Making plants **grow better**

Speciality fertilizers for professional growers

ICL

Ornamental Horticulture

ICL, focus on Fertilizer Performance in Ornamental Horticulture

At ICL we are committed to bring you, the grower, proven performance. Performance in our top-end products such as Osmocote and Peters and quality in the outstanding service provided by our technical advisors who work closely with you and for you in the field.

We understand the challenges you face and strive to provide you with innovative products that help you solve any issue. Whether you are dealing with a challenging cultivation situation involving sensitive crops or issues with irrigation water, our skilled sales force and our R&D department is continuously looking for solutions to help you grow better plants and make your life easier.

ICL's key drivers for quality in ornamental horticulture are:

- **Proven performance in fertilizers**
  Achieved through continuous research, years of experience and stringent quality control.

- **Expert advice**
  Our teams of technical advisors offer recommendations tailored to your individual needs to help you make the most out of your fertilizer plan.

- **Grow green**
  Osmocote, the green choice, allows you to grow more with less. Use our coated fertilizers to comply with regulations and decrease fertilizer usage and spillage.

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Making plants grow better

Section I
ICL Products for Ornamental Horticulture

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1.1 Osmocote ICL Coated Fertilizers

1.1.1

Osmocote
Product development for growers

The introduction of Osmocote® – the world's first controlled release fertilizer – in 1967 revolutionized the fertilizer market. Over the past five decades, Osmocote has grown into one of the world's leading plant nutrition solutions that is used by growers around the globe.

ICL is proud that coated fertilizers are more relevant today than ever. We now offer five generations of Osmocote and have embraced cutting-edge technologies to develop new release patterns and features. All with the aim of meeting your evolving needs as a grower. Now and in the future. Whatever your specific needs, situation or crop, there is an Osmocote solution that is right for you.

Osmocote®
proven performance,
highest safety for plants

Osmocote®
Osmocote coating technology
- ✔ 100% coated NPK
- ✔ Full range of longevities available

The original

Controlled Release Fertilizer
1st generation coated fertilizer

Osmocote® Pro
Addtional to Osmocote:
- ✚ Trace element package included in the granules
- ✚ Orange/white color tracer for easy recognition

Proven performance

Controlled Release Fertilizer
2nd generation coated fertilizer

Osmocote® Exact
Additional to Osmocote Pro:
- ✚ Pre-defined release patterns
- ✚ Designed to perform in every situation - always
- ✚ Meets highest quality standards
- ✚ Highest safety for plants
- ✚ Premium trace element package included
- ✚ Color tracer for each longevity for easy recognition

3-4 5-6 8-9 12-14

The safest Osmocote ever

Standard High K

Patterned Release Fertilizer
3rd generation coated fertilizer

Osmocote® Exact DCT
Additional to Osmocote Exact:
- ✚ DCT (Double Coating Technology included. Innovative technology which enables programmed release patterns.

And of course featuring all unique benefits of Osmocote Exact.

Especially suitable for challenging growing conditions.

Taking fertilizers to a higher level

Protect

Programmed Release Fertilizer
4th generation coated fertilizer

Osmocote® 5
Additional to Osmocote Exact DCT:
- ✚ **OTEA-system** Better plant growth by **Optimized Trace Element Availability** troughout the season. Ultra small portions of Trace Elements come available to the plant, every day.
- ✚ **NutriMatch Release** Plants benefit from optimal NPK availability throughout the growing season. **NutriMatch Release** is the ultimate step in synchronizing NPK availability with plant need.

Osmocote 5 is programmed to have lower release at the beginning after potting for safe plant development, accelerating during the main growing season. (Osmocote 5 does not contain DCT.)

Establishing the new standard

5-curved RELEASE

Programmed Release Fertilizer
5th generation coated fertilizer

The GREEN choice

Trust in proven performance

A coated fertilizer must do what you expect from it. It needs to be **predictable** and **consistent** in its performance for good results. Choosing Osmocote coated fertilizers means choosing proven performance for the best results for your crops.

Over decades, Osmocote has proven to be worthy of your trust. Our years of experience, tried and tested coatings, pure and best quality raw materials used in our products and continuous quality control are the pillars of this trust. This is what you can expect from us at ICL: guaranteed high-quality crops and the best return on investment for your business.

The quality of your plants is guaranteed thanks to optimum growth. Plants grow better because Osmocote provides them with the nutrients they need exactly at the moment they need them. This gradual nutrient supply ensures that plants experience less disease pressure and can grow into vital, healthy specimens.

The plants even keep their vitality and health when they are delivered to the consumer. This is yet another benefit that comes from the continued release of nutrients from Osmocote fertilizers... customer satisfaction!

Be in control of your plants

Rely on Osmocote 5 & Osmocote Exact

Osmocote 5

- Extraordinary leaf color thanks to the OTEA-system.
- Nutrients supplied exactly when the plant needs them through NutriMatch-Release technology.
- Greater resilience thanks to smooth and steady plant growth.
- Available in longevities: 3-4M, 5-6M, 8-9M and 12-14M.

Osmocote Exact Standard

- Continuous nutrition during the growth season.
- All-round application: suitable for all crop types and many situations.
- Available in longevities: 3-4M, 5-6M, 8-9M and 12-14M.

Osmocote Exact Protect

- Up to three months postponed start of nutrient release, depending on the longevity.
- Specially developed for autumn and winter pottings.
- Ideal for situations where low EC levels are required after potting.
- Available in longevities: 5-6M, 8-9M and 12-14M.

Osmocote Exact High K

- Steady and efficient NPK release during the season.
- N:K ratio potassium-based.
- For compact plant growth or in case of irrigation water containing nitrogen.
- Available in longevities: 3-4M, 5-6M, 8-9M and 12-14M.

The 8 guarantees of Osmocote 5 and Osmocote Exact

Safety by:

1 Consistency
Osmocote 5 and Osmocote Exact's longevities and nutrient release patterns are guaranteed year by year, month by month, bag by bag. You know exactly what you buy and what your plants receive. As a grower, you are in control and can rest assured that the fertilizers will not cause surprises during the season.

2 Safety in release
What's in Osmocote, also comes out. Osmocote gets each and every element, NPK and all trace elements, where it needs to act.

Osmocote Exact

Other CRF - disintegrates when in contact with wetting agent

3 Safety against chemicals
Osmocote's resin coating is resistant against all kinds of plant protection products and wetting agents.

4 Secure supply of trace elements
Osmocote 5 and Osmocote Exact offer a premium trace element package.

5 Safety through colour coding
Each Osmocote longevity has its own colour for easy recognition. About 4% of the granules in a bag are colour coded according to longevity: red for 3-4 months, brown for 5-6 months, blue for 8-9 months and yellow for 12-14 months.

This colour coding system avoids mistakes and makes it easy to tell if the right product has been added to the substrate.

6 Safety in plant hole dibbling
Granules are uniform in size, which makes them perfect for dibbling with dosage machines. Less abrasion and bruising ensure longer operational times and interference-free function of the equipment.

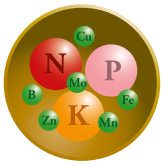
7 Low release rate during the first stage of cultivation
Our patented Osmocote coating technology and the use of only the best raw materials ensure even granules and a safe release of fewer nutrients during the first stage of cultivation. Thanks to Osmocote Exact's low initial release rate it is suitable for numerous cultures, even ones grown in greenhouses or tunnels.

8 Safety in heat
Osmocote has even proved its performance in extremely difficult circumstance. With temperatures reaching 40 degrees Celsius, Osmocote Exact's nutrient release remained secure and controlled. The laboratory trials from spring 2000 support the manufacturer's claims according to a research article on Osmocote's nutrient release published by the Fachhochschule Osnabrück in Germany. 'All Osmocote Exact product types release the nutrients gradually and evenly, even in severe temperature fluctuations. (Prof. Dr. Schacht 5/2003).

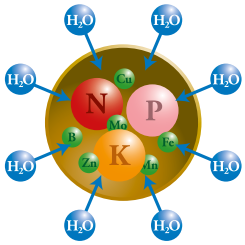
The Osmocote working principles

Osmocote are coated fertilizers containing nitrogen, phosphorus, potassium, magnesium and trace elements. Compositions vary per brand or per product.

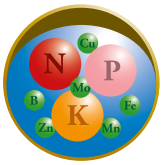
Every granule is covered by an organic resin coating that regulates the daily release of nutrients to the plant.



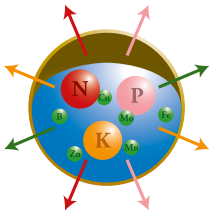
Granules contain NPK, MgO, B, Cu, Fe, Mn, Mo and Zn.



Water penetrates the coating and dissolves the nutrients inside the granule.



Osmotic pressure releases the dissolved nutrients through the granule coating.



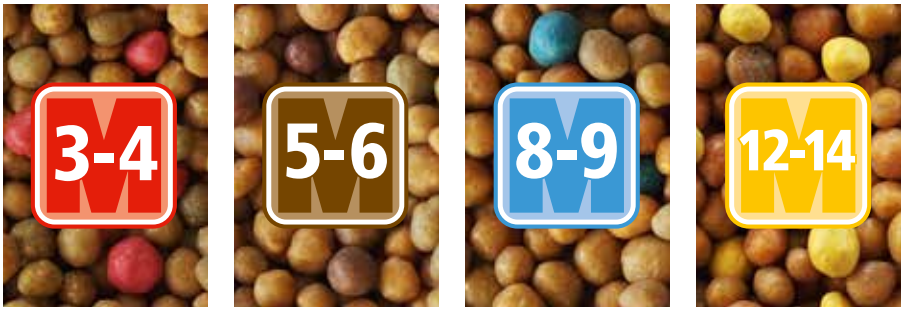
Influenced by temperature, the nutrients are released at a constant, regular and controlled rate during the longevity.

The release of nutrients is regulated by temperature only

Other factors such as salt levels, pH of the substrate, microbial activity, water quality and rainfall do not influence the nutrient release, making Osmocote the most reliable coated fertilizer.

Osmocote fertilizers are available in different longevities: 3-4, 5-6, 8-9 and 12-14 months. There is an Osmocote for every situation and crop type. The colour coding on the packaging indicates the longevity.

Osmocote 5, Osmocote Exact and Osmocote Exact Protect products also **contain colour tracers for easy recognition**. This ensures you always add the fertilizer with the correct longevity to your substrate!



The fertilizer ingredients and the thickness of the coating determine the longevity. The longevities in turn apply to an average soil temperature of 21 °C. Higher temperatures accelerate the nutrient release, while lower temperatures slow it down.

Average temperature influence on longevity

16 °C	6-7 months
21 °C	5-6 months
26 °C	4-5 months

1.1.2

Osmocote 5

The 5th generation

Osmocote® 5

5th Generation Coated Fertilizer | FEED NEED NutriMatch Release | Trace Elements OTEA system

3-4 | 5-6 | 8-9 | 12-14

Osmocote 5
The 5th generation

Osmocote® 5 gives you as a grower access to the latest generation controlled release technology. Osmocote 5 takes efficient, safe and consistent plant nutrition to a new level. All with the aim of enabling your plants' full potential.

Each granule of Osmocote 5 contains:

1. **NutriMatch-Release technology** for an NPK release pattern that matches the plant's needs more precisely than ever before. This brings about even more efficient and effective uptake and use of the applied plant nutrition.

FEED NEED NutriMatch Release

2. **OTEA-System**, an ingenious technology that optimizes the availability of trace elements in the growing media and their uptake by plants.

Trace Elements OTEA system

Osmocote 5 grower benefits

1	Extraordinary leaf color thanks to the OTEA-system that supplies trace elements in an entirely new way, from the start at potting until the delivery of the plants
2	NutriMatch Release technology that ensures plants are supplied with nutrients exactly when they need them, resulting in higher-quality and healthier plants with better branching, earlier budding, and improved leaf color
3	Greater disease resistance thanks to smooth and steady plant growth enabled by the OTEA-System and NutriMatch-Release technology, which doses lower nutrient levels at the start of the crop growth, and then accelerates the supply of nutrients during the main growing season


Small granule,
big impact.
Osmocote®
5

1.1.3

Osmocote Exact DCT – 4th generation
Osmocote Exact Protect

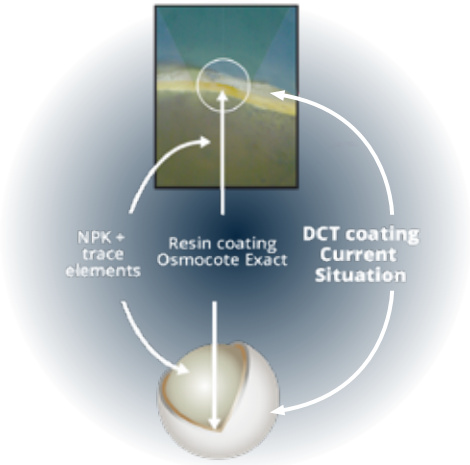
4th generation Osmocote: Powered by DCT

Taking fertilizers to a higher level

Our fourth-generation generation Osmocote® features an important innovation in coated fertilizers: Double Coating Technology (DCT). This revolutionary technology enables Programmed Nutrient Release for new-level precision nutrition. DCT is a second coating with a different composition than the resin coating that is applied around each Osmocote Exact granule. The DCT coating **postpones the start-up of the nutrient release**. So instead of kicking in immediately after application, the nutrient release is postponed for up to three months (depending on longevity and product).

DCT gives you unparalleled possibilities

By Osmocote Exact Protect you can achieve perfectly tailored release patterns by DCT granules in the product. This gives you the power to meet the challenges of even the most difficult growing conditions you might face at your nursery. So you can now meet challenges such as using higher dosage rates of coated fertilizers in tunnels and greenhouses and potting in the autumn or winter. Ask your ICL advisor for tailored advice.



Osmocote Exact Protect:

For autumn and winter pottings

Osmocote® Exact Protect is powered by DCT and developed especially for container nursery stock crops potted during autumn and winter in Northern Europe.

Developed for use from mid-October until mid-January, Osmocote Exact Protect contains only double coated granules. This means the nutrient release is postponed until a later predetermined time. With hardly any release in the winter months, EC levels in the growing media under outdoor conditions remain low during the first two to three months. You can mix Osmocote Exact Protect into the growing medium. We do not recommend topdressing. Always contact your ICL advisor for a tailored advice.

Osmocote Exact Protect grower benefits

1	Aligned precisely to the needs of your container nursery stock potted in autumn and winter outdoors in Northern Europe
2	Programmed nutrient release that is ideal when low EC is needed in the first period after application
3	Highly effective with release being postponed until the plant can take up the nutrients
4	Optimum safety and reliability thanks to the use of proven Osmocote Exact technology
5	Time and cost effective because the plant's nutrient needs are met in one application, often eliminating the need for refertilization in spring

For autumn pottings, we recommend that you contact your ICL advisor for tailored advice.

Osmocote® Exact Protect

1.1.4

Osmocote Exact Standard – 3rd generation
Osmocote Exact Standard, High K, Mini, Tablet

Osmocote Exact Standard:

The safest Osmocote ever

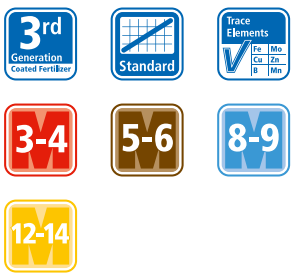
Osmocote® Exact Standard brought precision nutrition to a new level as our first third generation fertilizer. It gives you a constant nutrient release throughout the growing season. It matches your plants' needs with pinpoint precision. This combines to bring you maximum efficiency and safety for your plants.

The great thing about Osmocote Exact Standard is that you can count on its **reliable performance** in almost any growing situation. You'll also enjoy **maximum consistency and uniformity** because our tailored production process and stringent quality control ensure that each bag contains the same high-quality fertilizer and guaranteed release pattern. If your plants need more nutrients available later in the growing phase, we recommend that you use the 5th generation Osmocote 5.

Osmocote Exact Standard grower benefits

1. You know before usage that Osmocote Exact will perform. Bag by bag, week by week, month by month, year by year
2. Works in all situations. With Osmocote Exact you stir up your nursery operations
3. Efficient and sustainable thanks to the high nutrient use efficiency
4. Unique color coding with specific colors for each longevity, so it is easy to recognize in the growing medium

Osmocote® Exact Standard



Osmocote® Exact High K

3rd Generation Coated Fertilizer | High K | Trace Elements (Fe, Mo, Cu, Zn, B, Mn) | 3-4 | 5-6 | 8-9 | 12-14

Osmocote Exact High K:

High potassium, compact growth

Osmocote® Exact High K with high potassium content has been specially developed to support compact plant growth and for use when irrigation water contains high nitrogen levels.

Growers like to grow high quality plants and sometimes a high potassium analysis fertilizer can help to achieve this. Offering plants less nitrogen and more potassium will slow down growth and stimulate compactness. Plants will grow less long, enabling to place more pieces on a trolley for transportation. This makes the transport economical. Also for replanting in public green areas, sometimes more compact plants are preferred. Here the high potassium products of Osmocote Exact contribute value.

In areas where the irrigation water contains higher levels of nitrogen, the Osmocote Exact High K products will combine perfectly with this nitrogen, avoiding long stretched and lush plant growth. As a grower you have your plant growth better in control, and plants can be sold in the desired quality class, the highest.

Osmocote Exact offers maximum safety when applied in the growing media at potting and is featured with a full package of essential trace elements. A range of longevities matching with your needs, is available.

Osmocote Exact High K grower benefits

1. Condensed plant growth thanks to a high potassium level and low phosphorus, making it ideal for CNS crops to grow compact
2. Perfect branching and healthy roots due to precision nutrient release
3. Full trace element package for great leaf shine and color
4. Boosts performance and enhance quality even after plants are sold to consumers
5. Maximum safety for plants, even in demanding cultivation conditions
6. Designed to be used in combination with irrigation water containing high nitrogen levels

Osmocote Exact Mini:

Mini granules, big advantages for small volumes

Osmocote® Exact Mini has been specially developed for use in small substrate volumes, such as plugs and trays. The mini granules produce maximum results in volumes as low as 20 ml. Osmocote Exact Mini is little but mighty!

You can apply Osmocote Exact Mini on cuttings and young plants by topdressing once the roots have developed sufficiently. It's perfect for bridging the period from rooting to re-potting because cuttings substrate is usually very low in nutrients and applying fertilizer with sprinklers is inconvenient. In some cases Osmocote Exact Mini can be mixed into the growing medium. Ask your ICL advisor for tailored advice.

While the granules are smaller than their big brother Osmocote Exact, this mini version gives you mighty performance with a complete package of trace elements and magnesium. It comes in resealable 10-kg buckets.

Osmocote Exact Mini grower benefits

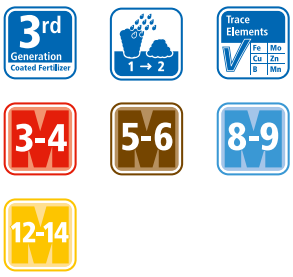
1. Perfect for use in small substrate volumes, such as plugs or trays
2. Optimized growing conditions in small pot volumes because nutrients stay in the growing medium
3. Uniform plant growth thanks to optimum dispersion of the granules
4. Optimized plant growth: 100% coated and 100% safe for plants
5. Each granule contains all the nutrients
6. Nutrition and irrigation can be seen as separate systems
7. Easy to apply and one application provides nutrients for a longer period of time

Osmocote® Exact Mini

ICL tip

Use Osmocote Exact Mini after rooting for slow-rooting and sensitive young plants to ensure healthy growth.

Osmocote® Exact Tablet



Osmocote Exact Tablet:

The power packs

Osmocote® Exact Tablets give you an easy and effective way to deliver precision doses of nutrients. The tablets are cone shaped, so they're very easy for you to push into the growing medium. Osmocote Exact Tablets come in two strengths - 5 gram and 7.5 gram.

Osmocote Exact Tablets feature a unique patented water-soluble glue system. This innovative technology means the tablets disintegrate after the plants are watered, which prevents roots from pushing the tablet out of the pot. This makes Osmocote Exact Tablets a very environmentally-friendly solution.

If you are using drip irrigation, push the tablet into the growing media under the drippers for optimum nutrient dispersal.

Caring for your customer

Osmocote Exact Tablets are often applied to container plants and hanging baskets just before delivery so consumers enjoy prolonged nutrition and a healthier plant.

1.1.5
Osmocote Pro
2nd Generation

Osmocote Pro:

Lowest cost in use

Good results and value for money. Osmocote® Pro combines high NPK with a complete trace element package. It's the perfect choice when you're looking for a good allrounder, usually for use as a base fertilizer. Osmocote Pro is your economical solution for good results and returns.

You can combine Osmocote Pro at base rates with Universol water-soluble fertilizers as part of your fertilizer plan. Ask your ICL advisor for tailored advice for your particular situation.

Osmocote Pro grower benefits

1	Complete nutrition (high NPK + trace elements) for optimum plant growth
2	100% coated: safe and reliable
3	Guaranteed longevity and composition
4	Orange / white color coding in all Osmocote Pro longeveties for easy recognition to ensure your growing medium contains the best 2nd generation coated fertilizer
5	Very efficient in use: all nutrients are released to the plant

Osmocote® Pro

ICL tip

IMPORTANT - We recommend that you use Osmocote 5 or Osmocote Exact if you have one or more of the following, situations or needs:

- Salt-sensitive crops
- High-value crops
- Application of coated fertilizer via plant hole dibbling
- High trace element availability is essential for your plants
- Challenging circumstances, such as difficult to manage pH of growing medium
- You grow in greenhouses or covered areas
- You apply full rates of controlled release fertilizers

1.1.6

Coated fertilizers for special purposes

Osmocote Bloom, Osmocote Start, Osmocote N, Ficote Total

Osmocote® Bloom

Osmocote Bloom:

Designed especially for bedding plants

Osmocote® Bloom is our specially designed controlled release fertilizer for bedding plants, including petunias, geraniums and many others.

