

Agromaster®



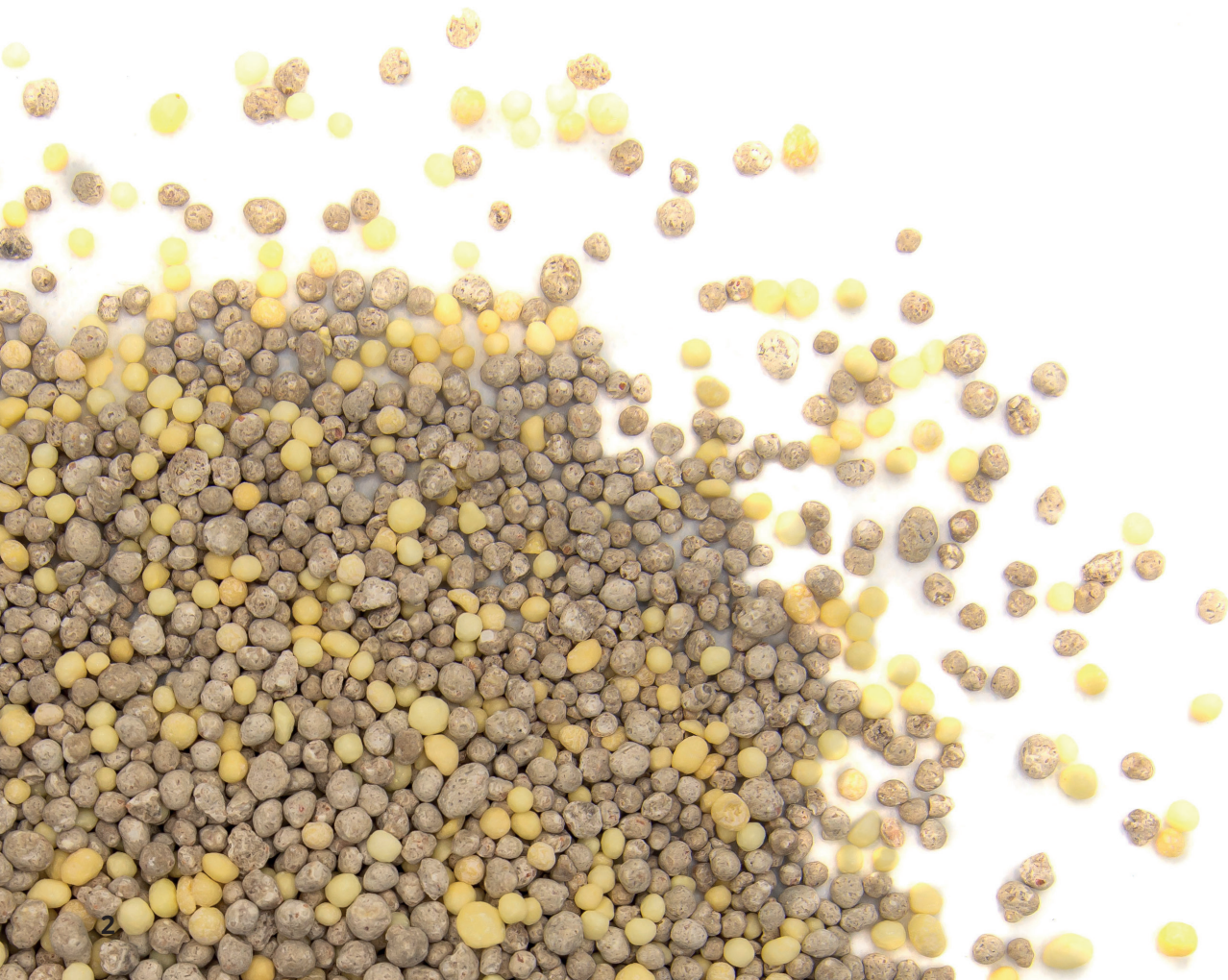
Master crop nutrition in any condition

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AICL Specialty
Fertilizers

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Less is more with controlled release fertilizers

