pressure on land use is increasing; the climate is changing, while fossil fuels and good quality water are becoming scarcer. It is our task to make crop production more sustainable as there is a growing need for healthy, versatile, adequate and safe food. At Wageningen UR we do not just develop cutting-edge knowledge; we also help to translate this knowledge into practice worldwide.

The contribution of Grodan in a healthy and sustainable food chain makes a difference. Therefore I am happy that Grodan reached out to confirm and to enrich their story. The accurate approach they took in defining their contribution as well as their determination to seek scientific support for their claims, characterizes this organisation.

Prof. dr. ir.
Leo Marcelis
Head of Chair group
Horticulture and
Product Physiology
Wageningen University
& Research

How to feed the world in 2050?

In 2050, the earth's population will be 9 billion, 70% of whom will be living in urban areas. This growing urban population will need access to healthy and nutritious food. Governments and Non-Governmental Organizations (NGO's) are promoting fresh food consumption for health reasons along with the importance of producing safe food that is sustainably grown. In parallel consumers are becoming more health-conscious and are increasingly driven to local, natural, and sustainable quality offerings – a trend which is strongly tied to the modern focus on healthy eating.

It is estimated that we will have to produce double the amount of healthy, nutritious food with half the resources of today. This leaves us with one of today's biggest challenges. Water, fertilisers, land and energy are crucial resources for food production. Less than 1% of the earth's fresh water is easily available and suitable for human use. 70% of that water is used for irrigation in agriculture. Water scarcity is addressed as part of the United Nations "Agenda 2030" Sustainable Development Goals.
Reserves of fertilisers, that are crucial for the production of food, are running out. Continuous and increasing demand on land resources has had a negative impact on the area and quality of land available for food production.

So, food production has to double while using half of the resources of today

Our roots in sustainable growing

Grodan supplies innovative and sustainable growing media solutions for professional growers and home gardeners. For almost 50 years our team has been dedicated to creating the optimal environment for roots resulting in healthy and strong plants. We are driven by developing the most sustainable growing solutions and by making these accessible to communities across the globe. This is our contribution to a future-proof horticulture that will provide people around the world with access to healthy food not only today but for generations to come.

Our growing media solutions are designed for Precision Growing, which is the most sustainable way of growing. This is all about giving the plant exactly what it needs. This effective way of growing leads to a better yield and quality of fresh produce while at the same time using valuable resources in the most efficient way.

As such Grodan brings the best of sustainability together, facilitating an efficient way of producing nutritious food to keep people healthy, with a positive impact on the planet by minimising the use of resources, whilst at the same time helping growers optimise their profit to sustain their businesses in the future.

Achieve sustainable food production for future generations

Producing more with less

Producing more with less is in our roots. Since we invented hydroponic stone wool growing in 1969 we have continuously evolved the Grodan approach to sustainable growing. Our first customers started growing hydroponically to avoid disinfection of the soil which was done with methyl bromide, a heavy toxic chemical. Our growing media enabled them to provide the plants with water and fertiliser much more precisely and efficiently. By doing so the yield per square meter further increased, while at the same time saving water, fertiliser and subsequently saving on costs.

Grodan can be seen as one of the Founding Fathers of Precision Growing for the horticulture industry. Today, growers make use of a wide range of innovative products for the entire growing cycle from the start of propagation till harvesting.

The Grodan approach continuously evolves

Doing much more with much less

✔ More yield per m^2

✔ More growing cycles per year

✔ More use of 'non-agricultural' land

Less land

Precision Growing makes more efficient use of the available land

Soilless cultivation can be sited anywhere; even on concrete floors in buildings. Hydroponics is a way to bring food to the city and to shorten the distance between producer and consumer. Urban horticulture can reduce land requirements for vegetable production by 75% or higher.

Less water

Water used to grow 1 kg of tomatoes

In soil not all of the water reaches the root, so this can quickly lead to 50–100% higher water consumption. This is not the case when growing hydroponically. Excess water can be easily re-used resulting in far more efficient water consumption. In addition, stone wool growing media enables innovative irrigation technology so that water use is measured and regulated and can therefore avoid excessive irrigation.

