

ORANGE

IS THE

NEW

GREEN

FRESHGROWERS: GROWING SUSTAINABLY IS OUR BUSINESS

INTRODUCTION

It all started with a carrot.

In 1998 ten young, energetic Nottinghamshire vegetable growers formed Freshgrowers, a vegetable growing co-operative that, nearly 25 years and 20,000 acres later, is still growing strong.

When one of our more adventurous members first suggested bringing some little French carrots to the UK market, we had no idea it would turn us into being world leading growers of Chantenay carrots. We now harvest 1,500 acres and supply over 90 percent of the Chantenay carrots eaten in the UK today.

The Chantenay carrot originated from the Chantenay region of France, with early references found back in the mid 1800s. However, production of Chantenay had almost ceased in the 1970s. The revival sparked by Freshgrowers has completely overhauled the humble carrot as it was then with new varieties, sizes and flavours.

Although some of us admit to having a bit less energy (*and hair*) today than we did in the nineties, as the success of our cooperative has grown, so too has our ambition for the positive impact that food production has on the environment.

Chantenay may be small, but we have big sustainability plans for our carrots.

GROWING SUSTAINABLY AT A GLANCE

Growing carrots in and around the Sherwood Forest Landscape character area, we have always taken a pride in soil conservation, provision of habitat for farmland birds and insects, and sympathetic hedgerow management. All of our farms have participated heartily in agri-environment schemes since their inception too.

All good stuff you might say. But now we are seriously upping our game to deliver even more for the environment from the production of our carrots. This is our sustainability focus at a glance.

CARBON NEUTRAL CHANTENAY CARROTS: having reduced our footprint, we are removing the equivalent amount of carbon that we emit in growing and harvesting our Chantenay crop, producing the world's first carbon neutral carrot.

OUR OWN GREEN POWER: we have invested in our own sources of renewable energy, installing wind turbines and solar panels across our factory and some of our farms.

REDUCING ENERGY USE: powering down our energy use from field to factory, because little changes add up.

TRANSPORT EFFICIENCY: reducing journeys, road miles and improving logistic efficiency of our carrot production.

BIODIVERSITY ACTION PLAN: 9-point plan for improving habitats and protecting pollinators across our farms.

REGENERATIVE SOILS: developing robust soil biological activity and improving the availability and ratio of nutrients for proper plant nutrition, with minimal soil disturbance.

CROP PROTECTION: adopting IPM for the control of pests, weeds, and diseases across our farms to reduce reliance on crop protection products.

GOOD BREEDING: when it comes to carrots, breeding matters. Through two decades of dedicated genetic breeding, we have dramatically improved yields, made Chantenay easier to cook and available to eat all year around.

WATER CONSERVATION: conserving, reducing and recycling water used in our fields and factory.

WASTE NOT WANT NOT: eliminating waste at every stage of production, packing and processing.

REDUCING PLASTICS: playing our part in reducing plastic packaging and developing ways to remove it altogether.

CARBON NEUTRAL CHANTENAY CARROTS

Having worked hard to reduce carbon in every aspect of our growing operation through improved productivity, investments in renewable energy and consideration of how we grow, our Chantenay carrot production has already reached a minimal carbon footprint.

Working with Campbell Gibbons Consulting to advise us on our overall approach to environmental sustainability, Intellync-Sustain (part of the AB Agri Group) to calculate the carbon footprint of our Chantenay carrot production, and Carbon Neutral Britain to offset our remaining emissions, we have proudly achieved carbon neutral status for our Chantenay carrots.