You'll enjoy higher quality plants because Osmocote Bloom delivers precision nutrition every step of the way during the crop cycle through to the selling and early consumer stages. Osmocote Bloom also helps you save on labor costs because you usually only need one application.

Growing will be easier as watering and fertilizer application can be seen as separate systems. No need to water the plants when they are already wet, to apply fertilizer.

Osmocote Bloom grower benefits

1. Achieve optimum results in bedding plants. Healthy, compact and uniform plants, with better shelf life in consumer phase
2. Sustainable due to lower emissions to surface and ground water. Complies with MPS regulations for nitrogen and phosphate emissions
3. Saves on labor costs as only one application is needed
4. Easy to apply into the growing medium, with mid-size granules that are perfect for mixing into smaller pots and packs
5. Lower EC value in the potting soil, less fertilizer inputs and no need to use a starter fertilizer, giving you better growth and results

Osmocote Start:

The short-track Osmocote

Osmocote® Start is a short-track High K solution that delivers an efficient and consistent nutrition supply. It's perfect for crops with a short cultivation cycle or for refertilization of crops during a period of around six weeks.

Thanks to the Osmocote coating, the nutrients are released to the plant gradually and evenly, while ensuring low EC values in the growing medium. This creates optimum conditions for the root development of your crops.

Use Osmocote Start in salt-sensitive crops and cuttings that have difficulties with rooting. Unlike traditional fertilizers, Osmocote Start limits risks of excessive salt levels and nutrient leaching. With Osmocote Start your crops always get the right nutrients. The high potassium level in Osmocote Start ensures compact growth.

Osmocote Start can be mixed into the substrate. You can also apply the fertilizer on dry crops, providing you ensure no granules remain on the leaves.

Osmocote Start grower benefits

1. Designed especially for compact-growing plants with a short cropping cycle
2. Promotes improved root growth and plant color
3. Fully coated fertilizer with uniform release
4. Efficient nutrition thanks to greatly reduced leaching
5. Safe to use – low EC combined with optimal nutrient supply

Osmocote® Start

Smaller Normal Mini

Trace Elements Fe Mo Cu Zn B Mn

6 Weeks

Osmocote® N

Osmocote N:

Controlled release nitrogen for peat reduced growing media

Osmocote N is a fully coated Nitrogen and Potassium Controlled Release Fertilizer. The product is designed for application in (mainly) peat reduced substrates to off-set nitrogen fixation caused by the peat diluents in the substrate.

The product comes with a longevity of 5-6M, ideal to not only compensate N-fixation at the start of the culture, but also the months after. Osmocote N does not contain added trace elements. The product can be used in container nursery stock crops, pot plants and bedding plants. It is in many cases applied in addition to a regular dosage Osmocot 5, Osmocote Exact or Osmocote Pro. Regular dosage rate is 1.0 kg/m3 in growing media containing 30% (or more) woodfiber, mixed in. If less nitrogen is required, the applied rate can be lowered.

Osmocote N grower benefits

1. Fully coated nitrogen and potassium, safe and reliable
2. Longevity of 5-6M, covering important phases in the crop growing
3. Nice even and round granules, easy to mix in the growing medium
4. Always extra nitrogen to (partly) off-set nitrogen fixation
5. Steady crop growth because the impact of peat diluents is mitigated

Ficote Total:

The straight forward base fertilizer

Ficote® Total is a coated fertilizer you can apply in base rates in easy-to-grow crops.

Ficote Total contains NPK, magnesium, and a full range of trace elements and essential nutrients. You can mix it into the potting soil or use it as a top dressing. Ficote Total has been developed especially for use as a base fertilizer. It's often combined with a water-soluble fertilizer for a tailored solution.

Ficote Total grower benefits

1. 100% coated product with controlled-release nutrients
2. Complete nutrient range with NPK and trace elements
3. Attractive price-quality ratio for crops with lower nutrient requirements
4. Easy to apply by mixing in growing media
5. A range of longevities is available, always matching your needs

Ficote® Total

1.2
ICL products for topdress applications

Osmocote Topdress FT

Osmocote Topdress

OsmoTop

Greenfix

Osmoform

1.2

ICL products for topdress applications
Osmocote Topdress FT, Osmocote Topdress, OsmoTop, Greenfix, Osmoform

Osmocote Topdress FT (Fusion Technology):

The way to ensure your plants' use all the nutrients applied

Your go-to solution when you need re-fertilization to keep your plants in top condition before selling them.

Osmocote® Topdress FT is a partly coated fertilizer developed specifically for topdress applications in container nursery stock. It contains fast and slow-release nitrogen and phosphate for precision nutrition. When topdressed, it gives your plants a quick green-up effect and nutrients up to four to five months. Thanks to the unique Fusion Technology (FT), **the product sticks to the growing medium** so no fertilizer is lost if pots are blown over.

Osmocote® Topdress
Fusion Technology

Osmocote Topdress FT grower benefits

1	Sticks to the growing medium thanks to Fusion Technology – no fertilizer loss if pots blow over and all nutrients stay available to the plants
2	Fast and prolonged plant response with both controlled-release nutrients and slow-release nitrogen and phosphorus
3	Dust-free and fine granules for even distribution
4	Contains extra trace elements for greening effect

There are more Topdress products. Check out the full Osmocote Topdress range on icl-growingsolutions.com.

ICL tip

If you'll be keeping plants at the nursery for a full season, we recommend using regular Osmocote Topdress 5-6M or 8-9M. These products combine longevity of NPK + Trace Elements with a built-in quick start of approx. 25% of the product. Check product breakdowns.

Osmocote Topdress:

The powerful option to grow plants which require a second growing season

When unsold plants stay over for a next growing season, in the same pot or plant container, every grower knows this is a challenging situation. How to feed plants in a way they grow into sellable plants? All kind of challenges pop up. How to get sufficient and constant nutrients in the growing media? What is the effect of pH issues? Will the plant react in a good way to applied nutrients?

Plants are not always sold in fall and stay over for the next growing season. An effective fertilizer is required to get them again healthy and let them grow into the plant size and quality you want. Re-fertilizing plants in the second growing season requires different characteristics of the fertilizer. As plants lack nutrients because there is no starter fertilizer present in the growing medium, a faster starter portion of fertilizer is key for greening up plants at the season start and initiating plant growth. After a good start, plants need to stay in optimum condition to grow smoothly into resilient plants. Then a continuous supply of NPK and trace elements must be secured. And this is what Osmocote Topdress does. A very constant supply of NPK and traces during the season, with a fast starter at the beginning, just after application.

Applying Osmocote Topdress will secure a good fertilizer supply and will save you labor as you apply all that is needed, and in one go. Easy, efficient, and effective.

Grower benefits Osmocote Topdress

1	Specially designed to give plants which stayed over from the previous season, what they need
2	Labor saving: plants get a full package of NPK and trace elements in one application
3	Built-in quick starter fertilizer, to start plant growth after wintertime
4	Safe, reliable Osmocote technology inside
5	Easy to apply, homogeneous product

Osmocote® Topdress

Spoon application 5-6 8-9

OsmoTop®

OsmoTop:

The quick way to green-up your container nursery stock

This quick reaction partially coated fertilizer is a favorite for repeat applications in container nursery stock.

OsmoTop® combines the trusted ICL coating technique with immediate availability of fertilizers in one product. It contains NPK, magnesium, and three essential trace elements. OsmoTop releases the coated portion of the nutrients over two to three months, sticks to the potting soil, and is dust-free.

OsmoTop grower benefits

1. Contains immediately available and controlled-release nitrogen
2. Dust-free and fine granules for even distribution
3. Sticks to the potting soil, minimizing fertilizer losses
4. NPK, magnesium, and three essential trace elements for a green color

GreenFix:

Super-fast greening up for container nursery crops

GreenFix® contains partially coated nitrogen, uncoated nitrogen, phosphate, potassium, calcium, magnesium, and sulphate obtained from the natural mineral Polysulphate®, a product from the mines of ICL.

GreenFix supplies nutrients for up to eight weeks. Large made up of uncoated nutrients, it's perfect for giving your crops rapid green, for example just before they're delivered to garden centers. Be ware the product is containing a large portion of uncoated material. Do not overdose and watch for weather conditions to avoid crops will burn.

Grower benefits of GreenFix

1. Quick-start for a rapid greening effect
2. Balanced composition of NPK, calcium, magnesium, and sulfur
3. Excellent price-quality ratio
4. Product adheres slightly to the surface when moistened, so the product stays in the pot
5. Dust-free and easy to use

GreenFix

Osmoform: The slow-release fertilizer for a fast color boost

Osmoform NXT | Osmoform Permanent | Osmoform Pre-Mix | Osmoform High N

Osmoform® NXT

Osmoform NXT:

Nutrition with slow-release nitrogen

Osmoform® NXT is the most advanced Osmoform product available. It is safe in usage and shows great green-up effects on plants. Easy to apply and stays on the pot surface.

Osmoform NXT grower benefits

1. Slow-release nitrogen
2. Sticks to the potting soil, so it doesn't fall out of the pot
3. Rapid start and greening effect
4. Efficient nitrogen, less sensitive to leaching compared to Water soluble fertilizers
5. NPK, magnesium, and trace elements with a high iron content

Osmoform® Permanent

Osmoform Permanent:

Quick greening

Osmoform® Permanent contains slow-release nitrogen. But it starts faster compared to Osmoform NXT. It is perfect for giving your plants a quick color boost, as it supplies quite some nutrients directly after application

Osmoform Permanent grower benefits

1. Partly slow-release nitrogen and immediately available nutrients
2. Bonds well with the potting soil, so nutrients are not lost during windy weather or transport
3. Quick plant reaction and a rapid greening effect
4. High magnesium and iron content for healthy and well-colored plants
5. Easy to use

Top dressing with Osmoform gives you a great quick way to bring color to your container nursery stock. Osmoform nutrition solutions are granulated slow-release fertilizers, most of which contain NPK, magnesium, and trace elements. They make nitrogen available to your plants over a period of 8 to 10 weeks.

Nitrogen is coming available to plants gradually through the breakdown of methylene urea chains. These chains are primarily broken down by temperature and bacterial activity.

Osmoform® Pre-Mix

Osmoform Pre-Mix:

The slow-release fertilizer for charging substrates

Specially developed for use in substrates, featuring small granule size for optimized distribution in growing media. The nitrogen in this slow-release fertilizer is released over 8 to 10 weeks.

Osmoform® Pre-Mix granules are 0.5-1.4 mm in diameter.

Osmoform Pre-Mix grower benefits

1. Starting mix with slow-release nitrogen for growing media, with quick start for fast greening effect
2. Balanced analysis of NPK, magnesium and trace elements
3. Excellent price-quality ratio
4. Ideal granule size for optimal dispersion in the substrate
5. Easy to apply in the growing medium

Osmoform® High N

Osmoform High N:

The slow-release fertilizer for nitrogen fixating substrates

Peat-reduced substrates are increasingly used in pot plants, bedding plants and container nursery stock. Osmoform High N answers changing nutrient needs.

The components that substitute peat in substrates often need more nitrogen to offset nitrogen fixation. Osmoform® High N only contains slow-release nitrogen, making it the perfect solution when you're using peat-reduced or peat-free substrates. The high nitrogen content ensures a good start-up supply for your crops. Osmoform High N granules are 0.5 - 1.7 mm in diameter and are easy to apply in the growing medium.

Osmoform High N grower benefits

1. Slow-release nitrogen that compensates the nitrogen-fixation of the non-peat components in the substrate
2. Quick start for a fast greening effect
3. Excellent price-quality ratio
4. Fine granules for optimal dispersion in the substrate
5. Proven performance

1.3
ICL Water-Soluble Fertilizers

Water-soluble fertilizers

Take the all-important first step in determining the best water-soluble fertilizer for your growing circumstances and water quality.

Fertilizer and water must work in perfect harmony to ensure the fertilizer optimally helps you produce the highest quality plants with the highest possible sales price. Irrigation water quality is the root cause of many crop and growth problems. That's why you need to have your water analyzed so you can pick the right fertilizer for your particular crop and irrigation water. This is crucial because salts in the irrigation water impact EC and pH levels in the potting soil, which in turn affects the crop. ICL water-soluble fertilizers offer you solutions for these challenges.

Definition of water quality
SOFT WATER 0 - 1.0 mmol/l HCO_3^-
NORMAL WATER 1.0 - 2.5 mmol/l HCO_3^-
Hard water >2.5 mmol/l HCO_3^-

For more information about water quality see section 3.5 (page 74) of ICL's technical information on plant nutrition.

3 steps to optimize your plant quality and make growing easier

Step 1	Have your irrigation water analyzed (irrigation water is the water you use to water and feed your plants). Don't just test the pH and EC values: The composition (the different elements) is also important, especially the HCO_3^--content. A **full water analysis** is recommended.
Step 2	Determine whether you need to acidify the water. We recommend acidifying the water if the bicarbonate (HCO_3^-) levels are higher than 2.5mmol/liter (=150 g/liter). The right way to acidify depends on several factors. Please contact your ICL advisor for tailor-made advice. Remember that the quality of the water can change when you mix springwater with rainwater. It is also important to change your fertilization plan if your rainwater supply is replenished.
Step 3	Select the right Peters or Universol fertilizer for your situation

Consult your ICL advisor for tailor-made advice during every step of this plan to the most ideal water-soluble fertilizer.

ICL tip

- Know your water quality to avoid problems! Analyze your irrigation water quality at least once a year
- Optimize the interaction between fertilizer and water. Your ICL advisor will be happy to make a tailor-made fertilizer plan for you

Optimize your choice in water-soluble fertilizers

A Pot-grown crops **in greenhouses / covered areas**

Growing plants with high demands regarding their fertilizer? *Poinsettia, Cyclamen, Begonia, etc.*	NO	YES	*Choice based on irrigation water quality*	Peters® Professional	Peters® Excel
High salt contents in irrigation water?	NO	YES	*Choice based on irrigation water quality*	Peters® Professional	Peters® Excel
pH problems in irrigation water?	NO	YES		*pH **increases** during season* Peters® Excel Acidifier	*pH **decreases** during season* Peters® Excel CalMag
Calcium deficiency in your plants?	NO	YES		Peters® Excel CalMag	
Ebb-and-flow irrigation? Poor roots?	NO	YES		Peters® Professional	Peters® Excel CalMag
All questions above answered by "NO"?				Universol®	

B Container-grown crops **outdoors / uncovered areas**

High salt content in irrigation water (> 450mg)?	NO	YES		Peters® Professional	
High carbonate hardness?	NO	YES		Universol® *for hard water*	
Soft water (i.e. rain water)?	NO	YES		Universol® *for soft water*	
Calcium deficiency?	NO	YES		Universol® *for soft water*	
All questions above answered by "NO"?				Universol® *standard range*	

1.3.1

Peters Fertilizers
Peters Professional, Peters Excel

Peters: perfect results every time

Peters® is the world's leading water-soluble fertilizer range. It features a well-balanced combination of NPK, trace elements and special additives to ensure you achieve optimum results. Even under the most challenging conditions. Peters is the only fertilizer to include M-77® technology that optimizes the availability and absorbability of nutrients.

Everything stems from optimum absorption

Maximum absorbability sets Peters apart. Peters contains special ingredients that help your plants absorb trace elements at the roots. M-77 'unlocks' the roots for optimum uptake of nutrients. Maximum absorption is at the heart of the Peters philosophy. Because absorption of nutrients is as important as the availability of nutrients.

Peters®

Peters has a solution for every situation

The Peters range includes formulations designed especially for a particular growth phase or growing situation. There are formulas for soft water (with calcium and magnesium) and for hard water (reducing bicarbonates). Peters formulas ensure you always have the right product composition for your specific cultivation situation. This prevents deficiencies and excesses and ensures your irrigation systems always stay clean.

The choice of professionals

Peters has been developed for pot plant and bedding plant crops. Using peat-based substrates or peat-reduced substrates in pots places special demands on your fertilizer. Peters harnesses vast research and development to fulfil these distinctive needs for optimum results. That's why Peters is the choice of professional growers around the world.

Top of the line

The Peters range's unique combination of qualities makes it the pinnacle of water-soluble fertilizers.

Outstanding water solubility, an optimum combination of trace elements, unrivalled absorption by the plant, the power of M-77 and a choice of formulations to solve growers' challenges make Peters the cream of the crop.

Peters® Professional grower benefits

1	Quickest plant response after application, also ideal to correct
2	Highest purity, fully water soluble
3	Featuring unique M-77 technology for maximum nutrient availability and uptake
4	Quickly dissolving, easy handling
5	Always good results

Solutions for every growing phase and every situation

Peters® Professional

Allrounder
20-20-20+TE

Allrounder has a balanced NPK formula containing urea. It's ideal for use in spring and summer. It acts as foliar feed and promotes healthy plant growth.

Blossom Booster
10-30-20+2MgO+TE

Blossom Booster is a classic formula that is still going strong. Its high phosphate levels and an N:K ratio of 1:2 make the Blossom Booster perfect for improving bud formation and flower development.

Special Purpose Low B
20-19-20+TE Low B

Special Purpose Low B is basically the same analysis like Allrounder 20-20-20+TE, only without added Boron. This product is especially suitable incase Boron sensitive plants are grown.

Hi-Nitro
31-11-11+TE

Contains mostly urea and has trace elements. Ideal for use in warm weather conditions or when high levels of nitrogen are needed quickly.

Foliar Feed
27-15-12+TE

Foliar Feed contains a high percentage of urea and comes with a specially adapted trace element package. This unique combination is the ideal foliar feed for pot plants and bedding plants. Your plants will react fast, which makes Foliar Feed a perfect solution for quick greening before sale.

Combi-Sol
6-18-36+3MgO+TE

Combi-Sol has enhanced levels of trace elements that deliver perfect results, also when applied in a two-tank-system with single elemental fertilizers. You can use this formula in two-tank systems with calcium nitrate. Used as 'stand-alone', the N:K ratio of 1:6 promotes excellent, compact plant growth. Combi-Sol can be the perfect solution when you're using irrigation water containing high levels of nitrogen.

Plant Starter
10-52-10+TE

High phosphate levels and a balanced N:K ratio. This is the ideal initial fertilizer for stimulating the development of a good, uniform root system and flower buds. Use on cuttings and/ord young plants just before potting for optimum rooting, and repeat just before initializing flower buds.

Special Formula Low B/Zn
6-17-36+3MgO+TE Low B/Zn

Special Formula Low B/Zn has a modified trace element packaged in which there is no boron and zinc. It is ideal for preventing discoloration in leaf edges and tips in palmaceous plants and bromelias.

Power P

9-41-25+TE

Thanks to its high levels of polyphosphates, Power P lets you as a grower achieve strong plant reaction. You can apply Power P during rooting, right before pruning and before flowering. Power P is easily dissolved as a stock solution. It requires no additional fertilizers: the acidity of the stock solution will automatically stabilize itself. Ask your ICL advisor for tailored advice.

Plant Finisher

9-10-38+3MgO+TE

Specially formulated for compact growth, with extra iron for optimum leaf color. Ideal in the later stage of propagation.

Pot Plant Special

16-11-32+TE

One of the most well-known Peters Professional formulas. Perfect for flowering pot plants and bedding plants, the N:K ratio of 1:2 ensures good color, compact growth and high-quality plants. Contains a high proportion of nitrate and an elevated trace element level for quick results.

Grow-Mix

21-7-22+3MgO+TE

Balanced N:K ratio with lower levels of phosphate, making it perfect for promoting growth in pot plants. As a large portion of the nitrogen consists of urea, this formula is also ideal for orchid cultivation.

Poinsettia Mix

17-7-27+2MgO+TE

Poinsettia Mix is the answer to the special fertilizer demands of Poinsettias. Modified levels of boron, zinc and molybdenum ensure perfect plant health and quality. High levels of nitrate nitrogen promote healthy root growth.

Potash Special

20-5-30+TE

Potash Special has an N:K ratio of 1:1.5, making it especially popular with pot plant growers. With a distinct proportion of urea, an additional supply of nitrogen can be supplied a few days after application.

Winter Grow Special

20-10-20+TE

Winter Grow Special is specially designed for application in cold and dark weather conditions to support plant growth during the winter season. This formula has a balanced N:K ratio and contains high levels of nitrate. Quick plant reaction.

Special Purpose Low B

13-0-45+TE Low B

Special Purpose Low B is basically the same analysis like Potassium Booster 12-0-43+TE, only without added Boron. This product is especially suitable in case Boron sensitive plants are grown.

Special Formula Low B

20-9-20+TE Low B

Special Formula Low B is a modified trace element solution without added boron. We recommend it for boron-sensitive crops and in combination with irrigation water with high boron levels.

Orchid Special

20-12-20+3MgO+TE

The Orchid Special is a tailor-made formula, designed to stimulate the growth of orchids during their vegetative phase. The product has a full package of trace elements, magnesium, and an increased iron content. The sophisticated formulation makes the fertilizer the standard food for all orchids. A balanced N:K ratio with a nitrogen composition specific to orchids. The unique M-77 formulation makes the performance of Peters® Professional Orchid Special unmatchable.

Potassium Booster

13-0-45+TE

A powerful N:K ratio of 1:4 which quickly elevates potassium levels within the plant, a full trace element package and nitrate nitrogen. Potassium Booster promotes both good condensed growth and great plant color.