Open field	Greenhouse without recycling	Greenhouse with recycling
60 L	22 L	15 L

High tech greenhouse 4 L

> **"Feeding a world population of 9.1 billion people in 2050 would require raising overall food production by some 70% between 2005/07 and 2050. Production in the developing countries would need to almost double."**
>
> Source: Report FAO Conference 'How to Feed the World in 2050'

Sources used

The facts presented in this booklet are a summary of a scientific review of dr. ir. Ep Heuvelink and Prof. dr. ir. Leo Marcelis from Wageningen UR. Below you find a summary of the literature list used for the review. The full list is available on request.

Water scarcity

Beerling, E.A.M., C. Blok, C., Van der Maas, A.A., and Van Os, E.A., 2014. Closing the Water and Nutrient Cycles in Soilless Cultivation Systems. Acta Horticulturae 1034: 49-55.

Van Kooten, O., Heuvelink, E., Stanghellini, C., 2008. New developments in greenhouse technology can mitigate the water shortage problem of the 21st century. Acta Horticulturae 767: 45-52.

Water quality

Massa, D., Incrocci, L., Maggini, R., Carmassi, G., Campiotti, C.A., Pardossi, A. 2010. Strategies to decrease water drainage and nitrate emission from soilless cultures of greenhouse tomato. Agricultural Water Management 97: 971–980.

Tüzel, I.H., Tüzel, Y., Gül, A., Meriç, M.K., Yavuz, O., Eltez, R.Z. 2001. Comparison of open and closed systems on yield, water and nutrient consumption and their environmental impact. Acta Horticulturae 554: 221-228.

Urbanisation

Hussain, A., Iqbal, K., Aziem, S., Mahato, P., Negi, A.K. 2014. A review on the science of growing crops without soil (soilless culture) – A novel alternative for growing crops. International Journal of Agriculture and Crop Sciences 7: 833-842.

United Nations, Department of Economic and Social Affairs, Population Division (2014). World Urbanization Prospects: The 2014 Revision, Highlights (ST/ESA/SER.A/352). ISBN 978-92-1-151517-6.

Fertiliser scarcity

Massa, D., Incrocci, L., Maggini, R., Carmassi, G., Campiotti, C.A., Pardossi, A. 2010. Strategies to decrease water drainage and nitrate emission from soilless cultures of greenhouse tomato. Agricultural Water Management 97: 971–980.

Pronk, A.A., Voogt, W., De Kreij, C., Smit, A.L., Van der Lugt, G.G., Marcelis, L.F.M. 2007. Bouwstenen voor het opstellen van gebruiksnormen voor nutriënten bij teelten onder glas. Plant Research International, Wageningen, the Netherlands, Report 141.

Land scarcity

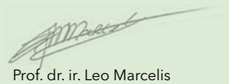
Cicekli, M., Barlas, N. T., 2014. Transformation of today greenhouses into high technology vertical framing systems for metropolitan regions. Journal of Environmental Protection and Ecology 15: 1779-1785.

Lambin, E., Meyfroid, P., 2011. Global land use change, economic globalization, and the looming land scarcity Proceedings of the National Academy of Sciences of the United States of America 108: 3465–3472.

Nutritious value

Gravel, V., Blok, W.J., Hallmann, E., Carmona-Torres, C., Wang, J., Peppel, A.C. van de, Condor Golec, A.F., Dorais, M., Meeteren, U. van, Heuvelink, E., Rembialkowska, E., Bruggen, A.H.C. van. 2010. Differences in N uptake and fruit quality between organically and conventionally grown greenhouse tomatoes. Agronomy for Sustainable Development 30: 797–806.

Thybo, A.K., Bechmann, I.E. and Brandt, K. 2005. Integration of sensory and objective measurements of tomato quality: quantitative assessment of the effect of harvest date as compared with growth medium (soil versus rockwool), electrical conductivity, variety and maturity Journal of the Science of Food and Agriculture 85: 2289–2296.



Prof. dr. ir. Leo Marcelis

More yield

Soilless cultivated fresh produce yield versus soil based cultivated yield

Hydroponic cultivation on stone wool growing media results in a higher yield per square meter compared to cultivation in soil. In a greenhouse the ultimate climate conditions can be created for plants. This, in combination with Precision Growing, enables growers to give the plant exactly the amount of water and fertiliser it needs. This leads to a strong plant that carries more fruits.