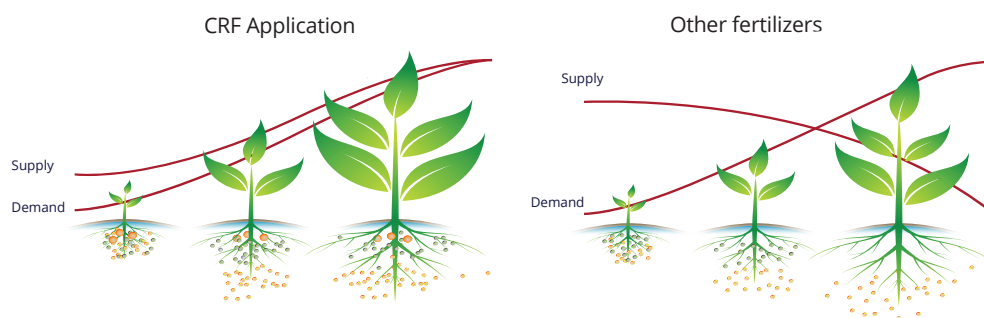
Modern agriculture needs to produce more with less inputs. Fertilizers now and in future must be able to increase yields without increasing the required nutrient input to reach those results.

Controlled Release Fertilizers (CRF) play an important role in improving yield, reducing nutrient losses and simplifying fertilizer application.

These products help to regulate the nutrient levels through the entire plant's growth cycle. Younger plants are not

harmed or stressed from excess salt levels, while mature plants have enough nutrition to last until the end of the growth cycle. One application of CRF delivers targeted nutrition that leads to healthy plants, uniform growth and optimal yield. Maximum results with minimal effort.

With CRF, the nutrient supply matches the demand of the plants to give both optimal growth and nutrient efficiency.



Learn more about
controlled release fertilizers.
Visit icl-sf.com/agromaster/





Lower your environmental impact with Agromaster

Using Agromaster on every 10.000 ha of cultivated land reduces CO₂ footprint equal to:



1496
circles around
the world in
an average car



planting
387.664
trees



the
emissions
of **1108**
European citizens
in a year

This Life-Cycle Analysis was executed by Blonk Consultants using General LCA standard ISO 14040-14044, Agri-Footprint 4.0, and the Product Environmental Footprint (PEF) method developed by the European Commission.

Please note that the results of this study have not yet been ISO 14040-14044 critically reviewed.

Nutrients, yield, and the environment: you're in control with Agromaster

A combination of ICL Specialty Fertilizers' advanced coating technology and specially selected conventional granules, make Agromaster a controlled-release fertilizer that masters even the hardest circumstances. Whatever the weather, your crop or the condition of the soil, you have the nutrient supply under control. You can count on this easy-to-use fertilizer's high yields and environmental compliance. Especially in spring and autumn when rainfall is heavy it can be difficult to apply nutrition effectively with any other fertilizer product.