For detailed information on all available Peters Professional products, see page 92-93

Peters® Excel

Hard Water Special

Soft Water Special

Peters Excel:

Improve your water quality and ease your life

Our Peters® Excel range features unique formulations that give you a source of complete plant nutrition using one tank to prepare the stock solution. What's more, Peters Excel improves your water quality. The range includes special products for soft water and hard water. All products are of superior purity and feature the best – chelated - trace element packages. All Peters Excel products feature our unique M-77® technology. Peters Excel helps you improve the irrigation water quality by lowering the bicarbonates present in hard water and by adding calcium/magnesium in soft water. You will see immediate and long-term effects on your plants.

The impact of the water you are using is often underestimated. Many growers do not have a clear picture of the quality and composition of the water they are using. It is important to know. What impact does the water have on my plants and their nutrient uptake?

Peters Excel ensures your plants grow smoothly whatever the water. When you have soft water (such as rainwater), you'll only need to use a single product to give your plants all the elements they need for strong growth (NPK, calcium, magnesium and trace elements). This gives you optimum ease of use and convenience.

If you have hard water with bicarbonates, you usually won't need to add additional acids in the stock solution when using Peters Excel Acidifier. This state-of-the-art nutrition solution will take care of all your hard water needs – safely and reliably. Peters Excel for hard water improves the quality of water by removing bicarbonates. Less bicarbonates reaching the growing medium means less increase of the growing medium pH. The best possible uptake of phosphates, manganese and iron delivered by Peters Excel is guaranteed.

When you're using hard water, the acidifying Peter Excel solutions will dilute more easily because they decrease the water pH in the stock solution. This gives you shorter dilution times and optimum ease of use. Peters Excel's strong action also mostly prevents calcium stains on leaves.

All the products within the Peters Excel range enable you to realize strong plant growth and compactness. Products within a group (hard water types or within a group of soft water types) can be mixed to achieve other NPK analyses. Never mix hard and soft water types together as this might cause precipitation.

Peters Excel takes your water quality into account to provide a precision nutrition solution that lets you grow better and easier.

Peters Excel CalMag

Soft Water Special

For soft water

Peters® Excel CalMag grower benefits

1	Specially designed for use in soft water
2	Healthy growth thanks to continuous supply of calcium and magnesium, which are essential elements often lacking in soft water
3	Made from the best raw materials and trace elements
4	Chelated trace elements encourage growth and perfect color
5	Unique M-77® technology

CalMag Grower

15-5-15+7CaO+3MgO+TE

Peters Excel CalMag Grower has been specifically engineered to promote healthy growth. This single-tank mix formula has a balanced N:K ratio and contains all necessary nutrients. CalMag Grower is compatible with calcium nitrate.

CalMag Finisher

14-5-21+7CaO+2MgO+TE

Peters Excel CalMag Finisher provides plants with all the essential nutrients. Often used as a follow-up to CalMag Grower, this premium high-potassium fertilizer leads to compact and condensed growth. CalMag Finisher can be used in combination with calcium nitrate.

Peters Excel Acidifier

Hard Water Special

For hard water

Peters Excel Acidifier grower benefits

1	Specially developed for use in hard water containing bicarbonates
2	Keeps growing medium pH level stable thanks to buffering effect on HCO_3^- (bicarbonates) in the applied irrigation water
3	Improves irrigation water quality and reduces EC values
4	Prevents blocked drippers and keeps irrigation systems clean
5	Perfect color and growth thanks to chelated trace element packages
6	Unique M-77 technology

Hard Water Grow Special

18-10-18+2MgO+TE

Hard Water Grow Special delivers balanced N:K when using hard irrigation water.

Hard Water Finisher

15-10-26+2MgO+TE

Hard Water Finisher delivers exceptionally compact growth and good flowering. Thanks to its N:K ratio of 1:2, it can be used in irrigation water containing nitrogen.

Extra Acidifier

15-14-25+TE

Extra Acidifier can handle hard irrigation water with high amounts of bicarbonate. This unique formula has the strongest acidifying effect of all acidifiers in the Peters Excel range.

For detailed information on all available Peters Excel products, see page 92-93

1.3.2

Universol Water-Soluble Fertilizers
Universol, Universol SW, Universol HW

Universol®

Optimized Color Recognition

Trace Elements Fe Mo Cu Zn B Mn

Bright Solution System

Bright Solution System

The Bright Solution System contains specially selected components that have a pH-regulating and chelating effect. Only Universol offers the Bright Solution System. This unique system in Universol improves nutrient availability and absorbability. It lets plants take up the nutrients provided by Universol more effectively and efficiently than ever before.

Universol:
Pure power

Universol's water-soluble fertilizers are a leading compound solutions for cultivating ornamental potted plants.

The Universol® line is specifically developed to give your crops a constant supply of well-balanced nutrition during every growth phase. Only the most soluble raw materials have been used to ensure maximum nutrient element uptake by the plants. Universol fertilizers can be used separately or mixed to get exactly the nutrition formula you need. You'll enjoy maximum reliability and great value for money with Universol.

Universol grower benefits

1. Convenient color recognition system on bag and product. Products in the standard Universol range contain a granulated dye for easy recognition during preparation and application
2. Bright Solution System for improved nutrient uptake, stronger effect and efficient use of fertilizers
3. Excellent solubility in water, which improves irrigation system hygiene and reduces the need for flushing
4. A complete package of trace elements, including a higher amount of iron, which improves leaf color and is easy-to-absorb even in cold conditions. All Universol formulas, except Universol Special P, contain magnesium
5. Always a matching formula. Choose the product that is perfect for your situation

For detailed information on all available Universol products, see page 94-95

Universol range: Solutions for every growing phase and every situation

Universol® Green
23-6-10+2.7MgO+TE

Universol® Green has a nitrogen-based N:K ratio (2:1) and is ideal to enhance growth. It contains NPK, Mg and a full package of trace elements.

Universol® Blue
18-11-18+2.5MgO+TE

Universol® Blue is a pure and balanced formula that stimulates vegetative growth. Use as a follow-on from Universol® Yellow. It contains NPK, Mg and a full package of trace elements.

Universol® Orange
16-5-25+3.4MgO+TE

Universol® Orange helps reducing plant growth's speed. The higher potassium content is perfect for flowering pot plants and bedding plants. It contains NPK, Mg and a full package of trace elements.

Universol® Yellow
12-30-12+2.2MgO+TE

Universol® Yellow boosts plant thanks to its phosphorous content. Ideal after potting to stimulate rooting of freshly planted crops and support to bud growth. It contains NPK, Mg and a full package of trace elements.

Universol® Violet
10-10-31+3.3MgO+TE

Universol® Violet grants strong and compact growth. High potassium content delivers intense leaf color and great flower development. It contains NPK, Mg and a full package of trace elements.

Universol® Basis
4-19-35+4.1MgO+TE

Developed for application using A/B tank systems, Universol® Basis contains NPK, Mg and full trace elements. For hardening off plants, it can also be applied as a stand-alone product.

Universol® White
15-0-19+9CaO+2MgO+TE

Universol® White is ideal in low phosphorous growing systems where soft water is used. It is low in phosphate and contains nitrogen, potassium, trace elements, calcium and magnesium. Often used for hydrangea where AIS04 is used to turn flowers blue.

Universol® Special 104
9-0-39+3.5MgO+TE

Specifically developed for application in an A/B tank system, Universol® Special 104 contains full trace elements and low phosphate.

Universol® Special 127
5-10-36+5MgO+TE

Specifically developed for application in an A/B tank system. Tank A with calcium nitrate, tank B with Universol ®Special 127. With increase trace element package, included EDDHA iron for optimal performance.

Universol®

Universol SW

Soft water specials

Soft Water Special

Soft water such as rainwater is often of good quality with few nutritional elements that hinder the nutrient uptake. But there is still always a chance that challenges will crop up when you're cultivating crops with soft water.

Common challenges that growers face:

- Calcium or magnesium deficiency caused by insufficient supply from soft water
- Insufficient pH-buffering leading to sharp pH variations in the water. This can usually be resolved by mixing 10% of spring water in the irrigation water

Universol® SW specials for soft water grower benefits

1	Full feeding applied by one stock solution, including calcium
2	Calcium and magnesium to enhance your crop's hardiness and resilience
3	Improved nutrient absorption for more efficient use of fertilizers
4	A complete package of trace elements, including a higher amount of iron for better leaf color
5	Easy-to-absorb source of iron, even in cold conditions

Universol SW 312R

18-7-12+2MgO+6CaO+TE

Universol SW 312R has been developed for use in soft water and, in addition to NPK, also contains calcium and magnesium. The analysis is aimed at growth promotion in the vegetative phase. The 312R contains a full package of trace elements. Dissolves well due to its acidifying effect in the stock solution.

Universol SW 213R

14-7-22+2MgO+5CaO+TE

Universol SW 213R is a good composition for compact cultivation. An analysis with a 1:1.5 N:K ratio ensures growth, color, and controlled growth. The 213R contains a full package of trace elements. Dissolves well due to its acidifying effect in the stock solution.

Universol SW 113R

11-11-31+2MgO+2CaO+TE

If plants need to be hardened off, if compact growth needs to be stimulated or if irrigation water contains a lot of nitrogen, then Universol SW 113R is the best choice. Lots of potassium and still some nitrogen and phosphate to keep the plant in good condition. Here again: the 113R contains a full package of trace elements. Dissolves well due to its acidifying effect in the stock solution.

See full product breakdowns on pages 94-95

Universol HW

Hard water specials

Hard Water Special

Hard water can contain large amounts of calcium, magnesium and bicarbonates. Depending on the depth and location of the wells, spring water is usually hard. The hardness of water is expressed in several ways, including German degrees (°dH) and the amount of calcium bicarbonate per liter (mmol/l).

Hard water can cause cultivation issues:

- Poor solubility of fertilizers, making it difficult to dissolve
- High ECs in the water, leaving less space for useful nutrients
- Rising pH and EC levels in the growing medium
- Reduced availability of nutritional elements in the root environment
- Precipitation in the tank and blockage in the irrigation system

Universol HW specials for hard water grower benefits

1	Improves water quality, resulting in improved uptake of nutrients by your crops
2	Acidifying effect, (partially) purifying the water of bicarbonate, for more stable pH-levels in the growing medium
3	Improved nutrient uptake, more efficient use of fertilizers
4	Excellent solubility in water, which improves irrigation system hygiene and reduces the need for flushing
5	Extra high level of iron in Universol HW 225 to promote chlorophyll formation during the hardening phase
6	A complete package of trace elements, including a higher amount of iron for better leaf color
7	Easy-to-absorb source of iron, even in cold conditions

Also available:

- **Universol HW Special 111** 18-18-18+TE
- **Universol HW Special 151** 10-50-10+TE
- **Universol HW Special 115** 9-9-41+TE
- **Universol HW Special 146** 6-21-35+2MgO+TE

Universol HW 211

23-10-10+TE

Hard water composition with strong emphasis on nitrogen. Generates growth and dark leaf color. Due to the acidifying effect in the stock solution, the fertilizer dissolves more quickly and easily. Watering systems remain cleaner and therefore drip systems are more reliable. In addition to NPK, 211 contains a full package of trace elements. Magnesium and calcium are often naturally found in hard water and are therefore not added to the fertilizer.

Universol HW 212

19-11-19+TE

The Universol HW 212 has a balanced analysis with a 1:1 N:K ratio. This composition is also aimed at growth, with a fair share of potassium. A very popular composition that can be widely used. Naturally, here too, a full package of trace elements. Magnesium and calcium are often naturally found in hard water and are therefore not added to the fertilizer.

Universol HW 225

11-10-28+2MgO+TE

Do you want compact growth? Or do you want to harden off plants? A lot of nitrogen in your irrigation water? Universol also has the solution for hard water specials. The 225, specially made for use in hard water, offers a high potassium content, with nitrogen and phosphate in smaller amounts to keep the plant in good condition. The 225 contains a full package of trace elements.

See full product breakdowns on pages 94-95

1.3.3
Agroleaf Power

Agroleaf® Power

Agroleaf Power:

Foliar feed with impact

Agroleaf® Power delivers excellent results at critical stages of crop growth. Growers praise this revolutionary nutrition solution for its outstanding purity and high nutrient content.

Its exclusive M-77® technology and Double Power Impact (DPI) complex provide greater uptake and prolonged availability of micro-nutrients. The Agroleaf Power range covers all macro and micro-nutrients. From targeting specific growth stages and minor deficiencies to correcting nutrient imbalances, there is a Agroleaf Power product to meet your specific needs. Agroleaf Power fertilizers are made of pure, high-quality raw materials, so they dissolve effortlessly and are easy for you to apply.

Agroleaf Power grower benefits

1. Rapid response time, so ideal as a curative foliar feed
2. DPI technology for improved photosynthesis
3. Highly concentrated foliar feed, which means less product to handle and apply
4. Superior delivery and nutrient uptake thanks to M-77 chelating growth enhancing package

The Agroleaf Power foliar feed range

Product Name	Analyses
Agroleaf Power Total	20-20-20+TE
Agroleaf Power High N	31-11-11+TE
Agroleaf Power High P	12-52-5+TE
Agroleaf Power High K	15-10-31+TE
Agroleaf Power Calcium	12-5-19+9CaO+2.5MgO+TE
Agroleaf Power Magnesium	10-5-10+16MgO+32SO3+TE

Agroleaf Power Calcium in the spotlight:

Extra calcium support via leaves

Agroleaf® Power Calcium is a precision foliar fertilizer giving you extra calcium and trace element support.

Agroleaf Power Calcium contains the unique M-77® technology that promotes nutrient absorption and supports plants' resistance. Agroleaf Power Calcium also contains chelated trace elements for optimum foliar absorption. The unique Agroleaf Power Calcium formula is the perfect solution for your crops that need extra calcium and trace element support.

Agroleaf Power Calcium grower benefits

1. Agroleaf Power Calcium strengthens the cell walls and improves the plant's resilience
2. The powerful potassium and calcium formula of Agroleaf Power Calcium promote compact plant growth
3. Agroleaf Power Calcium is highly soluble and easy to use, making it ideal for tank mixing
4. Agroleaf Power Calcium works quickly and effectively as it contains high quality raw materials that your crop absorbs immediately
5. Agroleaf Power Calcium ensures optimal foliar absorption as it contains chelated trace elements, while M-77 technology promotes optimum nutrient absorption

Agroleaf® Power Calcium

1.4
Trace element fertilizers

Micromax® Premium

Micromax Premium:

Give your plants guaranteed availability of trace elements for a full season

Micromax® Premium can be mixed by your growing media supplier, and gives your plants a constant supply of all essential trace elements for a full season. You guarantee optimum availability of trace elements, even at higher pH values (> 6.5).

Trace elements are essential for optimum growth. A shortage of trace elements can affect plant growth in many ways. This is a problem that is often underestimated. When it comes to plant growth, the availability of sufficient amounts of magnesium, copper, zinc, iron, manganese, boron and molybdenum is just as important as using a soil amendment that supplies nitrogen, phosphorus and potassium (NPK). If any of the trace elements is lacking, this will affect, if and at which speed at which the plant attains its mature size (growth rate).

Micromax Premium grower benefits

1. Perfect mix of a powerful start-up effect and lasting supply of trace elements for a full growing season
2. Promotes rooting and gives the ideal basis for healthy plant growth
3. Maximum ease and effectiveness with all essential trace elements in one application by your growing media supplier
4. Perfect crop color thanks to its high iron and magnesium content
5. Easy and safe application by mixing the product into the growing medium

Micromax WS Iron:

The water-soluble pure iron chelate for strong support in plant growth and color

Micromax® WS Iron is a water-soluble trace element fertilizer with iron EDDHA-chelates. It also contains X3, a **biostimulant** that facilitates the absorption of nutrients and enhances an effective uptake of iron by the roots and leaves.

Micromax WS Iron is easy and safe to apply and can be used to prevent or correct iron deficiency in various horticultural crops. If you apply it as foliar feed, you'll see fast results within two days. When applied through fertigation, you'll notice the difference in your plants within a week.

Product is available in 5 kg buckets or in 12.5 kg PE-bags.

Micromax® WS Iron

X3 ACTIVE! Fertigation

Micromax WS TE-Mix:

Soluble trace element mix for maintenance or quick correction

This water-soluble mix contains all essential trace elements, where possible in high-quality chelates.

The added biostimulant X3 ensures a quick uptake of nutrients deep within the leaves. You can apply Micromax® WS TE-mix via fertigation or as foliar feed for best results. You'll see results within just two days if you're using a foliar application. In the case of fertigation, you'll notice the difference in your plants within a week.

Micromax® WS TE-Mix

X3 ACTIVE! Fertigation

Micromax WS Iron & Micromax WS TE-mix benefits

1. X3 biostimulant for optimized uptake through leaves and roots
2. Improves the growth of fine roots
3. Increases plant vitality
4. Fully water soluble
5. Can be mixed with fertilizers and most plant protection products

1.5
Wetting agent

1.5.1
Wetting agent
H2Gro ED

A unique wetting agent for growing media water management

H2Gro® is a unique wetting agent specially developed and produced by ICL for use in growing media in ornamental horticulture crops. H2Gro 3D-effect improves the water uptake and the water distribution in the substrate, and optimizes the water content in the pots.

As a grower, you're familiar with the challenge of dry spots in pots and containers. They often occur around the sides of plant beds. Dry patches or dry spots in pots are caused by drying out through sun or wind. They can be made worse by the hydrophobic nature of certain growing media ingredients, such as bark, coco and wood fibers. You also know that re-wetting dry spots can be difficult.

Dry spots pose a real problem for you as a grower because they reduce the usable volume in the growing medium, which also negatively affects nutrient uptake. As a result, plant stocks develop at different rates, which leads to more sorting work and fewer A-quality plants.

H2Gro gives you the solution. It's a unique wetting and conservation agent that helps make your irrigation easier and more effective. The unique 3D-action has been developed specially to enable you to prevent and eliminate dry patches in pots and containers in plant beds.

H2Gro grower benefits

1	Effective water issue management via 3D-action in pots/containers: improved water uptake, optimized water distribution, improved water drainage out of the pots
2	Long-term activity suitable for several re-wettings, for optimized water content in the pot
3	Effective, efficient and reliable to guard against plant stress
4	Plants stay in healthier condition post-sale
5	Fewer dried out (hydrophobic) areas, which improves nutrient uptake

H2Gro® ED

H2Gro's unique 3D-action heralds a new era in advanced water management

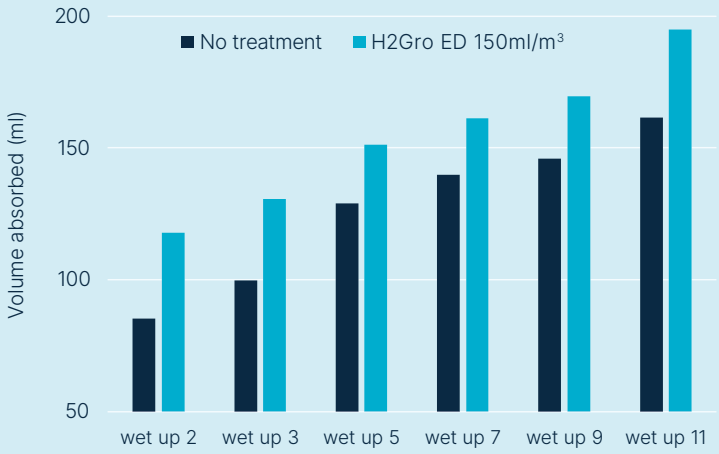
Wetting up / re-wetting

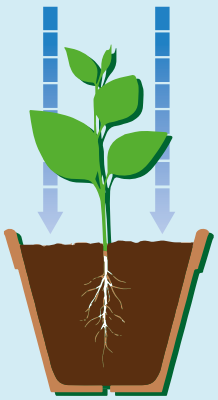
Untreated water can pool on or even flush off the surface because it cannot penetrate dry growing media. H2Gro lets water quickly penetrate into even water-repellent, hydrophobic areas.

Untreated growing media can dry out quicker, which can cause irrigation to leak away. H2Gro's re-wetting effect is long-lasting: it optimizes moisture retention in the growing medium for a longer period of time and through numerous re-wetting cycles.

H2Gro for optimized **WATER UPTAKE**

Make watering your plants easier





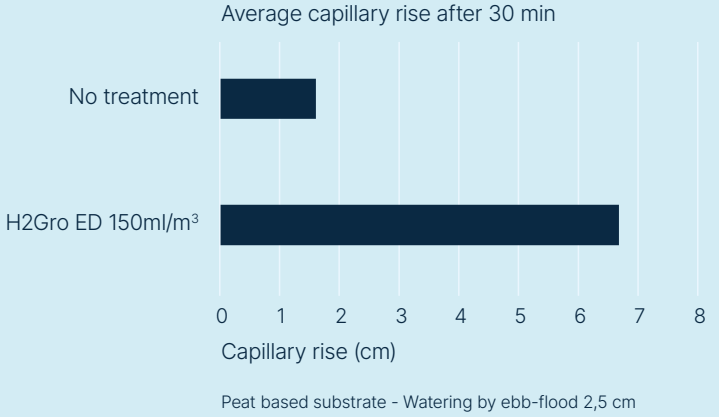
Substrate (peat based) absorbs 20-30% higher volume of water after a treatment with H2Gro ED 150 ml/m³

Spreading

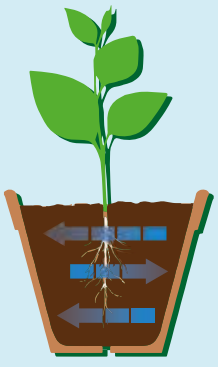
Water treated with H2Gro spreads evenly into the entire growing medium in pots and containers, resulting in better nutrient uptake and a larger area for the plant's roots to grow into. Excess water drains away easily, which provides for healthy roots and a stronger plant.