15 - 40%

Less gas emissions

Soilless cultivation emits significantly less greenhouse gasses per kg of fresh produce than soil based cultivation

The environmental impact of a greenhouse is mainly caused by the use of fossil energy for heating. By growing hydroponically the yields increase significantly compared to growing in soil. This results in a lower energy use and hence less CO_2 emission for each kilogram of fresh food.

10-15% CO_2

Less fertiliser

Efficiency in greenhouses

Besides the efficient use of water Precision Growing also enables efficient use of fertiliser. Excess fertiliser can be re-used. Because of Precision Growing the grower knows how much fertiliser a plant needs. The amount of fertiliser per kilogram of product can be reduced with 25% in an open system. In a closed system it is even possible to recirculate the fertiliser that is not taken up by the plant. This can be up to 78% without any reduction in neither yield nor product quality.

Soilless cultivation is

20-25%

more efficient compared to soil based cultivation

List of definitions

Fertiliser
A fertiliser is any substance, such as manure or synthetic fertilisers, added to the root environment to increase plant productivity.

Hydroponics
Hydroponics is a subset of hydroculture, the method of growing plants without soil, using mineral fertiliser in a water solvent. Stone wool (mineral wool) is the most widely used medium in hydroponics.

Grodan hydroponics cultivation
Crops cultivated hydroponically on Grodan mineral wool receive precisely the amounts of water and fertiliser that plants need for optimal growth with the minimal emission of water and fertiliser to the environment and minimal use of pesticides.

Non-Governmental Organization (NGO)
A Non-Governmental Organization (NGO) is a not-for-profit organisation independent from states and international governmental organisations.

Organic cultivation
Organic food is produced by methods that comply with the standards of organic farming which beholds an integrated farming system that strives for sustainability, the enhancement of soil fertility and biological diversity whilst, with rare exceptions, prohibiting synthetic pesticides, antibiotics, synthetic fertilisers, genetically modified organisms, and growth hormones.

Note: The legislation with respect to organic horticulture is not the same in Europe and in the US. In particular, organic cultivation out of the soil (but not in stone wool) is allowed in the US at the moment, while this is forbidden in Europe where organic cultivation is only possible in the soil.

Precision Growing for everyone

Precision Growing enables professional growers to better control important growing parameters and to ensure the optimal growing environment for root development in stone wool. Grodan is the number one of the world in growing media solutions for the professional horticulture industry and has the purpose to “empower Precision Growing for everyone”.

This sustainable growing method holds promising potential in countries with high population growth where demand for resource-efficient food production is already high and will continue to rise in the future.

Grodan hydroponics can be sited anywhere, including in urban areas that would otherwise be completely unsuitable for traditional soil-based production. Inner-city derelict land and even unused buildings such as old mills, factories and office blocks can now become unique growing areas for our food. The resulting reduction in food miles also has an additional sustainability impact on the food chain.

For consumers who want to grow food sustainably at home, Precision Growing offers them a successful, low maintenance and fun growing experience.

Sustainable growing – anywhere and for everyone

Passion for People, Planet and Profit

People

For all people, food safety is a vital factor for secure, modern living. Surveys show that the potential presence of pesticide residues in food is the number one concern of today's critical consumers.

Pesticide residues in fresh foods are subject to strict regulations around the world and products are regularly checked. Modern hydroponic greenhouse growers prefer biological alternatives, using beneficial insects to control pests and using bumble bees to pollinate crops. Thereupon, growers use minimal quantities of crop protection chemicals, since these can damage the beneficial insects they have invested in.

Planet

Embedding sustainability in our business means caring about the overall impact of our products they have on the world. We are committed to enriching the life of everyone who comes into contact with our products.

Grodan products are perfectly placed to ensure sustainable and safe food production while at the same time directly addressing the issue of water pollution. Precision Growing is an enabler for closed systems as it allows the recirculation of water and fertiliser. Consequently, the emission of fertiliser to ground and surface water supplies is substantially lower compared to conventional soil systems. In the most modern growing systems it is even possible to reduce emission of fertiliser to zero.

Furthermore, Precision Growing plays a part in reducing the biggest single environmental impact of a large part of the world's greenhouse production, which is CO_2 emission resulting from burning fossil fuels for heating. When growing hydroponically, yields increase significantly thereby reducing the CO_2 footprint of each kilogram of fresh food.