Benefits of Agromaster

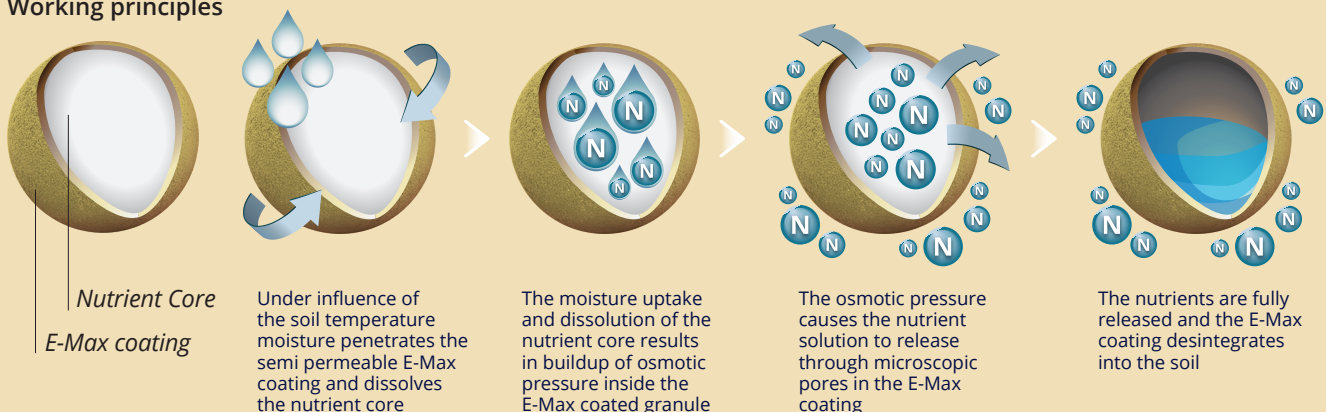
- 1 Higher or equal yield with less mineral input thanks to continual feeding
- 2 Less applications = less costs
- 3 Better for the environment thanks to reduced leaching, volatilization and denitrification
- 4 Separate fertilization and irrigation and be in control of both
- 5 You're in control of fertilization even in hard weather conditions



E-Max Release Technology

E-Max release technology is a polymer coating which improves nutrient use efficiency. The release of nutrients is based upon moisture and temperature, offering predictable longevities. Influenced by the temperature, the semi-permeable coating regulates the daily release of nutrients. At higher temperatures the release of nutrients will be faster. At lower temperatures it will be slower, in line with the nutritional needs of the plant.

Working principles



Improved Nitrogen Use Efficiency



Nitrogen Use Efficiency (NUE) plays a key role in future-proof agriculture and should be considered when evaluating different fertilizers.

Nitrogen is the nutrient applied at highest rates in agriculture. According to the Food and Agriculture Organization of the United Nations (2017), total nitrogen demand for fertilizers will reach 118.8 million MT in 2020. Globally, nitrogen use efficiency (NUE) for cereal production is estimated at merely 33-40%. The unaccounted 60-67%

represents ~\$20 billion annual loss of N fertilizer, by soil denitrification, volatilization, surface runoff, and leaching (William & Johnson, 1999). The highest loss rates of any nutrient in agriculture. The fraction that is lost from the cropping system is the source of much of the environmental pollution associated with fertilization.

CRF reduces nitrogen losses through leaching, volatilization, and denitrification

1 Less leaching

Applying fertilizers with an immediate nitrogen release creates a high concentration of this nutrient in the soil. But plants will not take up more nitrogen than they need.

Excess nitrogen is lost through leaching: it 'washes away' in the soil. CRF solve this issue thanks to their gradual nitrogen release that closely matches plant demand.

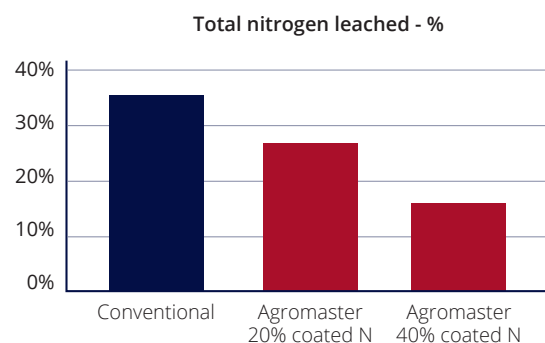
Trial case

Agromaster with E-Max vs. conventional nitrogen fertilizer

Trial was done in 2015-2017 at the University of Pisa (Italy), under the supervision of Prof. Pardossi.