H2Gro for **FASTER SPREADING** in pots

Explore the full potential of your growing medium



Peat based substrate - Watering by ebb-flood 2,5 cm



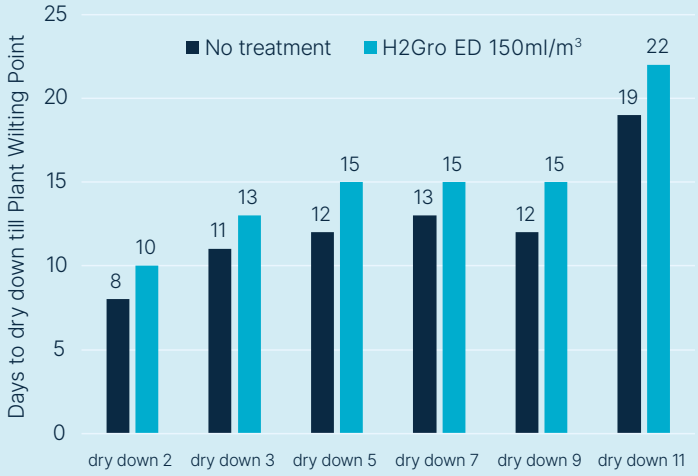
Substrate treated with H2Gro ED 150 ml/m³ has much faster water uptake

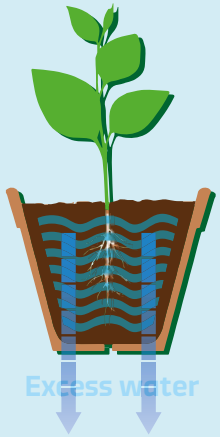
Water buffering capacity increase

If pots contain excessive water, H2Gro has a positive impact on draining this from the pots. It will contribute to a healthier root system. Just as important as good drainage from the pots is the presence of an optimal amount of moisture for plants to grow well. The buffer capacity in the potting soil is very important for this. And this is exactly where H2Gro helps. With H2Gro, potting soil retains moisture for longer, without an excess of water. An optimal balance. Plants grow regularly, without growth disturbances. More resilient plants are the result.

H2Gro **OPTIMIZES THE WATER BUFFER** in your pots

Keep plant roots healthier by longer water availability and faster drainage of excess water





Media treated with H2Gro ED 150ml/m³ stayed wet for 2-3 days longer, also after 11 dry down cycles: More flexibility in watering moment. Less frequent watering necessary

H2Gro is available in packaging sizes of 10 liter jerrycans, 200 liter drums and 1000 liter IBC

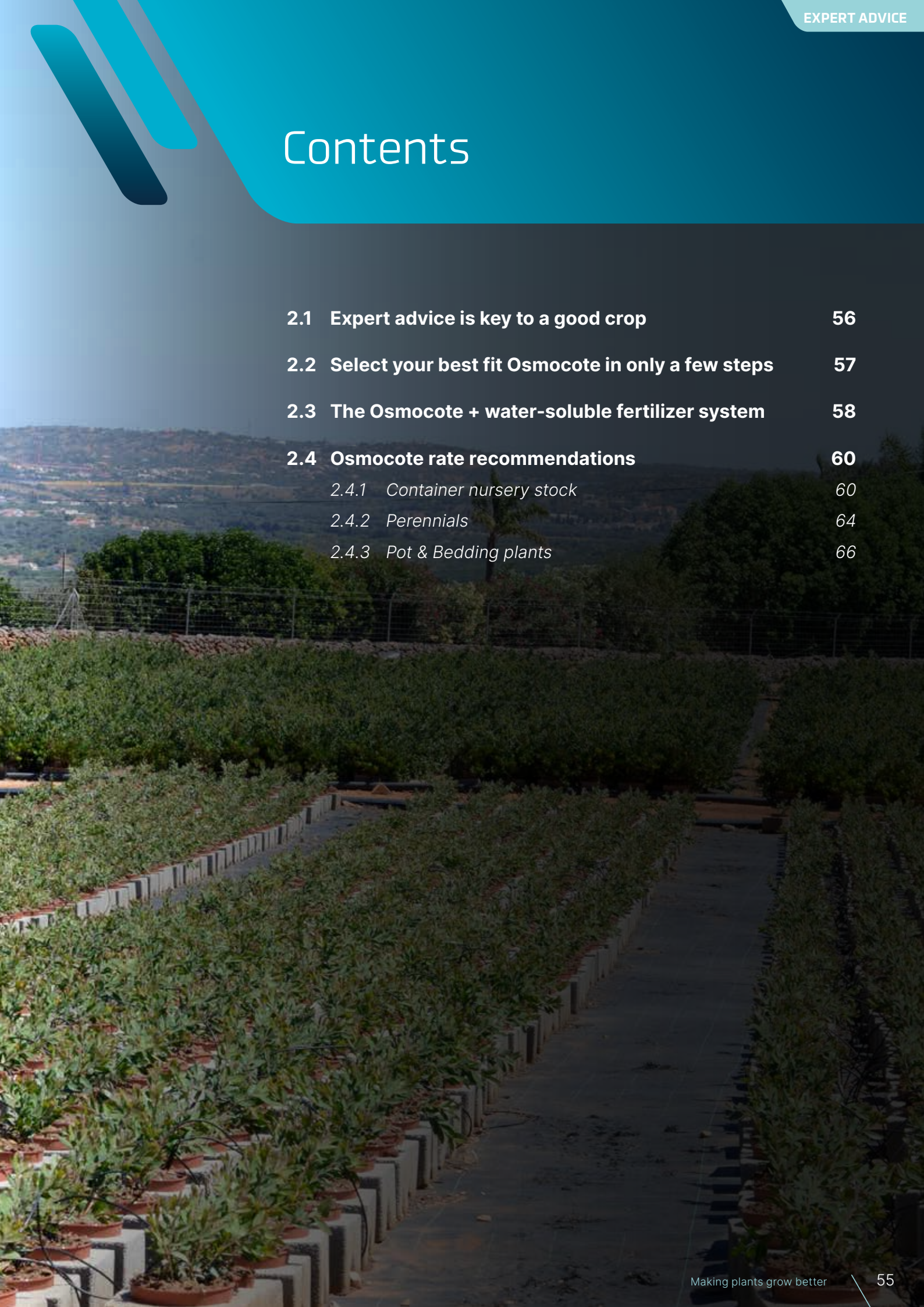
Applying H2Gro improves your water management of the posts / containers. Because plants do not dry out, they remain in better condition. It also prevents pots from falling over, which in turns minimizes your production losses. This helps increase plant quality and makes your work easier and faster, while achieving better financial results. H2Gro can be applied in nurseries using Dosatron or other dosage equipment.

ICL tip

H2Gro is also available in granules for easy application and can be mixed in the growing media or applied via topdressing.

Section II
Expert advise:
ICL service and know-how are here for you

Contents



2.1

Expert advice is key to a good crop

Experienced ICL advisors understand your day-to-day practice as a grower

Every growing situation is different. That's why you need the right specialized fertilization program to achieve optimum results. But choosing the perfect fertilizer isn't always easy. You've got to select one that gives your crops the ideal set of nutrients for healthy growth, which will pay off for you in higher yields and better profit.

ICL is here to help. We have unrivalled expertise in the field of fertilization and we're pleased to share this knowledge with you – tailor-made and in the field.

Your ICL specialist works with you to select fertilizers that will achieve the very best growing results.

Advice that yields results

Our specialists work shoulder to shoulder with you in the field to determine the perfect nutrition solution for your particular situation. This tailor-made and personalized service sets us apart and makes all the difference.

With ICL, you can count on added-value advice that is:

- Up to date and aligned to your crop's needs
- Tailored to your specific growing method
- Designed to let you make adjustments at any time during the growing season
- Aligned to the composition of your growing medium and irrigation water
- Focused on helping you select the perfect fertilizer for your crop

Information is key to making the right choice

The more information you have on fertilizers, the better your decision will be. It's important to have a clear vision on the objective of fertilization and know which product will work best for your crop and in your situation.

With ICL you receive the professional advice, clear information and useful insights you need to achieve growing success. A good crop that grows your profit.

2.2 Select your best fit Osmocote in only a few steps

Do you grow nursery crops in pots or containers?

YES

I apply fertilizer in the plant hole — NO → I mix fertilizer into the growing medium — NO → I apply fertilizer on the pots — YES → Choose your ICL topdress products on pages 27-33

YES

I mix fertilizer into the growing medium

YES

Is the required longevity a maximum of 6 weeks? — YES → Osmocote Start

NO

Do you produce balcony/bedding plants and is a longevity of 3 months sufficient for you? — YES → Osmocote Bloom

NO

Is 'yes' the answer to one or more of the following questions?

1. I grow high-quality/expensive crops
2. I grow in a greenhouse or tunnel
3. I want a premiumlevel of trace elements
4. My crops are salt-sensitive or have sensitive roots
5. I want to use the most predictable and safe Osmocote available
6. I use at least 75% of the recommended dose of coated fertilizers

NO → Osmocote Pro

YES

I want to use one product for all crops at my company — YES → Osmocote Exact Standard

My crops need a higher level of nutrition in the second half of the growing season — YES → Osmocote 5

I want lower EC values during the first weeks after potting
(for example, with salt-sensitive crops or winter potting) — YES → Osmocote Exact Protect

My aim is to grow compact, flowering crops and/or my irrigation water contains higher levels of nitrogen — YES → Osmocote Exact High K

The Osmocote + water-soluble fertilizer system

Rainfall is becoming more and more unpredictable. As a grower, you're faced with heavy rain showers and prolonged periods of continuous rainfall. This makes it more difficult for you to add fertilizer to growing media when you're using only water-soluble fertilizers. Osmocote® gives you the solution.

Even if you want to steer your plant growth with water-soluble fertilizers. Osmocote gives you great results when applied even at base rates (recommended is 75% of the normal dosage rate) and topped off with additional Universol. What's more, you'll have the added assurance that your plants can always rely on nutrients from the substrate – even in the event of heavy rain.

We recommend that you use base rates covering 75% of the plant's need to achieve the very best results. At these rates the beneficial effect of the base rate will generate the best return on investment for you. During the growing season, several Universol analyses are available so you can add precisely what your plants need at that particular moment. Universol Yellow to promote rooting, Universol Green / Blue to get growth. Universol Violet / Basis to slow down growth and to produce compact plants.

Benefits of a base rate Osmocote

Outdoor / Container nursery stock

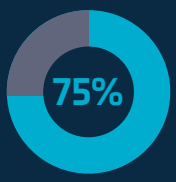
- Solid base nutrition ensuring plants always have sufficient feed (even in periods with excessive rainfall)
- Possibility to steer your crops by adding WFS at any point during crop growth
- You can add the WSF quantity based on plant need: less in the early crop stage, more in the later stage
- You can add acids or acidifying fertilizers such as Universol Hard Water of Peters Excel Acidifier to improve the irrigation water quality
- Happy customers thanks to longer shelf-life during consumer phase
- Fits into you sustainability strategy
- Always in control, also when fertilizing your plants get less attention

Greenhouse / Covered areas / Pot plants

- You need significantly less water-soluble fertilizers, giving you major cost-savings on water-soluble fertilizers
- Less disease pressure as watering only required when your plants need it and the fertilizer is already in the substrate
- Environmental benefits thanks to lower fertilizer emission
- Fits into your sustainability strategy
- Flexibility in steering the growth of your pot plants by choosing the optimal water-soluble fertilizer at any stage of the crop
- Happy customers thanks to longer shelf-life during consumer phase

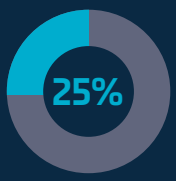
Osmocote, rely on a trustworthy base!

Table 1: The ICL Fertilizer system combining Osmocote® with Peters® and/or Universol®



Osmocote®

Applied at base rates



Peters® and/or Universol®

Applied additionally to Osmocote base rates

	OUTSIDE	INSIDE
Goal of additional water-soluble fertilization with Peters/Universol:	**Container Nursery Stock** *(outside / uncovered)*	**Pot plants / bedding plants** *(in greenhouse / covered)*
I - Promote rooting		
\\ Start of cultivation at transplanting \\ Promote roots in cuttings and young plants High phosphates, low EC levels and efficient nutrition	**Cuttings and young plants placed on small surface:** **Peters Professional Plant Starter or Power P** **Universol Yellow**	**Cuttings and young plants:** **Peters Professional Plant Starter** **Peters Professional Power P**
II - Generate growth (vegetative phase)		
\\ After well-developed roots \\ Promote branching \\ Promote growth Nitrogen based, and high level of trace elements	**Universol Blue and Green** **Universol HW or SW** *(all nitrogen based)*	**Peters Professional Allrounder** **Peters Excel Hard Water Grower** **Peters Excel CalMag Grower**
III - Finish growth, promote flowering (generative phase) and compactness		
\\ Strengthen plants, make them more resilient \\ Compact quality \\ Improve winter resistance \\ Keep well-colored plants Potassium-based, highly effective trace elements	**Universol Orange, Basis, Special 127** **Universol Hard Water 225** **Universol Soft Water 113R**	**Peters Professional Plant Finisher** **Peters Professional Combi-Sol** **Peters Excel Hard Water Finisher** **Peters Excel CalMag Finisher**

2.4.1

Osmocote rate recommendations for **container nursery stock**

Crop	Nutritional needs	pH 1:1.5 extract	Comments
Abelia	M	5.4	
Abeliophyllum	M		
Abies	M	5.0	
Acacia	M	5.4	
Acanthopanax	M		
Acer	M	5.0	
Acer campestre	M	5.0	
Acer palmatum	L	5.0	
Actinidia	H	5.0	1
Aesculus	M	5.0	
Akebia	H		1
Albizia	M	5.0	
Alnus	M	5.0	
Amelanchier	H	5.0	
Amorpha	M		
Andromeda	M	4.6	1
Aralia	M	5.0	
Araucaria	M	5.0	1
Arbutus	M	5.0	
Arctostaphylos	L		1
Aristolochia	M	5.0	1
Aronia	M		
Aucuba	M	5.0	
Azalea	*	4.6	1 2 4
Azalea japonica	L	4.6	1 2
Azalea mollis	L	4.6	
Bambusa	H	5.0	1
Berberis	M	5.0	7
Berberis	M	5.0	9
Berberis	H	5.0	8
Betula	M	5.0	
Bignonia	M	5.4	
Bougainvillea	M	5.4	1
Broussonettia	M		
Buddleja	H	5.0	
Buxus	H	5.4	1
Callicarpa	H	5.0	
Callistemon	M	5.4	
Calluna	L	4.6	1 2
Calycanthus	M		
Camellia	M	4.6	1
Campsis	H	5.0	
Caragana	M	5.0	
Carpinus betulus	M	5.0	
Caryopteris	H	5.0	1
Castanea	H	5.0	
Catalpa	H	5.4	
Ceanothus	H	5.0	1
Cedr. atl. 'Aurea'	M	5.0	1
Cedr. deod. 'Golden Horizon'	M	5.0	1
Cedrus	H	5.0	1
Celastrus	H	5.0	
Celtis	M	5.4	
Cephalanthus	M		
Cephalotaxus	M	5.4	
Cerastostigma	M		
Cercidiphyllum	M	5.4	
Cercis siliquastrum	M	5.4	
Cestrum	M	5.0	
Chaenomeles	M	5.0	1
Cham. law 'Elwood's Gold'	M	5.0	1
Cham. law. 'All.' & 'Colum.'	H	5.0	1
Cham. law. 'Elwoodii'	M	5.0	1
Cham. law. 'Golden Wonder'	M	5.0	1
Cham. law. 'Lane'	M	5.0	1
Cham. law. 'Stardust'	M	5.0	1
Chamaecyparis	M	5.0	1 5
Chamaecyparis	M	5.0	1 6
Chimonanthus	M		
Choisya	M	5.4	
Cistus	M		
Citrus	M		1
Clematis	H	5.0	
Clerodendrum	M	5.4	1
Clethra	M		
Colutea	M	5.0	
Cornus (alba)	H	5.0	
Corylopsis	M	5.0	
Corylus	M	5.0	
Cotinus	M	5.0	
Cotoneaster	H	5.0	6
Cotoneaster dammeri	L	5.0	5
Crataegus	H	5.0	
Cryptomeria	M	5.0	
Cuphea	M	5.0	
Cupressus 'Robinson's Gold'	M	5.0	
Cupr. x leylandii 'Cast. Gold'	M	5.0	
x Cupressocyparis leylandii	H	5.0	
Cupressus macrocarpa	H	5.0	
Cydonia	M	5.0	
Cytisus	L	5.0	1 7
Cytisus	M	5.0	1 8
Daboecia	M	4.6	
Daphne	M	5.4	
Davidia	M		
Decaisnea	M		

** Ask your ICL advisor for recommendations*

LEGEND Crop-related comments

1. Trace elements required; the addition of 100-200 gram/m³ Micromax Premium is recommended
2. Do not use plant hole dosage
3. Unrooted breeding
4. Dwarf cultivars
5. Horizontally growing cultivars
6. Vertically growing cultivars
7. Slowly growing cultivars
8. Rapidly growing cultivars
9. Yellow cultivars
10. Small cultivars

Crop	Nutritional needs	pH 1:1.5 extract	Comments
Deutzia	H	5.0	8
Deutzia gracilis	M	5.0	
Diervilla	H	5.0	
Diospyros	M	5.0	
Elaeagnus	H	5.0	1
Elsholtzia	M		
Enkianthus	M	4.6	
Ephedra	M		
Erica	M	4.6	1
Escallonia	H	5.0	
Eucalyptus	H	5.4	1
Euonymus	H	5.0	1
Euonymus fort. 'Vegetus'	M	5.0	1
Exochorda	M		
Fagus sylvatica	M	5.0	
Ficus carica	H	5.4	1
Forsythia	H	5.0	1
Fothergilla	H	5.0	
Fraxinus	H	5.4	
Fremontodendron	M	5.4	
Gaultheria	L	4.6	1
Genista	M	5.0	1 2
Ginko	H	5.0	1
Gleditsia	H	5.0	1
Griselinia	M		
Halesia	M	5.4	
Halimodendron	M		
Hamamelis	M	5.4	
Hebe (large-leaved)	H	5.4	1
Hebe (small-leaved)	M	5.4	1
Hedera	H	5.0	1
Hedysarum	M		

Crop	Nutritional needs	pH 1:1.5 extract	Comments
Helichrysum	M		
Hibiscus	H	5.4	
Hippophae	M	5.4	1
Holodiscus	M		
Hydrangea	H	5.4	1
Hydrangea macrophylla	M	5.4	
Hydrangea paniculata	M	5.4	
Hypericum	M	5.0	
Ilex	H	5.0	1
Ilex aquifolium	H	5.0	
Ilex crenata	M	5.0	
Indigofera	M		
Itea	M		
Jasminum	H	5.0	1
Juglans	H	5.0	
Juniperus	M	5.0	1 6
Juniperus	H	5.0	1 6
Juniperus chinensis	H	5.0	1
Kalmia	L	4.6	
Kalopanax	M		
Kerria	H	5.0	
Kiwi	H		1
Koelreuteria	M	5.4	
Linnaea amabilis	H	5.0	
Laburnum	H	5.0	1
Lagerstroemia	H	5.4	
Larix	M	5.0	
Lauris nobilis	M	5.0	
Lavendula	M	5.4	1
Ledum	M		
Leptospermum	M	5.4	
Lespedeza	M	5.4	

Crop	Nutritional needs	pH 1:1.5 extract	Comments
Leucothoe	M	4.6	1
Libocedrus (Calocedrus)	M		
Ligustrum japonicum	M	5.0	
Ligustrum ovalifolium	H	5.0	
Liquidambar	M	5.0	
Liriodendron	M	5.0	
Lonicera	H	5.0	
Lycium	M		
Magnolia	M	5.0	1
Magnolia kobus	H	5.0	1
Magnolia liliiflora 'Nigra'	H	5.0	1
Magnolia x soulangeana	H	5.0	1 3
Magnolia stellata	M	5.0	1
Mahoberberis	M		
Mahonia	M	5.0	
Malus	H	5.0	
Metasequoia	H	5.0	
Microbiota	M	5.0	
Morus	M	5.4	
Myrica	M		
Myrtus	M	5.4	
Nandina	M	5.4	
Nerium oleander	H		1
Nothofagus	M	5.0	
Olea	M		
Olearia	M		
Osmanthus	M	5.0	
Osmarea (burkwoodii)	M		
Pachysandra	M	5.0	
Paeonia	M	5.4	
Parrotia	M	5.0	
Parthenocissus	H	5.0	

Dosage advice in gram/liter (pot volume)

Nutritional needs	Osmocote Exact Standard				Osmocote 5				Osmocote Exact Protect		
	3-4	5-6	8-9	12-14	3-4	5-6	8-9	12-14	5-6	8-9	12-14
L (Low)	1.5-2.0	2.5-3.0	3.5-4.0	4.5-5.0	2.0-2.5	3.0-3.5	4.0-4.5	5.0-5.5	2.5-3.0	3.5-4.0	4.5-5.0
M (Medium)	2.0-2.5	3.0-3.5	4.0-4.5	5.0-5.5	2.5-3.0	3.5-4.0	4.5-5.5	5.5-6.5	3.0-3.5	4.0-4.5	5.0-5.5
H (High)	3.0	4.0	5.0	6.0	3.0-3.5	4.5	6.0	7.0	3.5-4.0	4.5-5.0	6.0