Besides helping to eliminate water pollution and reducing the CO_2 footprint of greenhouses 'doing more with less' also means using available land more efficiently. This is simply thanks to:

- a higher yield per m^2 which requires less land
- faster growth allowing more growing cycles per year
- cultivation can be done on land or even in buildings

Profit

Acting in a sustainable way means that we should leave a better world for our children and for the generations to come. Growing healthy, nutritious food in ways that utilise less of the world's valuable natural resources is a significant contribution to this goal. For consumers, reassurance of healthy and safe food at an affordable price is on the top of their list. For growers, a secure financial basis for business is essential.

Today, the world faces many challenges such as an increasing demand for food and limited resources available to meet up to this demand. Precision Growing enables growers to achieve higher yields while at the same time using less water, fertilisers and agricultural land. The result is an increase in yield and a significant reduction in CO_2 emission per kilogram crop. Not only is this the most sustainable way of growing, it is also the most profitable way of growing.

The Grodan solution

Grodan enables Precision Growing with the combination of stone wool growing media, innovative growing tools and personal advice. It is this unique portfolio that is perfectly placed to ensure sustainable food production.

Plug, block and slab

The Grodan concept consists of a plug for seeding and germination. Young seedlings are then transplanted into a block for their remaining time at the propagator. On delivery to the production greenhouse the young plants are placed onto a slab where they grow and produce fruits.

Innovative growing tools

At each stage of growth the use of our products is supported by innovative tools which allow the propagator and grower to monitor and manage the root zone environment in the most optimal way possible.

Personal advice

We don't stop there. Our customers are also supported by in house professional horticultural experts who guide them every step of the way.

In today's environmentally conscious world, choosing for organically grown food seems to be a logical choice at first sight. If the choice for organic food is based on a reduced use of pesticides and a lower impact on the environment, then controlled growing on substrates - hydroponically, takes the argument even further. Vegetables grown hydroponically and organically are both equally nutritious. Scientific research shows that hydroponics is the most sustainable method of growing. This way of growing uses less water and enables a more efficient use of fertiliser. On top of that this way of growing saves the use of valuable agricultural land and has a lower CO_2 emission per kilogram of product.

Controlled growing on substrates is as such a clear and logical choice. While the EU Ecolabel certificate on our products provides an extra reassurance that Grodan's growing media live up to the highest possible standards of sustainability. Our solution enables a method of cultivation that meets the challenges we face today and tomorrow by doubling food production with half of the resources as today. We understand this need and we are dedicated to provide a precision growing, growing medium solution that allows growers to do much more with much less.

Passion for what we do

Stuart Lambie
Sustainability Manager

Passion for what we do
I really believe that the human race needs to change the way it uses the earth's resources over the next 100 years. These will be big changes, ensuring the future of mankind. Grodan can play a part in that change, helping to bring fresh food to more people, in more parts of the world in new ways, some of which we probably can't even imagine right now – that's the future contribution we and Grodan can make.

Agnieszka Szymanska
Business Director

Passion makes the difference
Our people follow their passion every single day in the horticulture industry and I am proud to be part of that team. Together we make a difference with our expertise and innovations. These create value for our customers and I believe that we are able to improve lives of many people in different places in the world.

Tony Abbas
Sales Representative

Vision on the world
I've had the pleasure of growing into a position that is both professionally and personally fulfilling. The fact that the Grodan vision entails more than just selling products - that we look to play a part in solving issues of scarcity with our knowledge and technology makes me feel good about where I spend my days.

Part of the ROCKWOOL Group

The core of everything we do at the ROCKWOOL Group is: to release the natural power of stone to enrich modern living. The ROCKWOOL Group's product portfolio is perfectly placed to tackle many of today's biggest sustainability and development challenges. Embedding sustainability in our business is about the overall impact our products have on the world. Our growers apply the most sustainable methods of producing healthy, nutritious food by using fewer resources. At the end of the growing season our products can be recycled into fertile compost, reusable plastics, or clay alternatives for the brickmaking industry. We are dedicated to continuously improve our 'End Of Life' solutions.

Grodan professional growing media products are awarded the European Ecolabel

EU Ecolabel: NL/29/001

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