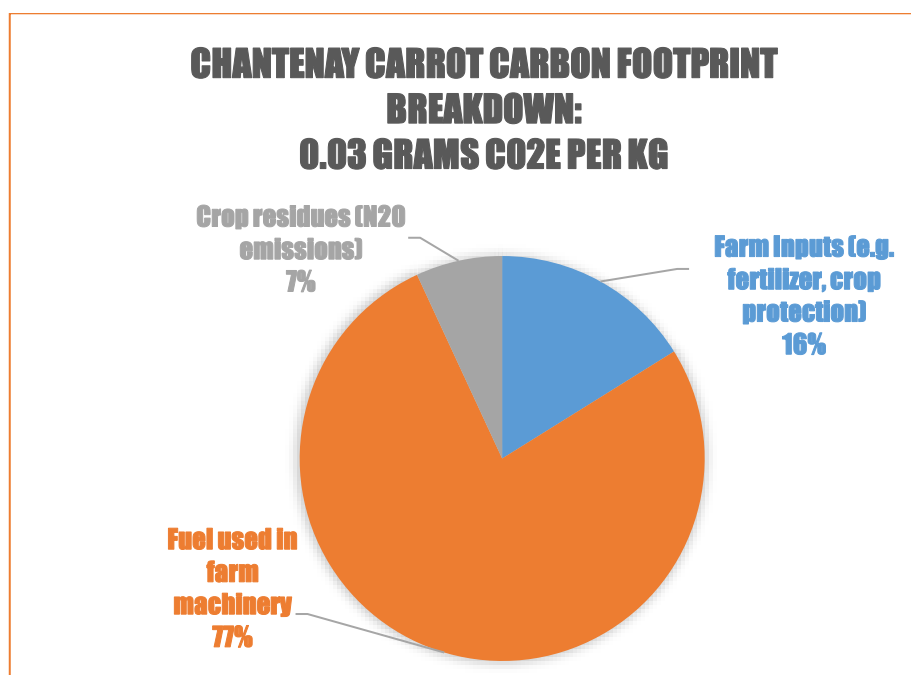
CHANTENAY'S CARBON FOOTPRINT

Using a product life-cycle analysis approach, Intellync-Sustain calculated that our 2021 crop of Chantenay carrots, approximately 12,500 tonnes in volume, emitted 362.95 tonnes of CO₂e.

That's a carbon footprint of 0.03g of CO₂e per Kg of Chantenay carrots. In other words, incredibly low, and it is this impressive low-level of carbon emissions that has enabled us to credibly offset the small quantity of GHG emissions that remain.

To put that into perspective, the carbon footprint of a litre of milk is x, x, x and the average person in Britain emits 10-15 Tonnes of CO₂ per year through what they buy, eat and do.

The main source of emissions for our Chantenay carrots is the fuel used in our field operations, which represents 77% of our overall product footprint.



CARBON OFFSETT PROJECTS WE ARE SUPPORTING

Investing in Carbon Neutral Britain's renewable energy offset portfolio had a good synergy with the investments we are making in green energy on our own farms. All of the projects are certified to the highest standards through the **Verified Carbon Standard (VCS)**, **Gold Standard Voluntary Emission Reductions (VER)**

and **Certified Emission Reductions (CER)** programmes. These are the projects we are proudly supporting:

Burgos Wind Farm – Philippines

The Burgos Wind Project is the largest wind farm in the Philippines. At the time it was built, it was also considered to be one of the largest wind farms in South East Asia. It is located in one of the best areas in the country to generate clean energy from wind. The 150-MW facility has fifty (50) Vestas V90 wind turbines, each with a rated capacity of 3 MWs. The wind farm has a substation which is connected to a 43 KM 115 kV Transmission Line to the Laoag substation of the grid operator, the NGCP (National Grid Corporation of the Philippines).

Preventing Fossil Fuel Burn for Energy

The project produces clean energy and displaces generation from other sources that contribute pollutants and greenhouse gas emissions to the environment.

Education within the Community

The Burgos Wind Team leads projects and initiatives with the local governments and communities that promote the protection of the environment. Engaging and empowering the community is a critical objective of the Project.

Employment

During construction, the Burgos Wind Farm generated a significant number of jobs, and today employs over 600 staff in the on-going management and maintenance of the wind farm and energy sites.

Andes Mountains Hydro Power – Chile

Located in the Tinguiririca River upper valley, this Hydroelectric project is around 120km south of Santiago, Chile. Known as La Confluencia, the 163 MW run of river hydro power plant utilizes the hydrological resources of the Tinguiririca, Portillo and Azufre Rivers, in a run of river scheme to generate and supply zero emission energy to the Chilean central electricity grid (SIC). The power plant generates certified emission reductions (CERs) by displacing electricity generation from grid connected fossil fuel-fired power plants that would otherwise be generating electricity.

Environmental Sustainability

The primary objective of the proposed project is to help meet Chile's rising demand for energy and increase renewable energy's share of overall Chilean electricity consumption.

Social Development

Through the "Tinguiririca Participa" grant program, the project directly finances proposals presented by community organisation, in areas such as healthcare, education, and social change.

Flora and Fauna

In addition to social projects, reforestation of around 120 hectares around the site has been implemented, helping protect and improve the local flora and fauna, with a specific impact on local Trichahue Parrot, Torrent Duck, Freshwater Catfish, Torrent Duck and Freshwater Catfish species.