Crop	Nutritional needs	pH 1:1.5 extract	Comments
Passiflora	H	5.0	
Paxistima	M		
Pernettya	M	5.0	1
Perovskia	M	5.0	1
Philadelphus	H	5.0	1
Photinia	H	5.4	1
Physocarpus	M		
Picea	L	5.0	4
Picea	M	5.0	6
Picea conica	H	5.0	1
Pieris	L	4.6	1
Pinus	L	5.0	1 4
Pinus	M	5.0	1 6
Pittosporum	M		
Platanus	H	5.0	
Polygonum	H		
Poncircus	M		1
Populus	H	5.0	
Potentilla	M	5.0	5
Potentilla	H	5.0	6
Prunus	M	5.0	
Prunus cerasifera	M	5.0	1
Prunus laurocerasus	M	5.0	1
Prunus persica	M	5.0	1
Pseudotsuga	M	5.0	
Punica	M		1
Pyracantha	H	5.4	
Pyracantha coccinea	M	5.4	
Pyrus	H	5.0	2
Quercus	M	5.0	1

Crop	Nutritional needs	pH 1:1.5 extract	Comments
Rhamnus	M		
Rhododendron	L	4.6	1 2 4
Rhododendron	L	4.6	1 2 8
Rhododendron hybr.	L	4.6	1 2 6
Rhodotypos	M	4.6	2
Rhus	M	5.0	
Ribes	H	5.0	
Robinia	M	5.0	
Rosa	M	5.0	
Rosmarinus	M	5.4	1
Rubus	H	5.0	1
Rubus idaeus	H	5.0	1
Salix unrooted breeding	L	5.0	3
Salix hastata	M	5.0	
Sambucus	M	5.0	
Santolina	M		
Sarcococca	M		1
Sequoia sempervirens	M	5.0	
Sequoiadendron	M	5.0	
Skimmia jap. 'Gamelion'	L	5.0	2
Skimmia 'Rubella'	M	5.0	2
Sophora	M	5.0	
Sorbaria	M	5.0	
Sorbus	M	5.4	
Spartium	M		
Spiraea	H	5.0	
Spiraea bumalda	M	5.0	
Staphylea	M		
Stephanandra	M	5.0	
Stranvaesia	H		

Crop	Nutritional needs	pH 1:1.5 extract	Comments
Styrax	M		
Symphoricarpus	H	5.0	
Syringa	H	5.4	
Tamarix	H	5.0	
Taxodium	M	5.0	
Taxus	M	5.4	
Thuja	M	5.0	10
Thuja	M	5.0	6
Thuja occ.	M	5.0	9
Thuja occ. 'Aurea Nana'	M	5.0	
Thuja occ. 'Rheingold'	M	5.0	
Thuja occ. 'Sunkist'	M	5.0	
Thuja plicata	H	5.0	
Thujopsis	M		
Tilia	M	5.4	
Tsuga	M	5.0	
Ulex	M	5.0	
Ulmus	M	5.4	
Vaccinium	M	4.6	
Vaccinium corymbosum	H	4.6	
Vaccinium vitis-idaea	M	4.6	
Viburnum	M	5.0	
Viburnum plicatum	M	5.0	
Viburnum tinus	H	5.0	1
Vinca	M	5.0	1
Vitis	H	5.4	1
Weigela	H	5.0	1
Wisteria	H	5.0	1
Yucca	H	5.4	
Zenobia	M		

General recommendations

- Dose rate recommendations are based on substrates with maximum 0,5 kg/m3 starter fertilizer.
- The recommendations are based on peat-based substrates. In peat free or peat reduced substrates adjustments may be required.
- Always pay attention to the 'dilution effect'. Example: If a P9 (approx. 0.5 liter) is repotted in a 2-liter container, the Osmocote dosage rate in the container is diluted, because the young plant material does not contain fresh growing media. This will impact plants' growth. To reach the required rate in the full container the applied rate in fresh growing media, must be increased.
- In case of containers larger than 10 liters, lower the rates. Your ICL contact is happy to advice.
- In greenhouses/covered areas it is advised to lower the dosage, as release rates will be higher (elevated temperatures) and all salts come available to the benefit of the plant (no leaching out). A choice for a longer longevity, at the same rate, can be an alternative option.
- Growing media with Osmocote must be used within maximum 2 weeks after the Osmocote is applied in the growing medium, at the producer. Take always into account that transport needs to be included in these 2 weeks. This will have impact, especially if the production location is far away. If growing media is after this 2-week period, it can mostly still be used, but measurements must show the EC-value. If EC is too high, extensive watering after potting, can flush away released salts.
- Self-heating of growing media, causing higher temperatures in the growing media, will accelerate the release of Osmocote. Check in case of self-heating, EC-values before using the growing media.
- Osmocote 5 and Osmocote Exact can be used as a plant hole application. This is only advised when cuttings are well rooted or with young plants (P7 or P9). A bit of substrate between granules and rooted cuttings is recommended. The 3-4M longevity is not suited for plant hole application.

Contact your ICL Growing Solutions advisor when you have questions about dosages and way of application in your specific situation.

Application methods

Mixed into the growing medium

Side-dibbling method

Plant hole dibbling

Toppdressing

Osmocote injector

Osmocote Exact Tablets

2.4.2

Osmocote rate recommendations for **perennials**

Crop	Nutritional needs	Comments*
Acaena	L	
Acanthus	H	
Achillea	H	6
Achillea	M	10
Aconitum	H	
Adonis	L	
Agapanthus	L	
Ajuga	L	
Alchemilla	H	
Allium	M	
Alstroemeria	M	1
Anaphalis	M	
Anchusa	H	
Anemone	L	1
Anthemis	M	
Aquilegia	M	
Arabis	L	
Armeria	L	
Artemisia	M	
Arum	M	
Asclepias	L	
Asperula	L	
Asparagus	M	
Asphodeline	L	
Aster	H	6
Aster	M	10
Astilbe	M	
Astragalus	L	
Astrantia	M	
Bellis	L	

Crop	Nutritional needs	Comments*
Bergenia	L	
Campanula	L	10
Campanula glomerata	M	
Campanula pyramidalis	H	
Carlina	L	
Catananche	M	
Centaurea macrocephala	M	
Centranthus	M	
Cerastium	L	
Chelone	M	
Chrysanthemum coccineum	M	
Chrysanthemum leucanthemum	M	
Chrysanthemum hybrids	H	
Chrysogonum	L	
Cimicifuga	M	
Convallaria	L	
Coreopsis	H	6
Coreopsis	M	10
Cortaderia	H	1
Crocosmia	H	
Cynara	H	
Delphinium	H	6
Delphinium	M	10
Dianthus	H	6
Dianthus	M	10
Dicentra spectabilis	M	

Crop	Nutritional needs	Comments*
Digitalis	M	
Dodecathion	L	
Doronicum	H	
Echinacea	M	1
Echinops	M	
Epimedium	L	
Eremurus	M	
Erigeron	M	
Eryngium	M	
Euphorbia	L	
Gaillardia	M	
Genista	M	1
Gentiana acaulis	L	
Gentiana asplepiadea	M	
Gentiana clusii	L	
Gentiana dinarica	M	
Gentiana lutea	H	
Geranium	M	
Geum - hybrids	M	
Goniolinum	M	
Gypsophila	M	6
Gypsophila	L	10
Helianthemum	M	
Helianthus	H	
Helichrysum	M	6
Helichrysum	L	10
Heliopsis	H	
Helleborus	M	1
Hemerocallis	M	
Heuchera	M	

** See 'crop-specific comments' on the previous page.*

Dosage advice in gram/liter (pot volume)

Nutritional needs	Perennials in large pots - visually attractive plants				Perennials in small pots plants for plantation projects	
	Osmocote Exact Standard				Osmocote Exact High K	
	3-4	5-6	8-9	12-14	5-6	8-9
L (Low)	not recommended	2.0	2.5	3.5-4.0	1.5	2.0-2.5
M (Medium)	1.5	2.5	3	4	2	2.5
H (High)	2	3	4	5	3	4

Crop	Nutritional needs	Comments*
Hosta	M	
Iris germanica	L	
Kniphofia	M	
Lamium	M	
Lathyrus	M	
Lavendula	H	1
Leontopodium	L	
Liatris	H	1 6
Libertia	M	
Ligularia	H	
Lilium	M	1
Lilium candidum	H	1
Lilium henryi	M	1
Lilium longiflorum	H	1
Lilium speciosum	M	1
Limonium	M	
Linaria	L	
Lobelia	L	
Lupinus	L	1
Lychnis	L	
Lysimachia	M	6
Lysimachia	L	10
Monarda	M	
Moraea	M	
Myosotis	L	
Nepeta	M	
Oenothera	M	
Oxalis	L	
Pachysandra	L	1
Paeonia	M	

Crop	Nutritional needs	Comments*
Papaver	M	
Phlox	H	6
Phlox	M	1 10
Phyllostachys	L	
Physalis	L	
Physostegia	M	
Polygonum	M	
Primula	L	1
Rannuculus	M	
Rudbeckia	H	
Salvia	H	6
Salvia	M	10
Saxifraga	L	
Scabiosa	H	
Sedum	L	
Sempervivum	L	
Decorative grasses	M	
Solidago	H	6
Solidago	M	10
Solidaster	M	
Thalictrum	M	
Thymus	L	
Trollius	M	
Verbena	H	1
Veronica	H	6
Veronica	M	10
Viola	L	
Viola cornuta	L	
Viola odorata	L	
Zantedeschia	H	1

2.4.3

Osmocote rate recommendations for
pot & bedding plants

Crop	Nutritional needs
Alyssum	M
Antirrhinum	M
Aster	L
Asteriscus	M
Bacopa	M
Begonia semperflorens	M
Bellis	M
Brachycome	M
Calceolaria	L
Calibrachoa	M
Celosia	L
Chrysanthemum	H
Cineraria	L
Coleus	L
Cuphea	M
Dahlia	M
Dendranthema	H
Diascia	H
Erysimum	M
Fuchsia	M
Gazania	M
Glechoma	L
Godetia	L
Gomphrena	L
Heliotropium	M
Herfstviool	M

Crop	Nutritional needs
Impatiens New Guinea	M
Impatiens walleriana	M
Ipomea	M
Lantana	H
Lobelia	M
Mimulus	M
Nemesia	M
Nicotiana	H
Pelargonium grandiflorum	M
Pelargonium peltatum	H
Pelargonium zonale	H
Petunia	H
Phlox	H
Plectranthus	H
Portuluca	M
Salvia	M
Salvia farinacea	M
Sanvitalia	M
Scaevola	L
Senecio	M
Sutera diffusa	M
Tagetes	M
Verbena	M
Vinca rosea	L
Zinnia	L

ICL tip

For bedding plants in small pot volumes it is recommended to choose for Osmocote Bloom. The smaller the granule size and the greater number of granules per kg. will ensure even distribution, even in the smaller pot volumes.

ICL tip

For bedding plants High K products can be used. Choose from Osmocote Bloom or alternative Osmocote Exact High K.

Dosage advice in gram/liter (pot volume)

Nutritional needs	Osmocote Exact Standard				Osmocote 5			
	3-4	5-6	8-9	12-14	3-4	5-6	8-9	12-14
L (Low)	1.5-2.0	2.5-3.0	3.5-4.0	4.5-5.0	2.0-2.5	3.0-3.5	4.0-4.5	5.0-5.5
M (Medium)	2.0-2.5	3.0-3.5	4.0-4.5	5.0-5.5	2.5-3.0	3.5-4.0	4.5-5.5	5.5-6.5
H (High)	3.0	4.0	5.0	6.0	3.0-3.5	4.5	6.0	7.0

Section III
Technical information on plant nutrition

Contents

3.1

Plant growth and nutrition

Manage nutrients properly is a specialist job. Fertilizers are only effective when applied in the correct way and at the right time. Processes in plants play a fundamental role in the uptake and efficiency of nutrients.

Growth = Photosynthesis - Respiration

Growth

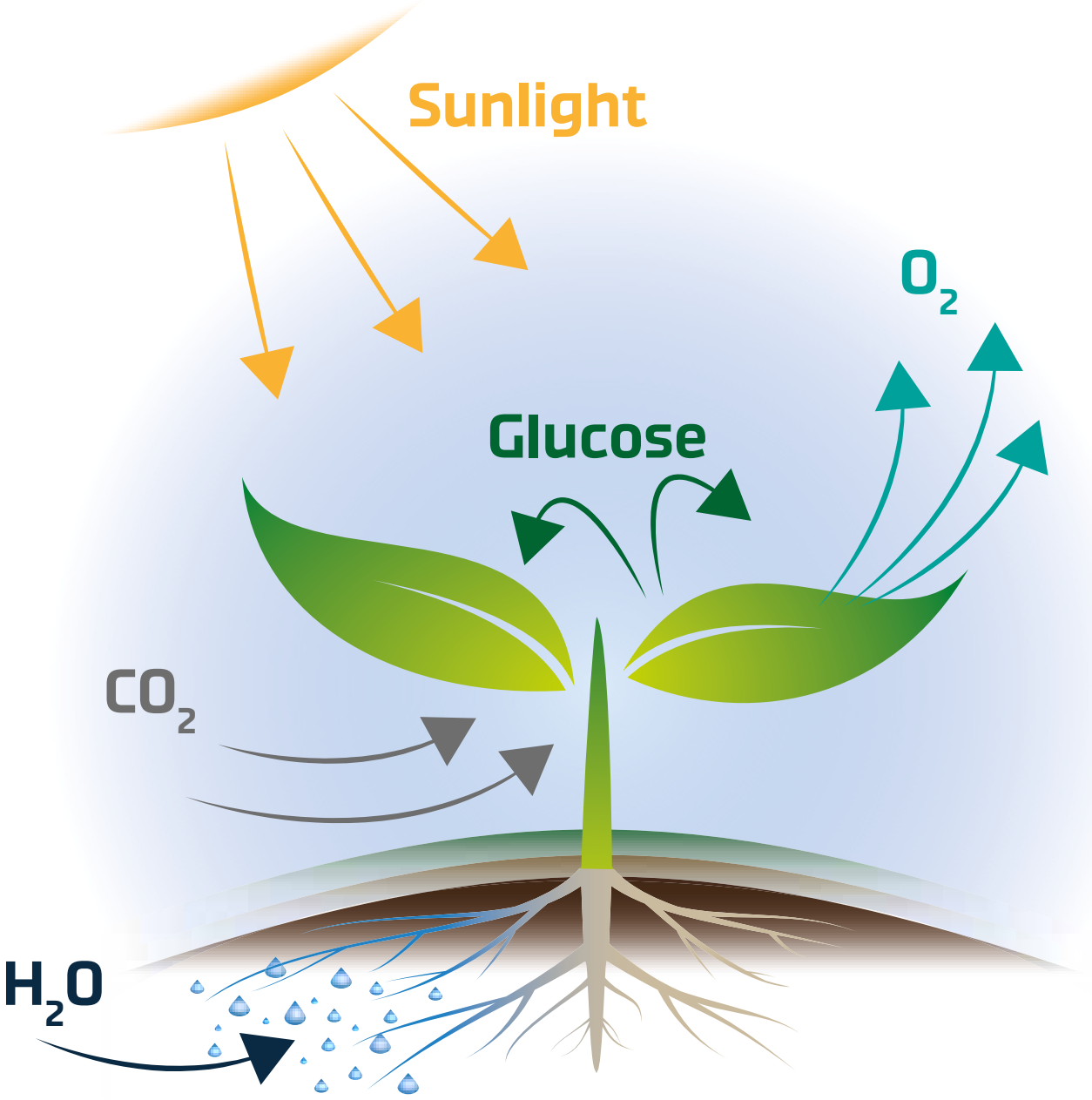
Simply put, the difference between photosynthesis and respiration is growth. If a plant is able to produce more during photosynthesis than it consumes during respiration, it will grow. Growth is in fact an increase in dry matter (mass).

Photosynthesis

Photosynthesis is the complex reaction which plants use to turn energy from the sun into sugars. In other words, the plant takes carbon dioxide from the air and water from the soil and combines them together to form carbohydrates (sugar). Oxygen is released as a waste product. Photosynthesis is dependent on temperature and light exposure. It occurs only during the day.

Respiration

Plants (like humans) burn sugars and produce carbon dioxide in respiration. In addition to sugars, respiration also requires oxygen and water. Unlike photosynthesis, respiration does not require light. Respiration occurs in dark and light.



3.2

Macro, meso and micro elements

Soil nutrients come in three basic categories, macro, meso and micro elements.

- Macro elements are nitrogen (N), phosphorus (P), potassium (K).
- Meso elements are magnesium (Mg), calcium (Ca) and sulphur (S).
- Micro elements or trace elements are iron (Fe), manganese (Mn), zinc (Zn), boron (B), copper (Cu), molybdenum (Mo) and silicon (Si).

In order for growth to occur there has to be a proper balance between these categories.

The table gives you an idea of the optimum nutrient element ratios in plant tissue.

Element	Ratio in plant tissue
Molybdenum	1
Copper	100
Manganese	1000
Calcium	100,000
Nitrogen	1,000,000

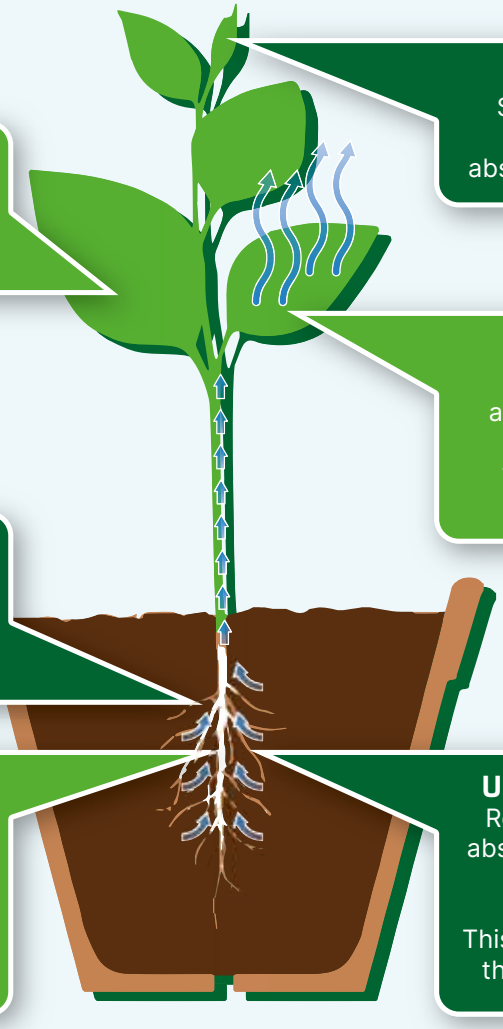
3.3

How plants absorb their food and the impact on fertilization

Plants need to get enough nutrients to grow well, but it's also important that the nutrients are absorbed at the right places. To gain better insight into this process and the way it affects plants, it is good to start with some basic information about nutrient absorption.

Nutrients are absorbed by plants in the form of nutrient elements. Plants can only absorb elements that are dissolved in water.

How do nutrients get to the right place?



Uptake by the leaves
Some elements (N, Mg, Fe, Mn, Ca) are partially absorbed through the leaves.

The distribution of nutrients in leaves requires energy (formed during photosynthesis).

Uptake by capilarity
Evaporation causes water and nutrients to move up to fill the space left by the water molecules that were 'pulled out' of the leaves.

Absorption
Water (with nutrients) is only absorbed by root hairs. 90% of nutrients are absorbed by the roots.

At root level you find little absorptive hairs that firmly stick to the soil particles. These hairs can only survive up to three weeks. Stimulate young root hair growth to improve absorption!

Uptake by root pressure
Root pressure causes water absorbed from the soil to rise up the stem.

This also supplies nutrients to the upper parts of the plant.

3.4

ICL tip

The primary aim of plant cultivation is to ensure the optimal uptake of water and nutrients. Tips and tricks give helpful ideas for increasing plant growth and performance

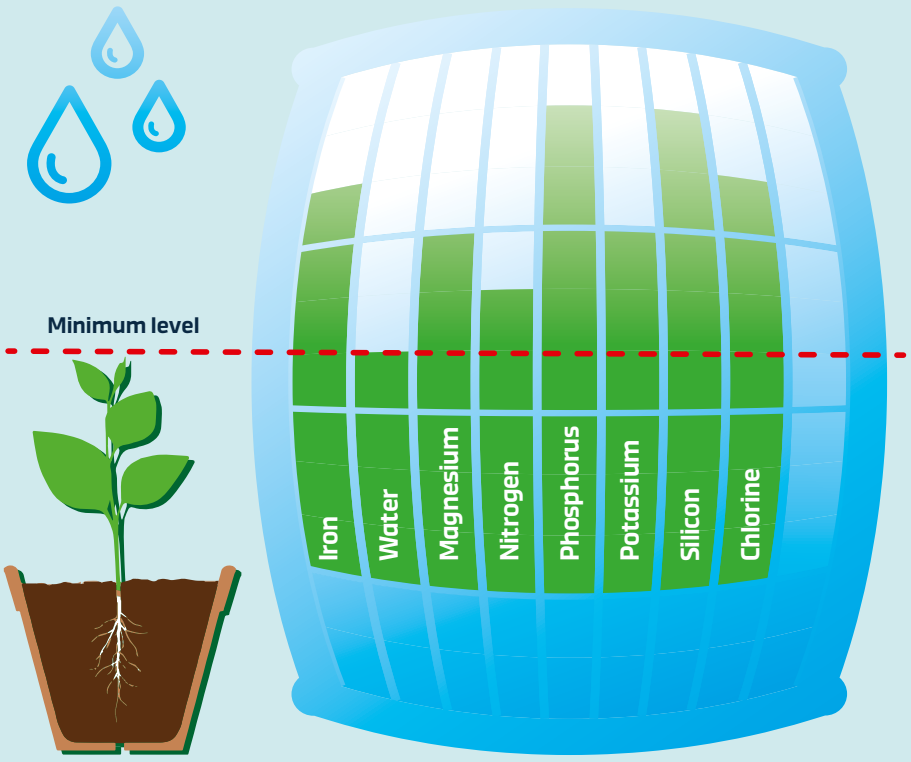
Tips & Tricks for Plant Growth and Nutrition

- Try to **increase photosynthesis** as much as possible (or prevent conditions that limit photosynthesis). The more photosynthesis, the more energy, which allows for more growth.
- A **healthy root system** is continuously growing and should have lots of white tips. Plants absorb the majority of their nutrients (90%) through the roots. So concentrate on developing a healthy root system, for example through the use of Peters Professional Plant Starter with high phosphorus content.
- Consider the effect on photosynthesis and plant growth before any cultivation is carried out. This way you can take the correct measures to prevent plant stress.