Treatments:

- Conventional nitrogen fertilizer
- Agromaster, 20% coated N, 3-4M longevity
- Agromaster, 40% coated N, 3-4M longevity



Conclusion:

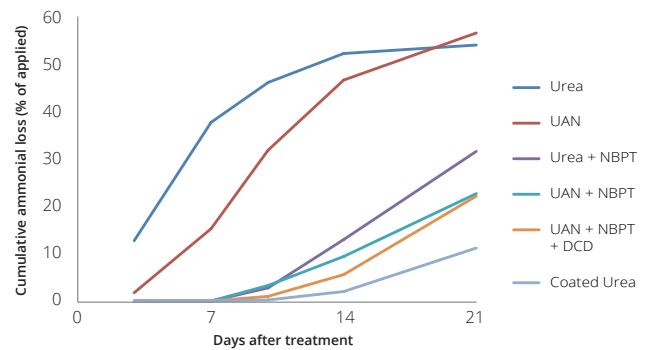
From the 360 kg N/ha supplied:
127 kg N was lost in the Conventional treatment
97 kg N with Agromaster, 20% coated N
57 kg N with Agromaster, 40% coated N



2 Less volatilization

Ammonia gases can be lost through volatilization when urea/ammonium fertilizers are applied superficially and exposed to air. Surface volatilization depends on moisture level, temperature and the surface pH of the soil. Moist soil surfaces, temperatures higher than 10°C and pH levels over 6.5 significantly increase volatilization. Nitrogen in CRF is encapsulated inside the coating, and so is not exposed to air.

Trial case - Volatilization of different nitrogen sources



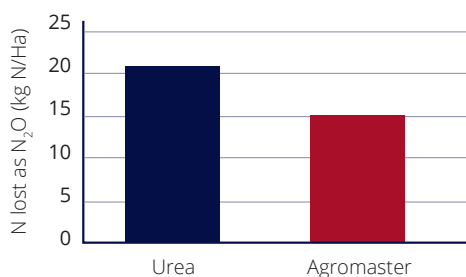
In a laboratory incubation of 21 days done by the University of Illinois, it was observed that Coated Urea had clearly the lowest amount of NH₃ volatilization. By the end of the experiment, Urea with urease inhibitor (NBPT) had 3 times more volatilization and UAN (Urea ammonium nitrate) with both urease and nitrification inhibitors had 2 times more volatilization!

3 Less denitrification

When a soil does not have enough oxygen to supply the bacteria and microorganisms in the soil, the microorganisms strip oxygen from nitrate. This process, called denitrification, produces nitrogen gas or nitrous oxide which volatilizes from the soil. Denitrification is worse in wet

or compacted soils, and in warm temperatures. CRF reduce denitrification thanks to gradual N release, minimizing the time N is in the soil before plant uptake. And with only one application of CRF needed, less heavy machinery needs to enter the field, so soil compaction decreases.

Trial case - Nitrous oxide (N₂O) emissions. - Agromaster with E-Max vs Urea



These results are the average from a series of trials done between 2012-2015 in Queensland, Australia. The measurements were done in sugar cane fields with gas collection chambers.

Conclusion:
Average 27% reduction in nitrous oxide emissions (average of 4 sites). Up to 40% reduction in high loss scenarios (saving 19.5 kg N/ha).

Controlled release fertilizers provide significant reduction in nitrogen losses



Numerous studies demonstrate that CRF provide significant reduction in nitrogen losses and can considerably increase nutrient use efficiency, increase yields, and quality.

Measuring NUE

The following measuring method is used to calculate NUE in trials. This method allows calculation in any trial*.

Term	Calculation	Explanation
Partial factor productivity (PFP)	$PFP = Y/F$	Simplest expression of productivity based on level of nutrient application
Y = Yield		
F = Application rate of said nutrient		

*it does not account for soil fertility, so values may vary greatly from location to location.