Rice Husk Power Project – Cambodia

The Angkor Bio Cogen (ABC) project is the first renewable energy project to utilise rice husk as biomass fuel for electricity generation in Cambodia. It powers a 2 MW new rice husk power generation plant in the Kandal province.

Emissions Reductions

GHG reduction is achieved through (1) the use of rice husk, which was previously left to decay in the open space, resulting in methane emissions (2) the export of generated power to the Angkor Rice Mill, which partially replaces power generated by non-renewable sources (3) surplus generated power is supplied to the local power utility, providing electricity to the community living outside the project premises.

Social Development

The Project has contributed to the economic, social and environmental well-being of the community through providing reliable electricity to the rice mill and neighbouring businesses.

Huaneng Changyi Wind Farm Project – China

The Huaneng Changyi Phase II Wind Farm Project generates electricity from wind supplies this electricity to the North China Power Grid (NCPG). The project has installed and operates 33 wind turbines with a capacity of 1500 kW each. A total of 49.5 MW of renewable energy power generation capacity, and the net supply to the Grid of 106,523 MWh per year, once fully operational.

As the Grid is currently dominated by fossil fuel-fired power generation, the project is leading to greenhouse gas (GHG) emission reductions, with an average 91,886 tonnes of CO2 equivalent (tCO2e) per year offset.

Renewable Energy Technologies

As one of the few renewable sources within the region, it is hoped the project will stimulate and accelerate the commercialisation of grid-connected wind power technologies and markets.

Employment

During construction, the project generated a significant number of jobs, and today employs over 400 staff in the on-going management and maintenance of the wind farm and energy sites.

GENERATING OUR OWN GREEN POWER

We have invested in our own sources of renewable energy, installing wind turbines and solar panels across our factory and some of our farms.

Our factory is partially powered by a 500KW wind turbine, which produces an average 1,500,000 KW of electricity annually. The factory also has solar panels fitted across two thirds of its roof space. The PV cells generate an additional 200,000 KW power annually, creating a total renewable energy output of 1,700,00 KW.

We use approximately 500KW for our own operations, meaning that 1,200,000 KW is exported back to the grid annually.

In future, we will be exploring the potential for battery storage of our excess power, providing the technology is available to handle the energy generated on a large scale.

REDUCING ENERGY USE

It doesn't take many growers to change a lightbulb, but it takes a collective effort to drive an ongoing culture of energy efficiency from field to factory.

All of the lighting in our factory has been changed to LED's where possible. Lighting which is not in regular use such as storerooms and outside areas have been fitted with PIR light systems to prevent lights being left on, reducing light pollution, and wasted electricity.

The motors throughout the factory that drive our packing and processing machinery have been replaced with more energy efficient upgrades. The factory also uses 'power factor converters' that work by capturing the energy not used by the motors, often referred to as 'dirty electric', and recycling this power back into factory operations.

We mainly use a fleet of electric forklifts inside the factory that are charged overnight and can generally suffice a whole day of usage without further charging. The forklifts required for moving heavier items are gas powered.

GOING THE EXTRA MILE ON TRANSPORT

Almost all of our carrots are grown within a 30-mile radius of our factory, which minimises food-miles. All of the carrots are transported from the fields to the packhouse by one single company who organise routes to minimise haulage and reduce the time that empty trailers are on the road.

We make sure that every journey counts. For example, the trays we are required to use for transporting the final product to retail depots arrive at our factory in a full lorry-load. We now re-fill the same lorry with the customer's order, creating a well-planned circular loop. Similarly, we encourage our customers to send full orders, filling more space on a lorry, and reducing the number of smaller more frequent deliveries required; reducing journeys and maximising efficiency.

Growers out on farm are increasingly conscious of the emissions emitted during field operations, not least driven by the increasing price of fuel. From field to factory, we are taking care to use appropriately sized horsepower tractors and vehicles for a job, so that excess horsepower doesn't become wasted energy, and profit.

BIODIVERSITY ACTION

Working with ecology consultancy ELM Associates, we have conducted a thorough biodiversity habitat assessment across the three farms where the majority of our Chantenay crop is grown.

Using the UK Hab method (*widely recognised as a universal method of assessing habitat and biodiversity net gain assessments*), our first Habitat Assessment Report is a baseline of a sample of the key habitats across the farms, providing a record of what is there now and what condition it is in. We will conduct a similar assessment of the key habitats in 2026. In the intervening years (2023, 2024 and 2025), we will conduct a health-check of our progress and habitat to condition to ensure we are on track.