Plant growth in relation to fertilization

Balance between elements

Plants generate energy from food. Crops require a balanced diet of essential nutrients in order to grow. If there is a lack of nutrient(s) or in example water, crops will show abnormal growth and deficiency, or they may not reproduce. In the 19th century **Justus Freiherr von Liebig** developed **the Law of the Minimum**, a principle which states that growth is controlled not by the total amount of resources available, but by the lowest available nutrient (limiting factor). The image of the so-called Liebig's barrel shows how it works.



Liebig's barrel

3.5

Optimizing fertilization and irrigation water quality

Plants rely on water to transport nutrients to their cells. Water is necessary for good plant nutrition. The quality of water has a major influence on the effectiveness of fertilizers. In the next pages you will find all the information you need to determine the quality of your irrigation water.

The quality of a fertilizer does not only depend on what's in it, **but also on what the plant can absorb!**

Tips & Tricks for Watering and Cultivation

ICL tip

- Analyse your irrigation water on a regular basis (minimum once a year).
- Review your analysis with an ICL technical advisor.
- The most common parameters used for deter-mining irrigation water quality are acidity (pH), Electrical Conductivity (EC) and hardness (Ca-, Mg-bicarbonate), but look at the other elements in the water as well.
- Determine, together with your ICL SF advisor the need for measures to improve the quality of the water.
- Take into account the differences in water hardness and pH buffering capabilities between the different types of irrigation water (e.g. rainwater vs. well water).
- If the water is too hard or contains too high levels of Bicarbonate (HCO_3^-), it may be necessary to decrease the pH in the water by acidifying.
- Soft water may contain low concentrations of calcium. Adjust tank composition accordingly and add calcium.
- Match irrigation to water quality, weather conditions, and crop need at all times.
- ICL offers products that improve water quality based on advanced technologies. Ask your ICL advisor for tailored advice.

3.6

Types of irrigation water and their properties

Rainwater

- Large fluctuation in pH due to lack of pH buffering
- Very low EC levels. Clean water collecting system has great impact on quality
- Algae growth can become a problem and should be prevented

Well water

- Composition varies per area and depth of the well
- Constant composition and temperature (yearly water analysis is recommended)
- May contain iron, manganese and bicarbonates
- May contain high levels of Ca and Mg

Recirculated water

- Ensure water is disinfected to kill plant pathogens
- Frequent water analysis is required to prevent sodium accumulation/build up
- Recirculated water with high EC levels is usually low in trace elements
- Adjust amount of additional fertilizers according water analysis

Surface water

- Watch out for potential fungi/bacteria in the water
- Possible high concentration of Na and Cl
- Composition varies per season and area and may fluctuate quickly

Reverse Osmosis (RO) water

- pH neutral, does not contain any salts
- Very clean water
- Does not contain buffers. Buffering capabilities removed through RO
- Expensive method of water purification due to power consumption
- Take note of regulations referring to the disposal of the waste water from the RO installation.

Tap water

- High pH levels due to buffering effect
- Quality varies per region
- May contain Ca, Mg, Na and Cl
- Take into consideration the levels of HCO_3^- (bicarbonate)
- Expensive

3.7

Performance indicators of water quality

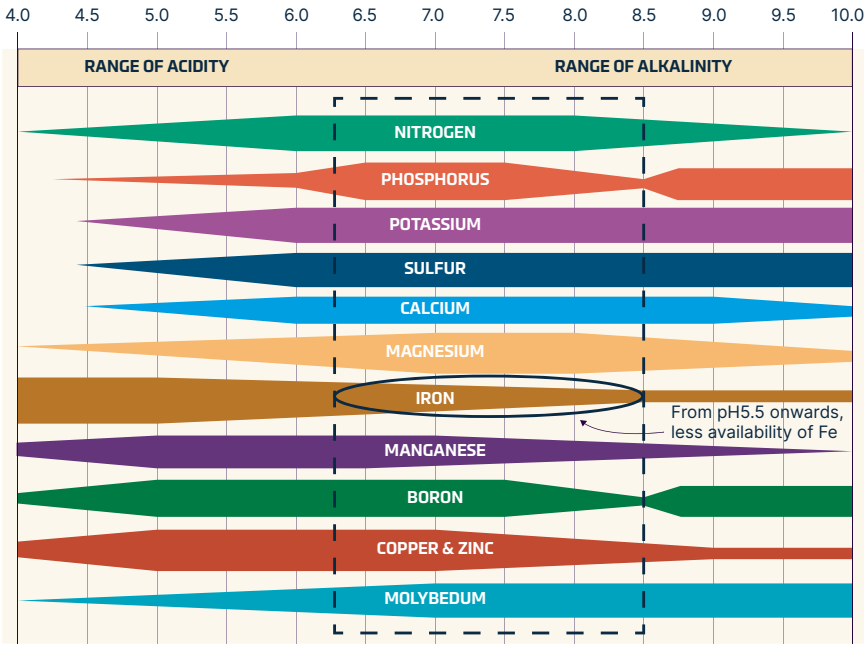
pH value

Variations in pH during cultivation will affect the quality of your plants. Low pH levels disturb the uptake of elements such as potassium, calcium, magnesium and molybdenum. Low pH can increase toxicity because some trace elements are absorbed too easily. A pH value that is too high can prevent a plant from absorbing phosphate and trace elements (with the exception of molybdenum).

Water pH and Bicarbonates (HCO_3^-)

Water pH can change easily and quick when only a small buffer of HCO_3^- is available. Only a small amount of acidifying fertilizer can drop pH by several points. For optimum results it is recommended to always have a small buffer of HCO_3^- (1.0 - 1.5 mmol/l HCO_3^-) in the irrigation water. Also in case rainwater is used. Always realize water pH is not equal to substrate pH.

The influence of substrate pH on nutrient availability for plants



Water hardness

The simple definition of water hardness is the amount of dissolved calcium and magnesium carbonate ions in the water. Hard water increases the pH in the growing medium. Soft water on the other hand reduces pH in the root environment in case acidifying fertilizers are used. It's essential that growers take measures to improve water quality. Whether the water is hard or soft, ICL provides expert advice on how to control the quality of your water.

EC

Electrical Conductivity (EC) is the amount of electrical current water can carry. EC is expressed as milliSiemens per centimeter (mS/cm) at 25ºC. The electrical conductivity of water is actually a measurement for salinity. Soil with excessively high salinity, or high EC, can prevent efficient nutrient absorption by the plant. Irrigation water with high EC is also unfavourable for usage on plants, because it limits the possibilities of fertilization and it can harm plants.

3.8

Optimizing the balance between fertilization, natural rainfall and irrigation

In case of inside or outside grown crops in growing media, it is always recommended to add at least 75% base rate of Osmocote. This will ensure a steady and continuous supply of essential plant feed. On top of the base rate Osmocote, you have sufficient 'space' to steer crop growth based on requirements during every crop stage, by adding WSF.

Use for this purpose Peters® or Universol water-soluble fertilizers to ensure a full package of N, P, K, MgO and trace elements.

During the full season additional water-soluble fertilizer has to be applied to fulfill the full plant needs. Special attention is required after heavy rainshowers. It can be beneficial to your plants to add temporarily higher amounts of WSF to quickly increase EC levels in the growing medium. Depending on the amount of rainfall in a short time, the WSF rate needs to be determined. Your ICL advisor has experience to help you.

During the season you can vary the N, P, K composition in line with plant needs. Early in the season more N, later more K. For stimulating root development, P-formulas cab be applied.

ICL tip

Tips & Tricks for optimizing fertilization, rainfall and irrigation

- Measure the impact of your work by placing rain gauges between crops, preferably in several places spread throughout the nursery
- If frequent watering applications are needed to keep the soil moist, add 0.5 to 1.0 mS/cm of nutrition at a time, depending on the crop's needs
- If you are using a fertilizer solution with an EC of 2.0 mS/cm or more over the crop, sprinkle briefly with clean water afterwards (one to two minutes) to clean the leaves from salts
- Measure how much water you are giving per square meter. Do this by turning on your sprinklers and using cups or rain gauges to measure how much water your plants are getting
- Measure the time it takes for water (with fertilizer) to get from your pumpingsystem to the most farthest end of the nursery. You can check this by adding colouring to the water
- Always have insight into the EC value of your irrigation water. Take this value into account when measuring the total EC
- Consider the use of H2Gro (see page 51) to improve the water management of pots and containers

3.9

Relation growing media and pH

What does pH mean?

pH stands for "potentiae Hydrogenii". This is the concentration of H^+ ions in a solution. If the number of H^+ ions and OH^- ions is equal, the solution is neutral (pH 7.0). More H^+ makes the solution acid (lower pH, < 7.0), more OH^- makes the solution aqueous, and gives a higher pH (>7.0). pH has a logarithmic scale and is expressed with a pH value from 0-14, with 7 being neutral.

- pH 3.0 = 10^{-3} mol H^+ (=0.001mol/l)
- pH 7.0 = 10^{-7} mol H^+ (=0.0000001mol/l)
- pH 11.0 = 10^{-11} mol H^+ (=0.00000000001 mol/l)

For growing media in horticulture, a pH-H_2O range between 4 and 6.5 is in most cases targeted for. Most plants are grown within this range.

pH buffer of substrates

Raw materials have a certain degree to which they can absorb changes in the pH. This is called the pH buffer. Different peat types have a different buffer capacity. The more and more used alternatives for peat, like wood fiber, coir fiber and bark, buffer the pH less well. The pH behavior of these alternative materials is harder to predict. Raw materials of volcanic origin (pumice, lava, perlite) have almost no pH buffer.

Liming

Each crop prefers a certain pH, like mentioned. To bring the pH of a substrate to the desired pH level, carbonates (CO_3^{2-}) are added which neutralize the acid (H+). The liming demand differs per raw material in the substrate. Peat demands more lime than other materials like wood fiber and coir. Lime fertilizers contain calcium carbonate and sometimes magnesium carbonate. Calcium carbonate dissolves poorly and is slower, while magnesium carbonate dissolves quite well and acts faster. The first rapid rise in pH is due to magnesium carbonate. It can take up to a week after production the substrate before it reaches a stable pH.

What can influence the pH value of the substrate?

- The composition of the substrate (the amount of organic substances and the ability of the soil to bind and exchange H^+ ions)
- The application of calcium and other cations to the soil
- Seasonal fertilization (exchange of cations with H^+ ions in the peat complex)
- By the plant:
  - *Absorption of **cations** by the plant: this results in H^+ ions being delivered to the root environment (lowering pH levels)*
  - *Absorption of **anions** by the plant: this results in ions being delivered to the root environment (rise in pH levels)*
- More nutrition is available than what the plant is able to absorb: this may affect the balance of cations and anions and lead to changes in the pH level
- Watering: the composition and amount of water that is applied can affect the balance of cations and anions in the soil

ICL tip

Did you know?

In case peat in your growing media is replaced by wood fiber, coir or bark, this can influence the pH in the root zone.

Less organic substances mean:

- Reduced buffering capacity of H^+ ions
- More pH fluctuations in the substrate
- Less space for calcium in the complex

3.10

AngelaWeb3.0

AngelaWeb3.0, designed and developed by ICL takes precision nutrition to the next level.

This innovative computer programme offers advisors and growers the possibility for individual recommendations, tailored to specific pot plants, nursery stock crops, cut flowers, vegetables and fruits. AngelaWeb3.0 takes into account the crop type, variety, and growth phase to display the specific nutritional demands. By inputting information regarding the water source and how it is applied, and selecting the fertilizer products of choice, AngelaWeb calculates a regime tailored to the exact needs of the crop.

AngelaWEB3.0

Designed by the experts in precision nutrition for professionals

- Give the crop exactly what it requires
- Maximize your return on investment
- Optimize nutrient usage

Giving your plants what they need

Many factors have an impact on plant quality and correct nutrition is among the most important. It not only has a key role to play in preventing plant diseases, it is also vital to healthy growth and, where appropriate, crop yield – and therefore ultimately its financial performance.

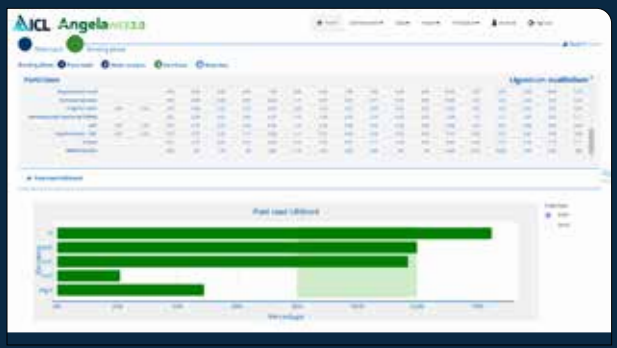
Plants need the correct nutrients depending on the growth stage, the growing media, and its pH and Electrical Conductivity (EC). Water quality is another key parameter, and this can change at many nurseries over the course of the season when switching between different water sources. How it is applied to the crop also has an impact.

How it works...

Web-based AngelaWeb is straightforward to operate and apply. First the crop, including the variety, as well as the growth phase are selected. This information is then used to calculate and display the crop's specific nutritional requirements, and the option is also provided to create Controlled Release Fertilizer simulations.

The next step, put in base fertilizers: Osmocote followed by water analysis. The program calculated the plant need that have to be fulfilled with WSF and liquids Unique the combi CRF + WSF calculations. This involves inputting data from a detailed analysis of the water source and how it is to be applied. Next, by selecting from a list of 'straights' or water-soluble fertilizers, the software calculates a fertilizer regime. In support of this, it generates a graph showing the percentage of the plants' nutritional needs being fulfilled at each growth stage, as well as the EC level.

As the season progresses, if certain elements changes, such as the water source, the existing data can be retrieved and changes quickly made. The software, having made the necessary tweaks to the fertilizer programme, produces new print outs and reports.



AngelaWeb3.0 generates graphs showing the percentage of the plants nutritional needs being fulfilled at each growth

Container Nursery Stock Deficiency symptoms

Macro elements

N Nitrogen

N deficiency in Lonicera
Source: LVG Bad Zwischenahn (D)

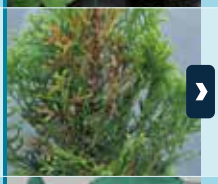
N deficiency in Cham. laws. 'Ellwoodii'
Source: LVG Bad Zwischenahn (D)

N deficiency in Philadelphus
Source: ICL Research (NL)

P Phosphate

P deficiency in Hypericum
Source: LVG Bad Zwischenahn (D)

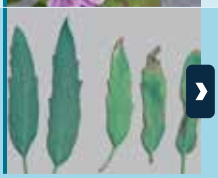
P deficiency in Hydrangea
Source: ICL Research (NL)



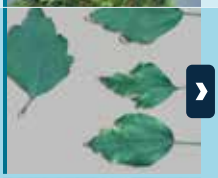
P deficiency in Thuja
Source: LVG Bad Zwischenahn (D)

K Potassium

K deficiency in Ribes
Source: LVG Bad Zwischenahn (D)



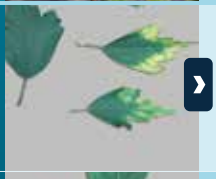
K deficiency in Caryopteris
Source: PPO Boskoop (NL)



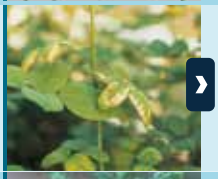
K deficiency in Hibiscus
Source: PPO Boskoop (NL)

Meso elements

Ca Calcium



Ca deficiency in Hibiscus
Source: PPO Boskoop (NL)



Ca deficiency in Rosa
Source: ICL Research (NL)

Ca deficiency in Taxus bacatta'Hicksii'
Source: LVG Bad Zwischenahn (D)

Mg Magnesium

Mg deficiency in Hydrangea
Source: PPO Boskoop (NL)

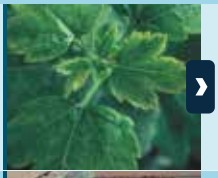
Mg deficiency in Cham. laws. 'Ellwoodii'
Source: LVG Bad Zwischenahn (D)

Mg deficiency in Magnolia
Source: LVG Bad Zwischenahn (D)

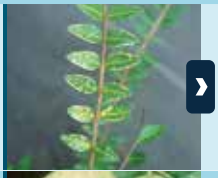
Micro elements

B Boron

B deficiency in Cytisus
Source: PPO Boskoop (NL)



B deficiency in Ribes
Source: PPO Boskoop (NL)



B deficiency in Lonicera
Source: LVG Bad Zwischenahn (D)

Cu Copper

Cu deficiency in Lonicera
Source: LVG Bad Zwischenahn (D)

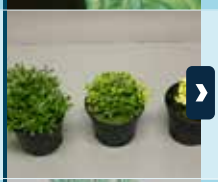
Cu deficiency in Cham. laws. 'Columnaris'
Source: ICL Research (NL)

Cu deficiency in Philadelphus
Source: PPO Boskoop (NL)

Fe Iron

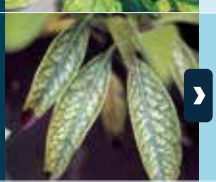
Fe deficiency in Hydrangea
Source: ICL Research (NL)

Fe deficiency in Cham. laws. 'Columnaris'
Source: LVG Bad Zwischenahn (D)

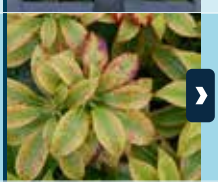


Fe deficiency in Potentilla tridentata 'Nuuk'
Source: LVG Bad Zwischenahn (D)

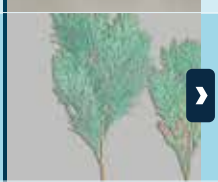
Mn Manganese



Mn deficiency in Kalmia
Source: LVG Bad Zwischenahn (D)



Mn deficiency in Pieris
Source: LVG Bad Zwischenahn (D)



Mn deficiency in Chamaecyparis
Source: PPO Boskoop (NL)

Mo Molybdenum

Mo deficiency in Ribes
Source: PPO Boskoop (NL)

Mo deficiency in Caryopteris
Source: PPO Boskoop (NL)

Mo deficiency in Philadelphus
Source: PPO Boskoop (NL)

Pot and Bedding Plants Deficiency symptoms

Macro elements

N Nitrogen

N deficiency in Guzmania 'Ostara'
Source: Corn. Bak B.V. (NL)

N deficiency in Doronicum
Source: LVG Heidelberg (D)

N deficiency in Poinsettia
Source: ICL Research (NL)

P Phosphate

P deficiency in Hydrangea
Source: ICL Research (NL)

P deficiency in Verbena
Source: WUR Glastuinbouw, Bleiswijk (NL)

P deficiency in Petunia
Source: WUR Glastuinbouw, Bleiswijk (NL)

K Potassium

K deficiency in Primula
Source: ICL Research (NL)

K deficiency in Kentia
Source: ICL Research (NL)

K deficiency in Gerbera
Source: ICL Research (NL)

Meso elements

Ca Calcium

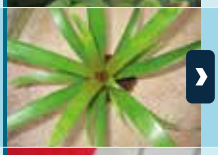
Ca deficiency in Poinsettia
Source: ICL Research (NL)

Ca deficiency in Rosa
Source: ICL (NL)

Ca deficiency in Primula
Source: LVG Heidelberg (D)

Mg Magnesium

Mg deficiency in Pelargonium
Source: USDA (USA)



Mg deficiency in Guzmania
Source: Corn. Bak B.V. (NL)

Mg deficiency in Ficus
Source: ICL Research (NL)

S Sulphur

S deficiency in Pelargonium
Source: LVG Heidelberg (D)

S deficiency in Poinsettia
Source: LVG Heidelberg (D)

S deficiency in Poinsettia
Source: ICL Research (NL)

Micro elements

B Boron

B deficiency in Petunia
Source: ICL Research (NL)

B deficiency in Kalanchoë
Source: WUR Glastuinbouw, Bleiswijk (NL)

B deficiency in Hibiscus
Source: IFAS (USA)

Cu Copper

Cu deficiency in Chrysanthemum
Source: WUR Glastuinbouw, Bleiswijk (NL)

Cu deficiency in Gerbera
Source: ICL Research (NL)

Cu deficiency in Pelargonium
Source: USDA (USA)

Fe Iron

Fe deficiency in Rosa
Source: ICL Research (NL)

Fe deficiency in Pelargonium
Source: ICL Research (NL)

Fe deficiency in Calibrachoa
Source: LVG Heidelberg (D)

Mn Manganese

Mn deficiency in Kalanchoë
Source: WUR Glastuinbouw, Bleiswijk (NL)

Mn deficiency in Spathiphyllum
Source: ICL Research (NL)

Mn deficiency in Pelargonium
Source: USDA (USA)

Mo Molybdenum

Mo deficiency in Kalanchoë
Source: WUR Glastuinbouw, Bleiswijk (NL)

Mo deficiency in Poinsettia
Source: NCSU (USA)

Mo deficiency in Chrysanthemum
Source: WUR Glastuinbouw, Bleiswijk (NL)