Rice

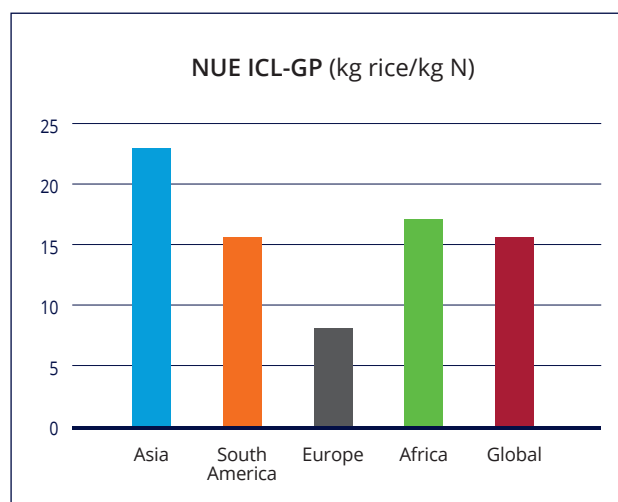
Agromaster can substantially improve yield and nutrient use efficiency in rice cultures. Generally, rice yields are strongly related to nitrogen availability and if the efficiency of the applications can be improved, yields can increase.

Between 2015 and 2019 about 15 official trials have been done around the globe to test the Agromaster concept in comparison to commodity fertilizers. Trials were done on all

continents in which Agromaster was applied at seeding or planting without any additional fertilizer, in comparison to multiple applications with standard fertilizers.

Conclusions

1. Using Agromaster with controlled release nitrogen, as base fertilizer, significantly increased the yields, used at similar or sometimes lower doses than in the conventional practice.
2. This could be explained by the increase in nitrogen use efficiency, which for the case of PFP (Partial Factor Productivity) was on average 29% and yield increased by 12% across the different trials.
3. The increase in nitrogen use efficiency suggests that for some situations, by using Agromaster with controlled release nitrogen, it is possible to reduce the amount of added N without a negative impact on the yields. This will offer farmers a useful tool to comply with legislation that limits the input of fertilizers.





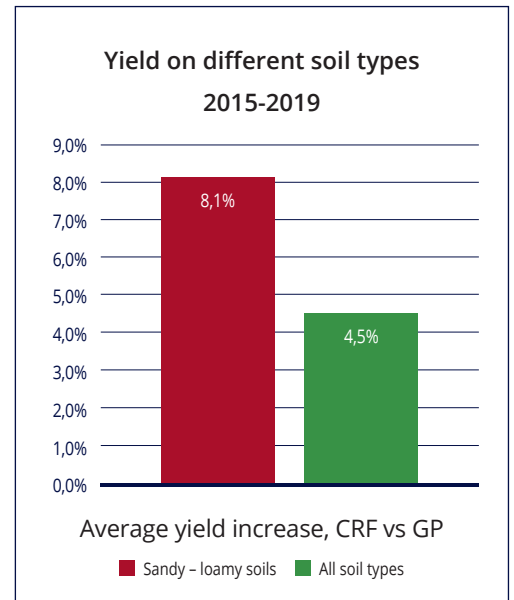
Potatoes

Trials 2015-2019: 14 trials in seed production potatoes & fresh-market potatoes.

- Objective:** Show increased nitrogen use efficiency and increased yield using Agromaster (CRF)
- Locations:** PPO Lelystad, PPO Vredepeel and Trialstation Zwaagdijk (NL)
- Crop:** Seed production potatoes & fresh-market potatoes
- Soil type:** Sandy - loam and other soil types
- Treatments:** Equal dosage of nitrogen (N)/ha by 1 application of CRF versus Grower Practice: 2, 3 or even 4 applications of CAN (calcium ammonium nitrate)

Conclusions

On average 8% yield increase could be obtained from Agromaster versus standard Grower Practice with a very consistent result over seed and fresh market potatoes.