The farms

- **HAYWOOD OAKS FARM** extends to 170 ha with a mix of enterprises including sugar beet, potatoes, carrots, horse grazing and solar panels. It is an outstanding farm from a biodiversity consideration with an excellent range of habitats, well-spaced across the farm, offering genuine benefits to farmland birds, pollinators, woodland bird species and mammals such as brown hare. Currently 26% of the farm is considered good habitat for biodiversity.

The farm has always engaged with agri-environment schemes and has recently commenced a new 5-year wildlife offer agreement in January 2021. This includes winter bird seed mixes, wildflower margins, legume fallow and infield grassland areas. There has also been significant woodland planting over the years through the woodland creation grants and a woodland management plan has been approved to manage and thin some of these areas.

The recent purchase of an additional 153ha block of land was also assessed during the survey for a comparison. Presently all overwinter stubbles, the rotation here will include carrots, outdoor pigs, spring wheat and spring barley. Only 4.5% of this farm is currently considered good for biodiversity and there are huge opportunities for improvement, especially with wild seed mixes for birds, pollen and nectar mixes and hedge restoration.

KEY HABITATS on Haywood Oaks Farm are hedgerows, woodland, veteran trees, legume/flower rich grassland, wild seed mixes and the mixed cropping.

FOCUS SPECIES include red-tailed bumblebees, linnet, pipistrelle bat and spotted fly catcher which are chosen to reflect the wide variety of habitats across the farm.

- **HODSOCK LODGE FARM** extends to approximately 171 ha and is a mix of arable and grassland, with a beef cattle enterprise. Cultivations have been reduced in recent years with the majority of crops established with a single pass subsoiler and cultivator. At present cover crops are not part of the rotation and there are opportunities here to improve soil health and organic matter.

There is an ELS/HLS agreement on the farm, which expires in 2022. This has included winter bird seed mixes, overwinter stubble and brassica options, which has helped deliver a wide rotation of crops grown. There are significant opportunities to increase biodiversity on the farm outside the scheme with more targeted management of existing features and habitats, especially hedgerows, which we learned are being over-managed. This year is a good opportunity to re-evaluate the scheme and consider commencing a new mid-tier application.

KEY HABITATS are 7,127m of mature hedgerows, watercourses, woodland and mixed cropping rotation. There are 2,798m of watercourses cross the farm. The farm has old and newer planted mixed woodland and low intervention management has resulted in abundant deadwood and good habitat.

FOCUS SPECIES include brown hare, bumble bee species, redwing and skylark, which will all benefit from good habitat management.

- **LITTLE MORTON FARM** extends to approximately 248 ha, with a 34 ha solar farm. A mix of arable and grassland with a beef cattle enterprise, the farm has a long rotation including carrots, spring cereal, beetroot, winter cereal, potatoes, fodder maize and grassland leys.

There is an ELS/HLS agreement on the farm (in conjunction with Hodsock Lodge Farm), with many of the same observations made. The farm has significant areas of grassland, including that on the solar farm, and there is a good opportunity to increase biodiversity by more sensitive management.

KEY HABITATS on the farm are 15,880m of hedgerows, grassland, and mixed cropping.

FOCUS SPECIES include bumblebees, brown hare, song thrush and yellowhammer across the farm.

Changing our approach

Every grower believes they are doing the best on their farm to promote biodiversity and manage habitats. However, having an independent expert review our environmental performance and advise us on what we could do better has been a real eye-opener.

We have been doing a good job, outstanding in some areas, but we now know we can do more. Our biodiversity action plan for our three Chantenay growing farms spans 9 priority areas, and will help ensure that we measure, monitor and deliver the best possible outcomes for nature and the environment from the production of our carrots.

Biodiversity priority

What we will do differently

Protecting our woodland and veteran trees

Continue no intervention management of woodland: the old woodlands and newer planted areas will be managed as no intervention to allow focus on other areas of the farm, with new corridors along hedges and watercourse margins linking newer plantations to existing woods.
Root Protection: ensure that all veteran trees on the farms are protected by a 4m wide margin and have a 'no plough/cultivation zone' under the canopy.