Zn Zinc

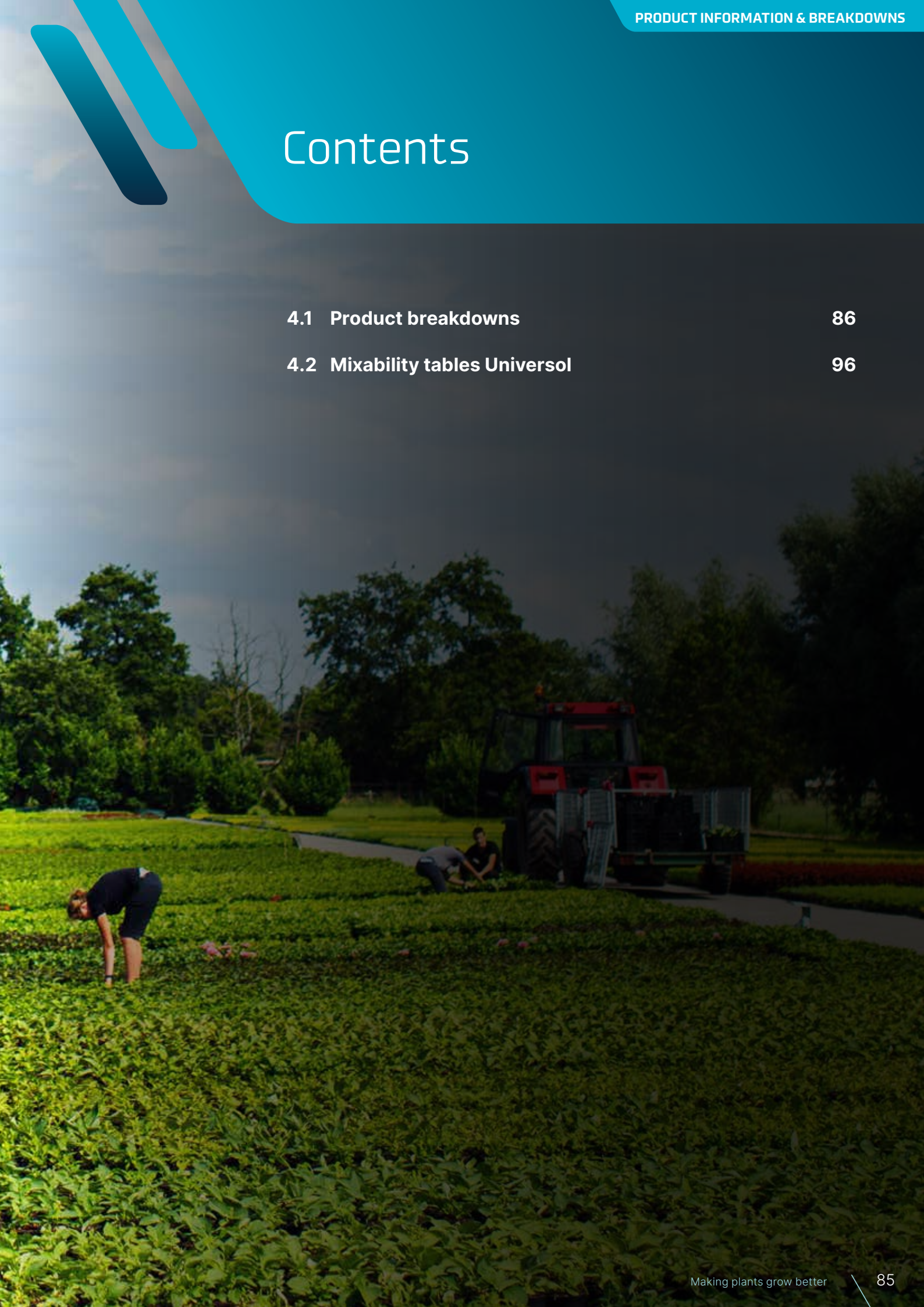
Zn deficiency in Pelargonium
Source: USDA (USA)

Zn deficiency in Poinsettia
Source: ICL Research (NL)

Zn deficiency in Poinsettia
Source: ICL Research (NL)

Section IV
Product breakdowns & mixability tables

Contents



4.1
Product breakdowns

Osmocote® 5

Name	Analysis	Longevity in months at 21 °C	N %	NO_3-%	NH_4+ %	Urea %	P_2O_5 %	K_2O %	
Osmocote 5 Booster	16-8-12+2.2MgO+TE	1 - 2	16	7.4	8.6	0.0	8	12	
Osmocote 5	16-8-12+2.2MgO+TE	3 - 4	16	7.3	8.4	0.3	8	12	
Osmocote 5	16-8-12+2.2MgO+TE	5 - 6	16	7.3	8.4	0.3	8	12	
Osmocote 5	16-8-12+2.2MgO+TE	8 - 9	16	7.3	8.4	0.3	8	12	
Osmocote 5	16-8-12+2.2MgO+TE	12 - 14	16	7.3	8.4	0.3	8	12	

Osmocote® Exact

Name	Analysis	Longevity in months at 21 °C	N %	NO_3-%	NH_4+ %	Urea %	P_2O_5 %	K_2O %	
Osmocote Exact Standard	16-9-12+2MgO+TE	3 - 4	16	7.0	9.0	0.0	9	12	
Osmocote Exact Standard	15-9-12+2MgO+TE	5 - 6	15	6.4	8.6	0.0	9	12	
Osmocote Exact Standard	15-9-11+2MgO+TE	8 - 9	15	6.6	8.4	0.0	9	11	
Osmocote Exact Standard	15-9-11+2MgO+TE	12 - 14	15	6.4	8.6	0.0	9	11	
Osmocote Exact Lo.Start	15-8-11+2MgO+TE	16 - 18	15	6.6	8.4	0.0	8	11	
Osmocote Exact Mini	15-9-11+2MgO+TE	3 - 4	15	6.4	8.6	0.0	9	11	
Osmocote Exact Mini	15-9-11+2MgO+TE	5 - 6	15	6.4	8.6	0.0	9	11	
Osmocote Exact Protect	14-8-11+2MgO+TE	5 - 6	14	6.2	7.8	0.0	8	11	
Osmocote Exact Protect	14-8-11+2MgO+TE	8 - 9	14	6.2	7.8	0.0	8	11	
Osmocote Exact Protect	14-8-11+2MgO+TE	12 - 14	14	6.2	7.8	0.0	8	11	
Osmocote Exact High K	12-8-19+1.8MgO+TE	3 - 4	12	5.1	6.9	0.0	8	19	
Osmocote Exact High K	12-8-19+1.8MgO+TE	5 - 6	12	5.1	6.9	0.0	8	19	
Osmocote Exact High K	12-8-19+1.8MgO+TE	8 - 9	12	5.1	6.9	0.0	8	19	
Osmocote Exact High K	12-8-19+1.8MgO+TE	12 - 14	12	5.1	6.9	0.0	8	19	

Osmocote® Exact Tablet

Name	Analysis	Longevity in months at 21 °C	N %	NO_3-%	NH_4+ %	Urea %	P_2O_5 %	K_2O %	
Osmocote Exact tablet	14-8-11+2MgO+TE	3 - 4	14	6.2	7.8	0.0	8	11	
Osmocote Exact tablet	14-8-11+2MgO+TE	5 - 6	14	6.2	7.8	0.0	8	11	
Osmocote Exact tablet	14-8-11+2MgO+TE	8 - 9	14	6.2	7.8	0.0	8	11	
Osmocote Exact tablet	14-8-10+2MgO+TE	12 - 14	14	6.2	7.8	0.0	8	10	

	MgO %	SO_3 %	Fe % Total	Fe % EDTA	Mn %	Zn %	Cu %	B %	Mo %	Granule size mm
	2.2	15.0	0.30	0.30	0.05	0.012	0.018	0.01	0.010	2.0-4.5 mm
	2.2	15.0	0.30	0.30	0.05	0.012	0.018	0.01	0.010	2.0-4.5 mm
	2.2	15.0	0.30	0.30	0.05	0.012	0.018	0.01	0.010	2.0-4.5 mm
	2.2	15.0	0.30	0.30	0.05	0.012	0.018	0.01	0.010	2.0-4.5 mm
	2.2	15.0	0.30	0.30	0.05	0.012	0.018	0.01	0.010	2.0-4.5 mm

	MgO %	SO_3 %	Fe % Total	Fe % EDTA	Mn %	Zn %	Cu %	B %	Mo %	Granule size mm
	2.0	16.0	0.45	0.09	0.065	0.028	0.060	0.024	0.024	2.0-4.5 mm
	2.0	15.0	0.47	0.09	0.065	0.028	0.060	0.024	0.024	2.0-4.5 mm
	2.0	15.0	0.45	0.09	0.065	0.028	0.060	0.023	0.024	2.0-4.5 mm
	2.0	15.0	0.45	0.09	0.064	0.028	0.060	0.023	0.023	2.0-4.5 mm
	2.0	15.0	0.45	0.09	0.060	0.015	0.050	0.020	0.020	2.0-4.5 mm
	2.0	14.0	0.46	0.09	0.064	0.027	0.071	0.023	0.023	1.0-2.23 mm
	2.0	15.0	0.46	0.09	0.063	0.027	0.071	0.023	0.023	1.0-2.23 mm
	2.0	13.0	0.43	0.08	0.060	0.026	0.056	0.022	0.021	2.0-4.5 mm
	2.0	14.0	0.43	0.08	0.060	0.026	0.056	0.022	0.021	2.0-4.5 mm
	2.0	14.0	0.43	0.08	0.060	0.026	0.056	0.022	0.021	2.0-4.5 mm
	1.8	20.0	0.35	0.07	0.050	0.021	0.060	0.018	0.018	2.0-4.5 mm
	1.8	21.0	0.35	0.07	0.049	0.021	0.060	0.018	0.018	2.0-4.5 mm
	1.8	21.0	0.35	0.07	0.049	0.021	0.060	0.018	0.017	2.0-4.5 mm
	1.8	21.0	0.35	0.07	0.049	0.021	0.054	0.018	0.017	2.0-4.5 mm

	MgO %	SO_3 %	Fe % Total	Fe % EDTA	Mn %	Zn %	Cu %	B %	Mo %	Weight per tablet gram 5 or 7.5
	2.0	14.7	0.410	0.080	0.050	0.013	0.046	0.010	0.018	5
	2.0	14.5	0.410	0.080	0.050	0.013	0.046	0.010	0.018	5 or 7.5
	2.0	14.0	0.410	0.080	0.050	0.013	0.046	0.010	0.018	5 or 7.5
	2.0	14.0	0.410	0.080	0.050	0.013	0.046	0.010	0.018	5

Osmocote® Pro

Name	Analysis	Longevity in months at 21°C	N %	NO_3-%	NH_4+ %	Urea %	P_2O_5 %	K_2O %	
Osmocote Pro	19-9-10+2MgO+TE	3 - 4	19	6.3	8.2	4.5	9	10	
Osmocote Pro	19-9-10+2MgO+TE	5 - 6	19	6.2	8.2	4.6	9	10	
Osmocote Pro	18-9-10+2MgO+TE	8 - 9	18	5.9	7.7	4.4	9	10	
Osmocote Pro	18-9-10+2MgO+TE	12 - 14	18	5.9	7.7	4.4	9	10	
Osmocote Pro low P	16-3-16+3MgO+TE	8 - 9	16	6.2	6.8	2.4	3	16	
Osmocote Pro low P	16-3-16+3MgO+TE	12 - 14	16	6.0	6.7	2.6	3	16	
Osmocote Pro High K	11-11-19+2MgO+TE	5 - 6	11	3.8	6.2	1.0	11	19	
Osmocote Pro High K	11-11-19+2MgO+TE	8 - 9	11	3.8	6.2	1.0	11	19	

Osmocote® Bloom

Name	Analysis	Longevity in months at 21°C	N %	NO_3-%	NH_4+ %	Urea %	P_2O_5 %	K_2O %	
Osmocote Bloom	13-07-18+1.5MgO+TE	2 - 3	13	5.2	6.9	0.9	7	18	
Osmocote Bloom	15-06-18+TE	2 - 3	15	6.5	7.6	1.0	6	18	

Osmocote® Start

Name	Analysis	Longevity in months at 21°C	N %	NO_3-%	NH_4+ %	Urea %	P_2O_5 %	K_2O %	
Osmocote Start	11-11-17+2MgO +TE	6 weeks	11	4.5	6.5	0.0	11	17	

Osmocote® N

Name	Analysis	Longevity in months at 21°C	N %	NO_3-%	NH_4+ %	Urea %	P_2O_5 %	K_2O %	
Osmocote N	38-0-5	5-6	38			38.0	0	5	

Ficote® Total

Name	Analysis	Longevity in months at 21°C	N %	NO_3-%	NH_4+ %	Urea %	P_2O_5 %	K_2O %	
FicoteTotal	17-09-11+2MgO+TE	3 - 4	17	7.6	9.4	0.0	9	11	
FicoteTotal	17-09-11+2MgO+TE	5 - 6	17	7.6	9.4	0.0	9	11	
FicoteTotal	17-09-11+2MgO+TE	8 - 9	17	7.6	9.4	0.0	9	11	
FicoteTotal	17-09-10+2MgO+TE	12 - 14	17	7.6	9.4	0.0	9	10	

	MgO %	SO_3 %	Fe % Total	Fe % EDTA	Mn %	Zn %	Cu %	B	Mo %	Granule size mm
	2.0	13.0	0.30	0.06	0.04	0.011	0.037	0.01	0.015	2.0-4.5 mm
	2.0	13.0	0.33	0.06	0.05	0.020	0.043	0.02	0.016	2.0-4.5 mm
	2.0	12.0	0.33	0.06	0.05	0.020	0.041	0.02	0.016	2.0-4.5 mm
	2.0	13.0	0.35	0.07	0.05	0.014	0.045	0.02	0.017	2.0-4.5 mm
	3.0	18.0	0.20		0.03	0.008	0.050			2.0-4.5 mm
	3.0	18.0	0.20		0.03	0.008	0.050			2.0-4.5 mm
	2.0	20.0	0.20	0.04	0.03	0.012	0.035	0.01	0.010	2.0-4.5 mm
	2.0	20.0	0.20	0.04	0.03	0.012	0.035	0.01	0.010	2.0-4.5 mm

	MgO %	SO_3 %	Fe % Total	Fe % EDTA	Mn %	Zn %	Cu %	B %	Mo %	Granule size mm
	1.5	19.0	0.35	0.07	0.05	0.021	0.052	0.017	0.017	1.0-2.5 mm
	0.0	16.0	0.30	0.30	0.04	0.010	0.024	0.010	0.010	1.0-2.5 mm

	MgO %	SO_3 %	Fe % Total	Fe % EDTA	Mn %	Zn %	Cu %	B %	Mo %	Granule size mm
	2.0	17.0	0.38	0.17	0.05	0.014	0.090	0.01	0.009	1.0 - 2.23 mm

	MgO %	SO_3 %	Fe % Total	Fe % EDTA	Mn %	Zn %	Cu %	B %	Mo %	Granule size mm
										2.0 - 4.5 mm

	MgO %	SO_3 %	Fe % Total	Fe % EDTA	Mn %	Zn %	Cu %	B %	Mo %	Granule size mm
	2.0	0.0	0.22	0.04	0.03	0.008	0.025	0.01	0.010	2.0-4.5 mm
	2.0	0.0	0.26	0.05	0.04	0.013	0.033	0.01	0.013	2.0-4.5 mm
	2.0	0.0	0.25	0.05	0.03	0.015	0.032	0.01	0.012	2.0-4.5 mm
	2.0	0.0	0.21	0.05	0.03	0.013	0.032	0.01	0.011	2.0-4.5 mm

ICL topdress products*

Name	Analysis	Longevity in months at 21 °C	N %	NO_3-%	NH_4+ %	Urea %	P_2O_5 %	K_2O %	CaO %	
Greenfix	15-5-14+6CaO+2MgO	8 weeks	15		1.2	12.9	5	14	6	
OsmoTop	22-05-10+2MgO	2 - 3	22	0.0	0.7	21.3	5	10		
Osmocote Topdress FT	22-05-06+2MgO	4 - 5	22	4.8	5.9	11.3	5	6		
Osmocote Topdress	19-06-11+2MgO	5 - 6	19	8.4	9.5	0.0	6	11		
Osmocote Topdress	18-7-9+2MgO+3FE	8 - 9	18	7.1	8.6	2.3	7	9		

**products contain partly uncoated granules for immediate nutrient availability*

Osmoform®

Name	Analysis	Nutrient supply in weeks	N %	NO_3-%	NH_4+ %	Urea %	Ureaform % total	Ureaform % sol.	Ureaform % insol. 20°C	Ureaform % insolub.	
Osmoform High N	38-0-0	8 - 10	38	0.0	0.0	7.5	30.5	9.7	9.7		
Osmoform NXT	22-05-11+2MgO+TE	8 - 10	22	0.0	3.0	7.5	11.5	3.8	3.8	3.9	
Osmoform Pre-Mix	18-09-13+2MgO+TE	8 - 10	18	0.0	2.1	1.8	14.1	4.9	4.9	4.8	
Osmoform Permanent	19-07-18+2MgO+TE	8 - 10	19	0.0	1.7	6.5	10.8	3.4	3.4	3.4	

Agroleaf® Power

Product	Formulation	Product Name	Item code	N-total	NO_3-N	NH_4-N	Urea-N	P_2O_5	K_2O	CaO	
Agroleaf Power	31-11-11+TE	High N	2095	31	1.0		30.0	11	11		
Agroleaf Power	20-20-20+TE	Total	2096	20	4.3	2.2	13.5	20	20		
Agroleaf Power	15-10-31+TE	High K	2097	15	9.0	1.7	4.3	10	31		
Agroleaf Power	12-52-5+TE	High P	2094	12		8.7	3.3	52	5		
Agroleaf Power	12-5-19+9CaO+2.5MgO+TE	Calcium	2098	12	11.6	0.4		5	19	9.0	
Agroleaf Power	10-5-10+16MgO+32SO3+TE	Magnesium	2099	10	2.0		8.0	5	10		

	MgO %	SO_3 %	Fe % Total	Mn %	Zn %	Cu	B %	Mo %	Granule size mm
	2.0	28.0	0.000	0.000	0.000	0.000	0.000	0.000	1.0-2.5 mm
	2.0	12.3	0.500	0.500	0.000	0.050	0.000	0.000	1.2-1.7 mm
	2.0	18.0	0.800	0.300	0.100	0.050	0.000	0.000	1.0-2.5 mm
	2.0	10.0	0.500	0.000	0.000	0.000	0.000	0.000	2.0-4.5 mm
	2.0	11.0	3.000	0.000	0.000	0.000	0.000	0.000	2.0-4.0 mm

	P_2O_5 %	K_2O %	MgO %	SO_3 %	Fe % Total	Fe % EDTA	Mn %	Zn %	Cu %	B %	Mo %	Granule size mm
	0	0	0.0	0.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.5-1.7 mm
	5	11	2.0	14.1	0.500	0.000	0.100	0.020	0.020	0.000	0.001	1.2-2.8 mm
	9	13	2.0	14.5	0.100	0.100	0.100	0.020	0.100	0.030	0.010	0.5-1.4 mm
	7	18	2.0	17.3	0.500	0.000	0.100	0.020	0.020	0.000	0.001	1.2-2.8 mm

	MgO	SO_3	Fe DPTA	Mn EDTA	Zn EDTA	Cu EDTA	B	Mo	EC at 1g/l (mS/cm)	Max. solubility (kg/100 l)
		0.8	0.14	0.07	0.070	0.070	0.03	0.001	0.5	2.5
		0.8	0.15	0.07	0.070	0.070	0.03	0.001	0.8	2.5
		0.8	0.16	0.07	0.070	0.070	0.03	0.0012	1.0	2.5
		0.8	0.16	0.07	0.070	0.070	0.03	0.0012	0.7	2.5
	2.5		0.27	0.13	0.034	0.034	0.043	0.020	1.2	2.5
	16.0	32.0	0.14	0.26	0.076	0.076	0.25	0.0011	1.1	2.5

Peters® Excel

Name	Analysis	N %	NO_3-%	NH_4+ %	Urea %	P_2O_5 %	K_2O %	MgO %	CaO %	SO_3 %	
CalMag Grower	15-05-15+7CaO+3MgO +TE	15	11.5	1.4	2.1	5	15	3.0	7.0	0.03	
CalMag Finisher	14-05-21+7CaO+2MgO +TE	14.0	11.6	0.3	2.1	5.0	21.0	2.0	7.0	0.03	
Hard Water Grow Special	18-10-18+2MgO +TE	18	10.3	3.6	4.1	10	18	2.0	0.0	0.10	
Hard Water Finisher	15-10-26+2MgO +TE	15	10.0	1.1	3.9	10	26	2.0	0.0	0.10	
Extra Acidifier	15-14-25 +TE	15	8.7	1.0	5.3	14	25	0.0	0.0	0.00	

Peters® Professional

Name	Analysis	N %	NO_3- %	NH_4+ %	Urea %	P_2O_5 %	K_2O %	MgO %	CaO %	SO_3 %	
Hi-Nitro	31-11-11+TE	31	3.4	2.2	25.4	11	11	0.0	0.0	0.0	
Foliar Feed	27-15-12+TE	27	3.6	2.9	20.5	15	12	0.0	0.0	0.8	
Grow-Mix	21-7-22+3MgO+TE	21	6.3	1.4	13.3	7	22	3.0	0.0	6.3	
Potash Special	20-5-30+TE	20	9.0	1.0	10.0	5	30	0.0	0.0	0.0	
Winter Grow Special	20-10-20 +TE	20	12.1	7.9	0.0	10	20	1.0	0.0	1.7	
Special Formula Low B	20-9-20+TE Low B *	20	12.1	7.9	0.0	9	20	0.9	0.0	1.9	
Allrounder	20-20-20+TE	20	4.5	2.4	13.1	20	20	0.7	0.0	1.5	
Special Purpose Low B	20-19-20+TE Low B *	20	5.5	3.4	11.1	19	20	0.0	0.0	0.5	
Orchid Special	20-12-20+3MgO+TE	20	5.3	1.8	12.9	12	20	3.0	0.0	6.1	
Special Formula Low Zn	20-11-20+3MgO+TE Low Zn *	20	5.4	1.5	13.1	11	20	3.0	0.0	6.2	
All Purpose	18-6-12+2MgO	18	9,9	9,9	8,1	6	18	2,0	0,0	39,9	
Poinsettia Mix	17-7-27+2MgO+TE	17	11.9	5.1	0.0	7	27	2.0	0.0	4.0	
Pot Plant Special	16-11-32+TE	16	9.2	2.1	4.7	11	32	0.0	0.0	0.0	
Potassium Booster	13-0-45+TE	13	13.0	0.0	0.0	0	45	0.0	0.0	0.0	
Special Formula Low B	13-0-45+TE Low B *	13	13.0	0.0	0.0	0	45	0.0	0.0	0.5	
Blossom Booster	10-30-20+2MgO+TE	10	5.2	4.8	0.0	30	20	2.0	0.0	4.0	
Plant Starter	10-52-10+TE	10	0.3	7.4	2.3	52	10	0.0	0.0	0.1	
Plant Finisher	9-10-38+3MgO+TE	9	9.0	0.0	0.0	10	38	3.0	0.0	6.3	
Power P	9-41-25+TE	9	0.3	0.3	8.4	41	25	0.0	0.0	0.0	
Combi-Sol	6-18-36+3MgO+TE	6	6.0	0.0	0.0	18	36	3.0	0.0	7.0	
Special Formula Low B/Zn	6-17-36+3MgO+TE Low B/Zn *	6	6.0	0.0	0.0	17	36	3.0	0.0	7.3	

* Peters Professional Low B, Low Zn, don't have added B and/or Zn. By nature some raw matarials can contain low levels of B and/or Zn.