Fruit trees

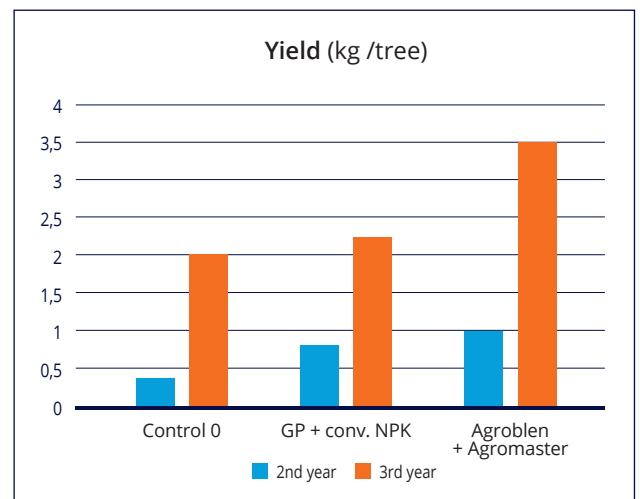
When planting young deciduous fruit trees, direct availability of nutrients in the first year after planting is key to achieve good establishment and subsequent growth. By improving rooting and growth development, trees can grow stronger branches in a shorter time and will generally be able to produce quicker and more fruit.

By using CRF, the total level of nutrients and the number of fertilizer applications could be significantly reduced while achieving equal or even better results.

Conclusions

At planting, the 100% coated nutrients provided by Agroblen allowed a 50% reduction of nitrogen input and number of applications, while improving the total annual shoot growth and trunk diameter by 6% and 24% respectively in the first 2 years.

In the following years, with a 20% reduction of nitrogen in only 1 application, Agromaster provided the best results in terms of number of inflorescences and final yield.



Agromaster Portfolio (Breakdown in %)

This is a selection of typical Agromaster formulations. Contact your local ICL sales adviser for the complete portfolio.

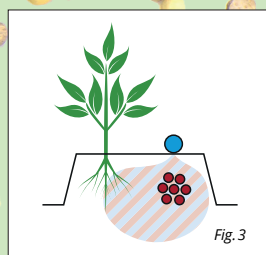
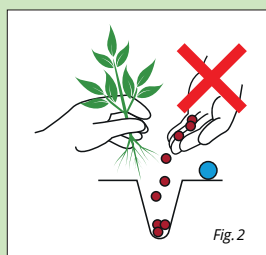
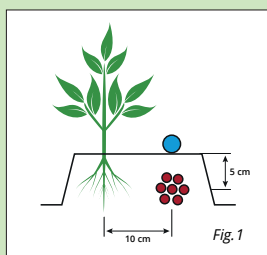
Product	Formulation	Item code	Longevity*	Coated N	Coated P	Coated K
Agromaster Start Mini	8-32-0+5MgO+9SO ₃ +TE**	5079	1-2	72	75	
Agromaster High P Mini	10-43-0	7642	1-2	74	74	
Agromaster Start Mini	12-44-0+5SO ₃	5090	1-2	36	36	
Agromaster Start Mini	21-21-5+2MgO+15SO ₃	5077	2-3	40	0	
Agromaster	12-47-0+1Zn	5144	1-2	35	35	
Agromaster High P	11-48-0	7641	1-2	74	74	
Agromaster	40-0-5	5502	1-2	31		
Agromaster	36-0-0+21SO ₃	5097	1-2	80		
Agromaster	9-6-25+2CaO+5MgO+29SO ₃	5092	1-2	50		
Agromaster	11-8-27+2CaO+13SO ₃	5500	1-2	61		
Agromaster	12-5-20+2CaO+4MgO+35SO ₃	5503	1-2	41		
Agromaster	14-5-18+27SO ₃	5505	1-2	35		
Agromaster	32-19-0	5501	2-3	31		
Agromaster	12-26-9+3MgO+9SO ₃	5074	2-3	36		
Agromaster	15-24-10+2MgO+8SO ₃	5108	2-3	30		
Agromaster	10-5-23+2CaO+5MgO+29SO ₃	5089	2-3	61		
Agromaster	11-8-27+3CaO+ 12.5SO ₃	5504	2-3	62		
Agromaster	11-11-21+14SO ₃	5110	2-3	30		
Agromaster	12-5-20+2CaO+4MgO+35SO ₃	5506	2-3	41		
Agromaster	15-7-15+3MgO+34SO ₃	5111	2-3	30		
Agromaster	15-5-20+3MgO+20SO ₃	5113	2-3	30		
Agromaster	16-10-16+2MgO+27SO ₃	5075	2-3	34		
Agromaster	19-5-20+4MgO+19.5SO ₃	5073	2-3	35		
Agromaster	25-5-10+2MgO+21SO ₃	5076	2-3	33		
Agromaster	15-5-20+3MgO+23SO ₃	5106	3-4	30		
Agromaster	25-5-10+25SO ₃	5102	3-4	30		
Agromaster	17-0-8+3CaO+3MgO+28SO ₃	4286	4-5	81		
Agromaster	27-5-9+21SO ₃	5065	4-5	75		
Agromaster	16-8-16+5MgO+16SO ₃	5018	5-6	94	82	82
Agromaster	22-10-10+4MgO+10SO ₃	5017	5-6	95	51	100
Agromaster	24-0-6+7MgO+24SO ₃ +TE***	5015	5-6	80	0	20
Agromaster	31-0-7+2MgO+8SO ₃ +TE***	5009	8-9	82		47