Hedgerow management

Change hedge cutting policy: cutting one year in three will maximise blossom production and regeneration on some key hedgerows. Gradually raising the hedge cutting height on some hedges to 2m tall (or >1.75m) will provide a variation of hedge height.
Gap up hedges with different species: where gapping up is required, we will consider a wider range of species such as spindle, guelder rose, holly, willow, crab apple and gorse in addition to hawthorn, blackthorn and hazel.
Hedgerow trees: we will review opportunities for planting new hedgerow trees, particularly fruit trees such as damson, cherry, crab apple and traditional varieties of apple and pear.

Margin management

More field margins and better management: aim for margins along all watercourses and consider how they can create corridors across the farm when next to hedges. Use field margins to extend the hedgerow habitat and buffer the hedges from farm operations. Introduce a 6m wide margin around the largest production fields.
Monitor establishment of flower and herb species: we will remove/bale the cuttings on wildflower margins to assist flower and herb species which do not respond well to cuttings being left on top.

Wild bird seed mixes

2% Wild Bird Mixes: research shows that 2% of each farm needs to be dedicated to such mixes if farmland bird declines are to be reversed.
Target bird species: A standard mix is presently sown. We will tailor the mix on each farm to target species identified from the bird survey (such as linnet and yellowhammer).

Solar panel fields	Grassland management for pollinators: the grassland around the solar panels is an excellent opportunity to provide pollinator habitat by allowing a longer sward to develop. We will rotationally graze the fields and/or introduce breaks to allow the sward to flower.
Grassland management	Aim for a longer sward and varied sward height: by varying cutting times and reducing any grazing on grassland fields we will create more complex habitats with a range of sward heights and flowering. Cutting half in late July and half in late September will maximise its value for insects.
Soil management	Aim for no bare soil overwinter: faster growing cover crops including mustard, fodder radish and phacelia will be sown directly into a stubble following harvest and offer economical, fast growing winter cover, protecting soils and building fertility.
Protecting pollinators	Provide a minimum of 1% pollinator habitat: pollinators have suffered significant declines, where large fields exist they have resulted in fewer sources of pollen and nectar for pollinators. Recent research shows that pollen sources should be placed 200m apart across the farm. We will increase pollinator habitat across all farms by 3-year hedge cutting rotations to maximise blossom production and the provision of wildflower margins with knapweed, ox eye daisy, yarrow & wild carrot, in addition to grasses. Lengthen the season of pollen and nectar: providing pollinator habitat early and late season is especially important to provide a longer season of pollen and nectar habitat and address the “hungry gap”. We will consider the provision of flowering plants across our farm margins from March – September.
Farmland birds	Repeat our farmland bird survey: The last farmland bird survey was completed in 2012 and showed good numbers of farmland birds including skylark, yellowhammer and linnet. A repeat of the survey will allow tailored biodiversity action for key species present. Farm buildings: house martins, swifts and swallows will take readily to bird boxes and the provision of such boxes is an easy conservation action. Wherever possible access into the buildings will be provided for swallows.

SOILS: a.k.a BROWN GOLD

Carrots like sandy loam soils, which is why Nottinghamshire, and its underlying geology, is one of the best parts of the country for growing carrots.

We use the Albrecht soil management system across all of our farms. If you'll allow us to get geeky for a moment (*we just love soil*), this stands for a Base Cation Saturation Ratio (BCSR) method. The underlying principle is to develop robust soil biological activity and improve the availability and ratio of nutrients for proper plant nutrition.

How we manage the soil on our land is just as important as soil health. Sandy soil is very light, so it requires less horsepower to get field operations such as drilling and harvesting done than other types of soils, which minimising disturbance and compaction. Although sandy soils do not hold much carbon, our soils do not need to be ploughed, which is a practice known for releasing carbon to the atmosphere. Tillage, the process of preparing our soil for planting, is also kept to minimum to reduce soil and organism loss, but also because it reduces costs.

Straw is applied to overwintering carrots to protect the crop from pests, diseases and the elements. Once removed, the straw is incorporated back into the soil adding organic matter and nutrients back into the system. This is especially valuable on sandy soils which have a lower nutrient holding capacity. It also prevents nitrates being leached out over winter as sand has a very low cation exchange capacity (CEC) 1-5meq/100g.

That's the geeky bit over now.

CROP PROTECTION

Integrated Pest Management (IPM) is a well-established method for the prevention, detection and control of pests, weeds, and diseases in agriculture and horticulture. It's a system that we adopt across all our farms, and have three in-house agronomists that oversee all our crop protection needs and applications.