	Fe % DTPA	Mn % EDTA	Zn % EDTA	Cu % EDTA	B %	Mo %	EC mS 0mg/l HCO_3^-	EC mS 50mg/l HCO_3^-	EC mS >150mg/l HCO_3^-	Solub gr/l (25°C)	Acidity mg/l HCO_3^-	A/B kg/kg $CaCO_3$
	0.120	0.060	0.015	0.015	0.020	0.010	1.3	1.0		460	45	0.058
	0.120	0.060	0.015	0.015	0.020	0.010	1.3	1.0		320	46	0.120
	0.120	0.060	0.015	0.015	0.020	0.010			0.9	350	88	-0.155
	0.120	0.060	0.015	0.015	0.020	0.010			0.9	300	84	-0.018
	0.120	0.060	0.015	0.015	0.020	0.010			0.9	250	124	-0.093

	Fe % DTPA	Mn % EDTA	Zn % EDTA	Cu % EDTA	B %	Mo %	EC mS >150mg/l HCO_3^-	Solub gr/l (25°C)	A/B kg/kg $CaCO_3$
	0.120	0.060	0.015	0.015	0.020	0.010	0.5	450	-0.512
	0.150	0.070	0.070	0.070	0.030	0.001	0.6	490	-0.466
	0.120	0.060	0.015	0.015	0.020	0.010	0.8	350	-0.204
	0.120	0.060	0.015	0.015	0.020	0.010	1.0	350	-0.070
	0.120	0.060	0.015	0.015	0.020	0.010	1.2	450	-0.206
	0.120	0.060	0.015	0.015	0.000	0.010	1.2	450	-0.214
	0.120	0.060	0.015	0.015	0.020	0.010	0.8	400	-0.285
	0.120	0.060	0.015	0.015	0.000	0.010	0.8	450	-0.281
	0.250	0.060	0.015	0.015	0.020	0.010	0.9	300	-0.230
	0.250	0.060	0.000	0.015	0.020	0.010	0.9	350	-0.221
	0,100	0,020	0,005	0,005	0,010	0,002	1,4	250	-0,690
	0.120	0.050	0.054	0.009	0.010	0.068	1.4	300	-0.066
	0.120	0.060	0.015	0.015	0.020	0.010	1.0	320	-0.039
	0.120	0.060	0.015	0.015	0.020	0.010	1.3	250	0.240
	0.120	0.060	0.015	0.015	0.000	0.010	1.3	250	0.242
	0.120	0.060	0.015	0.015	0.020	0.010	1.0	300	-0.181
	0.120	0.060	0.015	0.015	0.020	0.010	0.8	350	-0.452
	0.250	0.060	0.015	0.015	0.020	0.010	1.3	300	0.169
	0.120	0.060	0.016	0.016	0.020	0.010	0.7	210	-0.184
	0.250	0.060	0.015	0.015	0.020	0.010	1.1	300	0.124
	0.250	0.060	0.000	0.015	0.000	0.010	1.1	300	0.124

Universol®

Name	Analysis	NPK Ratio	N %	NO_3- %	NH_4+ %	Urea %	P_2O_5 %	K_2O %	MgO %	CaO %	SO_3 %	Fe % Total	
Universol Green	23-06-10+2.7MgO +TE	412	23	11.6	11.0	0.4	6	10	2.7	0.0	9.4	0.10	
Universol Special P	19-6-27+TE	-	19	12.0	5.9	1.1	6	27	0.0	0.0	2.4	0.10	
Universol Blue	18-11-18+2.5MgO +TE	323	18	9.9	7.7	0.4	11	18	2.5	0.0	8.3	0.10	
Universol Orange	16-05-25+3.4MgO +TE	315	16	10.4	5.2	0.4	5	25	3.4	0.0	11.0	0.10	
Universol White	15-00-19+9CaO+2MgO +TE	405	15	13.3	1.6	0.0	0	19	2.0	9.0	0.0	0.10	
Universol Yellow	12-30-12+2.2MgO +TE	131	12	3.0	8.6	0.4	30	12	2.2	0.0	15.0	0.10	
Universol Violet	10-10-31+3.3MgO +TE	226	10	6.8	2.8	0.4	10	31	3.3	0.0	15.5	0.10	
Universol Special 104	09-3-39+3.5MgO +TE	104	9	8.2	0.4	0.4	3	39	3.5	0.0	17	0.10	
Universol Special 127	5-10-36+5MgO +TE	127	5	5.0	0.0	0.0	10	36	5.0	0.0	18.8	0.12	
Universol Basis	04-19-35+4.1MgO +TE	159	4	4.0	0.0	0.0	19	35	4.1	0.0	18.0	0.12	
Universol Soft Water 312R	18-7-12+6CaO+2MgO + TE	312	18	12.0	4.9	1.1	7	12	2.0	6.0	0.0	0.120	
Universol Soft Water 213R	14-7-22+5CaO+2MgO +TE	213	14	11.7	2.3	0.0	7	22	2.0	5.0	0.0	0.120	
Universol Soft Water 113R	11-11-31+2CaO+2MgO +TE	113	11	9.8	0.0	1.2	11	31	2.0	2.0	0.0	0.120	
Universol Hard Water 211	23-10-10+2MgO +TE	211	23	11.0	8.0	4.0	10	10	2.0	0.0	4.0	0.120	
Universol Hard Water 225	11-10-28+2MgO +TE	225	11	5.4	1.7	3.9	10	28	2.0	0.0	17.2	0.320	
Universol Hard Water 212	19-11-19 +TE	212	19	9,5	5,1	4,4	11	19	0,0	0,0	3,9	0,200	
Universol Hard Water Special 111	18-18-18 +TE	111	18	10,8	7,2	0,0	18	18	0,0	0,0	0,0	0,120	
Universol Hard Water Special 151	10-50-10+TE	151	10	2,2	7,8	0,0	50	10	0,0	0,0	0,0	0,120	
Universol Hard Water Special 115	9-9-41 +TE	115	9	8,6	0,4	0,0	9	41	0,0	0,0	6,5	0,120	
Universol Hard Water Special 146	6-21-35 +2MgO +TE	146	6	5,6	0,4	0,0	21	35	2,0	0,0	10,0	0,120	

Micromax®

Name	SO_3 %	MgO %	Fe %	
Micromax Premium	40	12	15.0	

Micromax® WS

Name	Analysis	Fe % total	Fe % EDTA	Fe % DTPA	Fe % EDDHA	
Micromax WS Iron	6% Fe-EDDHA	7	0	0	7	
Micromax WS TE-Mix	Cu-EDTA + Fe-EDTA & DTPA + Mn-EDTA + Zn-EDTA + Mo + B	7.8	5.4	2.4	0	

	Fe % EDTA	Fe % DTPA	Fe % EDDHA	Mn % EDTA	Zn % EDTA	Cu % EDTA	B %	Mo %	EC mS (25°C) 0mg/l HCO_3^-	EC mS (25°C) 50mg/l HCO_3^-	EC mS (25°C) >150mg/l HCO_3^-	Solub gr/l (25°C)	Acidity mg/g HCO_3^-	A/B kg/kg $CaCO_3$	Typical pH 1 g/l 0.1%solu.	Acidifying. Neutral or Alkaline in growing media
	0.10	0.00	0.00	0.04	0.010	0.010	0.01	0.001	1.5			250	10	-0.400	4.1	Acidifying
	0.10	0.00	0.00	0.04	0.010	0.010	0.01	0.001	1.4			140	25	-0.128	5.4	Neutral-slightly acidifying
	0.10	0.00	0.00	0.04	0.010	0.010	0.01	0.001	1.3			350	10	-0.255	3	Acidifying
	0.10	0.00	0.00	0.04	0.010	0.010	0.01	0.001	1.4			320	10	-0.114	3.8	Neutral-slightly acidifying
	0.10	0.00	0.00	0.04	0.010	0.010	0.01	0.001	1.2			450	7	0.154	5.2	Neutral-slightly alkaline
	0.10	0.00	0.00	0.04	0.010	0.010	0.01	0.001	1.2			250	10	-0.446	4.1	Acidifying
	0.10	0.00	0.00	0.04	0.010	0.010	0.01	0.001	1.3			300	10	-0.048	3.8	Neutral
	0.10	0.00	0.00	0.04	0.010	0.010	0.01	0.001	1.3			200	10	0.105	4.1	Neutral-slightly alkaline
	0.00	0.08	0.04	0.08	0.020	0.020	0.02	0.002	1.3			95	9	-0.097	3.9	Neutral-slightly acidifying
	0.00	0.08	0.04	0.08	0.020	0.020	0.02	0.002	1.2			250	-	0.072	4.5	Neutral
				0.040	0.010	0.010	0.010	0.001	1.3	1.2		360	26	-0.090	3.7	Neutral
				0.040	0.010	0.010	0.010	0.001	1.3	1.2		240	20	0.074	3.9	Neutral
				0.040	0.010	0.010	0.010	0.001	1.1	1.1		230	27	0.136	3.7	Neutral-slightly alkaline
				0.040	0.010	0.010	0.010	0.001		1.4	1.3	330	89	-0.381	3.0	Acidifying
				0.040	0.010	0.010	0.010	0.001		1.3	1.2	238	89	-0.139	3.0	Neutral-slightly acidifying
				0,040	0,010	0,010	0,010	0,001	1,6			290	106	-0,276	2,8	Acidifying
				0,040	0,010	0,010	0,010	0,001	1,5			310	77	-0,261	3,1	Acidifying
				0,040	0,010	0,010	0,010	0,001	1,0			200	49	-0,427	3,5	Acidifying
				0,040	0,010	0,010	0,010	0,001	1,3			250	31	0,121	3,5	Neutral-slightly alkaline
				0,040	0,010	0,010	0,010	0,001	1,3			190	51	0,039	3,3	Neutral

	Mn %	Zn %	Cu %	B %	Mo %
	2.5	1.0	1.0	0.20	0.04

	Mn % EDTA	Zn % EDTA	Cu % EDTA	B %	Mo %
	0	0	0	0	0
	2.6	1.3	0.5	0.7	0.32

4.2
Mixability Tables Universol

All Universol products within the standard range (recognizable by the color in the product name) can be mixed in a stock solution tank. In the tables below you can find the analysis of the mix by combining two products mixed in mentioned ratio. In this way you can tweak the NPK analysis you want to give to your plants. Note: Universol Hard & Soft water cannot be mixed with the Universol standard range.

Universol Blue	Analysis after combining 2 products	Universol Green
0%	23-6-10+2.7MgO+TE	100%
10%	23-7-11+2.7MgO+TE	90%
20%	22-7-12+2.7MgO+TE	80%
30%	22-8-12+2.7MgO+TE	70%
40%	21-8-13+2.6MgO+TE	60%
50%	21-9-14+2.6MgO+TE	50%
60%	20-9-15+2.6MgO+TE	40%
70%	20-10-16+2.6MgO+TE	30%
80%	19-10-16+2.6MgO+TE	20%
90%	19-11-17+2.5MgO+TE	10%
100%	18-11-18+2.5MgO+TE	0%

Universol Blue	Analysis after combining 2 products	Universol Orange
0%	16-5-25+3.4MgO	100%
10%	16-6-24+3.3MgO	90%
20%	16-6-24+3.2MgO	80%
30%	17-7-23+3.1MgO	70%
40%	17-7-22+3MgO	60%
50%	17-8-22+2.9MgO	50%
60%	17-9-21+2.9MgO	40%
70%	17-9-20+2.8MgO	30%
80%	18-10-19+2.7MgO	20%
90%	18-10-19+2.6MgO	10%
100%	18-11-18+2.5MgO	0%

Universol Blue	Analysis after combining 2 products	Universol Violet
0%	10-10-31+3.3MgO	100%
10%	10-10-29+3.2MgO	90%
20%	12-10-28+3.1MgO	80%
30%	12-10-27+3.1MgO	70%
40%	13-10-26+3MgO	60%
50%	14-11-25+2.9MgO	50%
60%	15-11-23+2.8MgO	40%
70%	16-11-22+2.7MgO	30%
80%	16-11-20+2.7MgO	20%
90%	17-11-19+2.6MgO	10%
100%	18-11-18+2.5MgO	0%

Universol Violet	Analysis after combining 2 products	Universol Orange
0%	16-5-25+3.4MgO	100%
10%	15-6-26+3.4MgO	90%
20%	15-6-26+3.4MgO	80%
30%	14-7-27+3.4MgO	70%
40%	14-7-27+3.4MgO	60%
50%	13-8-28+3.4MgO	50%
60%	12-8-29+3.3MgO	40%
70%	12-9-29+3.3MgO	30%
80%	11-9-30+3.3MgO	20%
90%	11-10-30+3.3MgO	10%
100%	10-10-31+3.3MgO	0%

Universol Violet	Analysis after combining 2 products	Universol Green
0%	23-6-10+2.7MgO	100%
10%	22-6-12+2.8MgO	90%
20%	20-7-14+2.8MgO	80%
30%	19-7-16+2.9MgO	70%
40%	18-8-18+2.9MgO	60%
50%	17-8-21+3MgO	50%
60%	15-8-23+3.1MgO	40%
70%	14-9-25+3.1MgO	30%
80%	13-9-27+3.2MgO	20%
90%	11-10-29+3.2MgO	10%
100%	10-10-31+3.3MgO	0%

Universol Orange	Analysis after combining 2 products	Universol Green
0%	23-6-10+2.7MgO	100%
10%	22-6-12+2.8MgO	90%
20%	22-6-13+2.8MgO	80%
30%	21-6-15+2.9MgO	70%
40%	20-6-16+3MgO	60%
50%	20-6-18+3.1MgO	50%
60%	19-5-19+3.1MgO	40%
70%	18-5-21+3.2MgO	30%
80%	17-5-22+3.3MgO	20%
90%	17-5-24+3.3MgO	10%
100%	16-5-25+3.4MgO	0%

Section V
People & organization

Contents

5.1 Our vision: Impact on a sustainable future

ICL vision is to make a impact in the world of agriculture, ornamental horticulture, turf & landscape and advancing humanity for a sustainable future. Everything we do is focused on one aim: Making plants, crops and grass grow better.

We leverage state-of-the-art precision nutrition and technologies to ensure maximum growth. But we understand that growth must never come at the expense of the environment. That's why our mantra is: grow more and better with less. We make this possible by offering a range of products that includes innovative technologies such as controlled and slow release fertilizers, and a leading range of water-solubles, plant protection products, and growth enhancers.

We are committed to excellence in quality assurance, research & development, sustainability and corporate social responsibility. These areas are interrelated because they all entail providing the very best for people and the planet. Our dedication to quality assurance extends across the entire process from the supply of raw materials to delivery. In keeping with this, we focus on continually improving our environmental, health and safety performance.

We are proud to have been awarded the RHP certificate, the leading quality hallmark in horticulture. This is further proof that our products meet the highest safety and quality standards. We partner with you as our customer to fulfil our vision and live up to our commitment of creating a better and greener world.

5.2

For a greener future

As a globally leading fertilizer manufacturer, ICL fully recognizes the importance of responsible environmental protection and sustainable practice.

Responsible Care®

We are a member of the Responsible Care® Program that is dedicated to achieving improvements in environmental global health, safety, and environmental performance. We are a signatory to the principles of the Responsible Care Global Charter of the International Council of Chemical Associations.

Environmental Policy

ICL believes in working together for a greener and more sustainable future. We embrace our responsibility to promote a sustainable environment and have established an environmental policy based on three core values:

1 Protecting the environment

ICL avoids processes that generate gaseous pollutant emissions and installs closed circuits for wastewater recycling.

We are also committed to providing all our employees with the required training and tools to operate in an environmentally-responsible manner. It is our duty to protect the environment and we aim to reduce energy and water consumption.

2 Monitoring environmental impact

We are committed to assessing the environmental impact of all our processes. We also actively invest in new cleaner and safer technologies to improve production efficiency and reduce energy consumption.

3 Promoting best agronomic practices

We promote best agronomic practices in order to ensure the safe and optimum use of fertilizers. We promote tailor-made application methods so that the dose precisely matches the plant's specific needs. In addition, we advise our customers on the best way to transport, store, and handle our products with consideration for the environment.

These principles encompass:

- Product stewardship
- Responsibility for environmental risk management
- Increased transparency across the supply chain
- Contribution to sustainable development
- Increased dialogue with stakeholders and external controls
- Environmental Policy

ICL & GLOBALG.A.P.

ICL is an Associate Member of GLOBALG.A.P. and in this role supports this worldwide organization to achieve its crucial objective: the promotion of safe and sustainable agriculture practices to make this world a better place for future generations.

GLOBALG.A.P. is a network of partnerships that extends around the globe. By complying with a single harmonized global standard for safe and sustainable food production, producers can demonstrate their commitment to Good Agricultural Practice.

GLOBALG.A.P. MEMBER

5.3 Grow more with less

Less fertilizer per hectare with much lower emissions

Since the first development of Osmocote products in 1967, our goal has been to provide plants with all essential nutrients throughout the growth cycle, while minimizing leaching and loss of fertilizer. This goal is more relevant today than ever. The European Water Framework Directive was established in 2000 to clean up lakes, rivers and groundwater. For the agriculture and horticulture industries, this means strict rules for the amount of nitrates and phosphates that factories can release into bodies of water or the ground.

When water-soluble fertilizers are administered via a sprinkler system, part of the nutrients miss the pots and are absorbed by the surrounding soil. They eventually move into the surface water. A portion of the nutrients also drain out of the pots. 70% of water-soluble nutrients are wasted in total because they don't end up where they need to be.

Osmocote is mixed into the growing medium or applied directly into plant holes. The nutrients get where they need to go and significantly less fertilizer is leached and wasted. Osmocote releases the nutrients exactly where and when they are needed. You will see a noticeable difference and your plants will benefit greatly.

ICL's mission for sustainable plant nutrition

e3
EFFICIENCY · ECONOMY · ECOLOGY

Efficiency

- ✓ **Improving nutrition delivery and efficiency**

Economy

- ✓ **Reducing fertilizer, labor and resource input**
- ✓ **Generating optimal yield per season**

Ecology

- ✓ **Minimizing nutrient loss through the optimal location of the fertilizer**

5.4

ICL Research & Development

Working on future fertilizer technology

ICL's research & development facilities are among the world's best. Our research teams are dedicated to develop new products and innovative technologies that improve the environmental profile of our plant nutrition and maintenance products and services.

ICL invests in research and development each year as well as in the training of our employees.
Over 60 years of experience in the development and application of has enabled us to evolve into a leader in plant nutrition and a professional partner for the green sector. ICL trials its products extensively in different cultivation situations and climates in Europe, Asia, Pacific and USA. The insights gained from the results form the basis for the safe use of our products and for the further development of existing and new technologies and solutions.

The rewards of ICL's research and development activities are twofold: maximising customers' returns on investment while respecting the environment.

ICL's technical advisor teams bring this knowledge and expertise to you. Our local teams are at your service throughout the year for advice tailored to your situation. Our optimal fertilizer plans ensure you can grow quality plants with the best return on fertilizer investment.

Our experts work with customers to develop best fertilization practices which enable them to use our products in an optimum and environmentally friendly way. In keeping with our pledge to sound environmental stewardship, we implemented the Environmental Management System in compliance with the international standard ISO 14001.

5.5
ICL around the globe

The ICL controlled release fertilizer factory in Heerlen, The Netherlands.

Our commitment to a greener world spans the globe. Every day and around the world, our experts in the field work with end users to optimize plant nutrition and provide advice, know-how and expertise on location.

This combination of technology and a down-to-earth personal touch are the seeds of ICL's success.

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Making plants
grow better

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Impact for a **sustainable future**

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