* Longevity at 21 °C | ** TE = 0.125Cu, 2Fe, 0.75Mn, 0.25Zn | *** TE = 0.012Cu, 0.2Fe, 0.07Mn, 0.025Zn

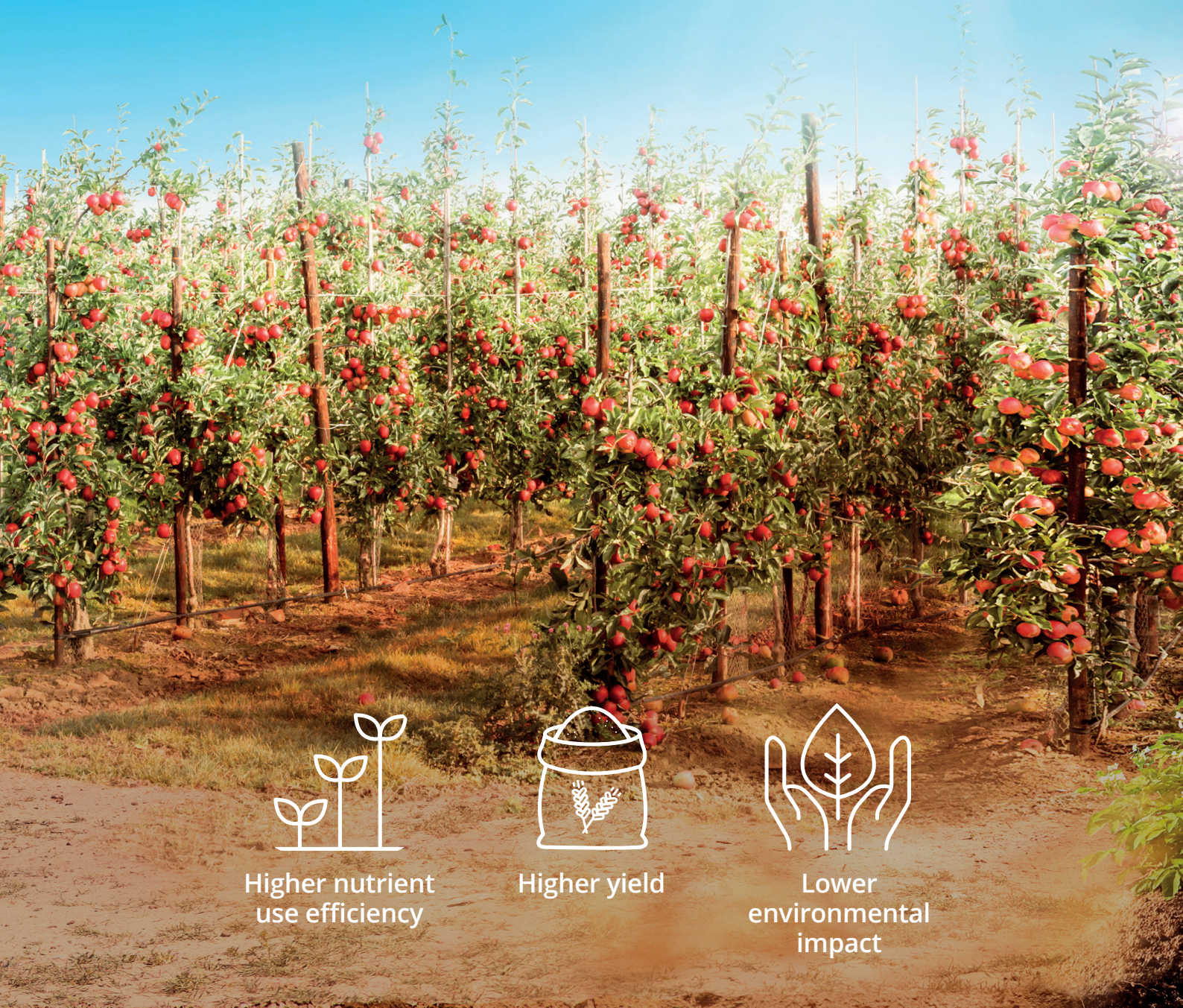
Application recommendations

- Agromaster products are developed for soil grown crops.
- Agromaster can be broadcasted or applied in row, spot or bed.
- When applied in row or spot, make sure the product is 10 cm from the plants (Fig.1).
- The recommended application method depends on the crop and selected product.
- Do not apply Agromaster in the planting hole (Fig.2).
- For best performance, Agromaster should be incorporated into the top 5 cm of the soil.
- Apply Agromaster before seeding/ planting or top-dressing later in the season, according to the plant needs.
- If there is a drip line, apply Agromaster close to the drippers (Fig.3).
- Irrigate well after application.

	N-total	NO ₃ -N	N-NH ₂	NH ₄ -N	P ₂ O ₅	K ₂ O	CaO	MgO	SO ₃	Technologies		
										E-Max	Poly-S	Resin
	8			7,4	32			5	9			✓
	10			10	43							✓
	12			12	44				5			✓
	21		14,2	4,8	21	5		2	15		✓	
	12			12	47	0						✓
	11			11	48							✓
	40		38,4	1,6		5			4	✓		
	36		28,8	7,2					21	✓		