The reality is that crops need protection from pests, diseases and weeds, but having an approach that reduces reliance on crop protection products is absolutely fundamental. The continuing loss of plant protection products and rising levels of resistance means that the conventional crop protection toolbox is shrinking. It makes environmental and economic sense to reduce reliance on pesticides.

GOOD BREEDING

Before we got our hands on it, Chantenay carrots used to be a summer vegetable that you'd generally only find in a can. It was low yielding and actually pretty ugly to look at, despite tasting very good. So in 1999 after screening every strain of Chantenay we could find and being very disappointed in the results, we started our own breeding programme.

Our goals were simple: keep the flavour, improve the shape and the quality. We learned more than we expected too about these little carrots. They had no stamina for one, often losing flavour during the winter, and not lasting as long as conventional carrots. They still looked ugly too, with big knobbly crowns that would hang on to grains of sandy soil no matter how hard you washed them. We had a lot to do to make these carrots naturally small, and more consumer friendly. Plus, if we wanted to make a business out of it, we needed to triple the yields.

Over two decades of careful breeding, we have improved the yield four-fold, retained the carrot's flavour and ability to grow all-year round, and finally shrunk those ugly crowns into dainty tops that means you can cook Chantenay carrots whole. It is these genetic improvements that underpin both the Chantenay carrot we know and love today, and our carbon story. By achieving such strong and consistent yields we get more out for everything we put in, which is better for the bottom line and the environment.

WATER CONSERVATION

Water used for washing and processing carrots in the factory is sourced from boreholes. Water saving measures mean that we typically use less than 5m³ daily, which is mainly used for cleaning dirty carrots from the field. This water is then recycled through a water treatment plant, reducing water wastage and maximising efficiency.

Carrots need water to grow, and mother nature doesn't always deliver what we need. Irrigation is used to water the crops in our fields when conditions demand it, but over recent years we have focused on adopting more precise water application techniques, such as sprinkler systems which are more targeted and efficient.

WASTE NOT WANT NOT

Farmers hate waste. It not only costs money, but our overriding aim as food producers is to see everything we produce consumed and enjoyed.

Our waste carrots are sold as stock feed for local farmers and horse livery yards to collect and use to feed their animals. Some of our carrots fed a Grand National winner, so we know they are good stuff!

Any soil that comes into the factory on our 'dirty vegetables' is recorded, collected and then returned to fields or used for landscaping. Such a precious resource can never be wasted.

We monitor our plantings and forecasting carefully, and will seek out ways to further improve our planning on farm to ensure we only grow what is required. We also want to continue working with our customers to improve the accuracy and timings of orders. Any carrot ordered, planted but not sold is an unnecessary waste. Making sure that retail promotions are used as a tool to drive consumer demand when volumes are high, rather than scheduled for arbitrary periods during the year is another important tool for reducing waste.

REDUCING PLASTIC PACKAGING

Here are some of the ways we are working with our customers to reduce and remove plastics from the supply chain:

- Thinner and smaller packaging containing the same size and weight of product reduces the volume of plastic per bag
- Using fewer colours and stickers on plastic packaging reduces contamination and improves its recyclability
- No plastic punnets or trays are used as standard in our factory (although these are still required for certain costumers)
- Where customers require us to use plastic trays to transport our produce from the factory to their depots, these products where once held together with plastic wrap. Now they are held together with a single back band, which uses significantly less plastic.

As a cooperative we are also trialling and developing new packaging formulations using plant extracts in place of traditional plastic.

THE LAST WORD

In line with our sustainability priorities we will continue to look at every element of our growing business to ensure that our emissions remain low, and to identify opportunities to reduce and remove carbon even further. We will conduct an annual calculation of our carbon to ensure we are on track. Our ability to reduce the small amount of carbon emitted from our Chantenay carrot production will rely on us building sequestration on our farms, driving higher yields through breeding and genetic innovation and maximising productivity through our approach to soil health, management and use of inputs.

Beyond carbon, our ambitious action plan for biodiversity will see us focus our attention on habitat management like never before. Under the expert eye of our ecologist consultant, we will be able to hone in on the actions that

will deliver the biggest benefits for nature and monitor success annually.

Our work on plastics, and exciting ideas for reformulation are a supply chain collaboration and we see huge potential to reform how our carrots reach the consumer, without compromising taste or quality.

Growing sustainably is what farmers do because, generally speaking, what's good for the environment is good for the bottom line. We are proud to share our sustainability journey with you, and will be open about our learnings along the way.

Make no mistake, orange is the new green.