	9	1,8	4,5	2,7	6	25	2	5	29	✓		
	11	0,4	6,8	3,8	8	27	2		13	✓		
	12	1,4	4,9	5,7	5	20	2	4	35	✓		
	14		4,9	8,8	5	18			27	✓		
	32		22,7	9,3	19				4	✓		
	12		5,9	6,1	26	9		3	9	✓		
	15		4,5	10,5	24	10		2	13	✓		
	10	1,6	6,1	2,4	5	23		5	29	✓		
	11		6,8	3,8	8	27	2		12,5	✓		
	11		3,3	7,7	11	21			19	✓		
	12	1,4	4,9	5,7	5	20	2	4	17	✓		
	15		6,9	8,1	7	15		3	34	✓		
	15		7,9	7,1	5	20		3	21	✓		
	16		9,4	6,6	10	16		2	27	✓		
	19		17,6	1,4	5	20		4	19,5	✓		
	25		19,7	5,3	5	10		2	21	✓		
	15		8,6	6,4	5	20		3			✓	
	25		16,4	8,6	5	10			25		✓	
	17		17			8	3	3	28	✓		
	27		20,3	6,7	5	9			21	✓		
	16	1,2	11,8	3	8	16		5	16	✓		✓
	22		19	3	10	10		4	10	✓		✓
	24	2,8	18	3,2		6		7	24	✓		✓
	31	2,3	26	2,7		7		2	8	✓		✓



Agromaster®



Higher nutrient
use efficiency



Higher yield



Lower
environmental
impact



Everris International B.V. (UK, Netherlands, Germany) is certified according ISO - 9001. Everris International B.V. Heerlen is also certified according ISO - 14001 and OHSAS - 18001. Everris International B.V. is a legal entity under ICL Specialty Fertilizers.

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