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SPRING 2021

Maximise seed potential with Newton

Achieve the best start with Newton seed treatment

- ✓ Accelerates germination & emergence
- ✓ Stimulates root and shoot growth
- ✓ Builds resilience to abiotic stress
- ✓ May increase yield

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Protect seed health before drilling

Giving crops the best start is essential to maximise seed potential and crucial for efficient and profitable crop production - particularly when you consider the less-than-optimal growing conditions that can so often coincide with seed germination and early establishment. Plants require extra attention in those first critical weeks to maximise their competitive nature and protect yield and quality potential. Newton is a naturally sourced phytohormone biostimulant seed treatment developed to help prime crops for growth.

Poor germination impacts vigour

Seed germination is one of the most vital steps in plant development and a key determinant for plant productivity. Rapid seed germination and uniformity in emergence are crucial for healthy, vigorous seedlings that grow on to become fit, high-yielding crops. But good germination and early seedling growth relies on getting the most from stored energy reserves of carbohydrates and proteins that live inside the seed, as well as access to the enzymes that trigger growth. This isn't always as straightforward as it sounds. Low soil temperatures, limited moisture, and low energy reserves caused by poor nutrition in the previous crop can all delay seedling germination and emergence, leading to poor crop vigour in the long term.

Poor root and shoot growth lead to poor establishment

Plant emergence and establishment are the starting points of crop growth and will set the pace for how it performs later in life. After germination, seedlings have to produce the energy they need by taking in light through their leaves to be used in photosynthesis, as well as nutrients and water from the soil through their roots. Poor shoot growth will slow photosynthesis causing energy production to grind to a halt. Below the surface a poor root system stops the plant getting access to critical water and nutrients.

After germination it is vital young seedlings are not allowed to dry out. Where conditions are dry a strong root system becomes even more important as crops need to pull up moisture from depth and this is where a good seed treatment biostimulant could be extremely beneficial.

Abiotic stress compromises growth

The exposure of seeds to abiotic stress can result in lower seed viability, reduced germination and poor seedling establishment that will lead to poor growth and compromise yield and quality potential down the road.

Abiotic stress can reduce crop yield by as much as 70%. A good biostimulant seed treatment can help to optimise seed health right before drilling - the best time in the growing season to protect genetic yield potential.

Seed biostimulant types

Biological / microbial inoculants
Apply live bacteria to the soil and hope it will populate and provide a beneficial effect. Once applied to the seed it must be drilled within 48 hours.

Seaweed extracts
A lot available on the market. Can be beneficial and provide many trace elements. An extract from a live organism so concentrations can vary.

Micronutritional / trace elements
Great way to ensure crop has immediate access to nutrition - plant roots do not have to travel far in the rhizosphere to find it - lazy roots??

Phytohormones
Arguably the most important - not just for the seed. Plant hormones must be balanced throughout the life of the plant. Play a key role in awakening dormant seed and signalling growth.

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Newton seed treatment

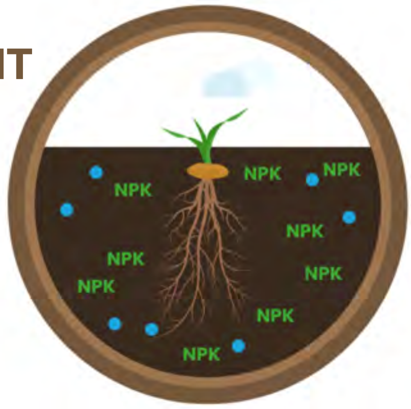
Newton is a novel and revolutionary phytohormone seed treatment designed to help winter and spring cereals get up and away as quickly as possible, the natural way. Newton is approved for use in organic crops by Organic Farmers & Growers.

IMPROVES SEEDLING VIGOUR

Accelerates germination & emergence

Newton contains crucial signalling peptides that play a fundamental role in the regulation of growth and development. Only recently discovered, and in a ready to use form for immediate use by the crop, these signalling peptides play a vital role in stimulating germination and emergence and influence the behaviour of other plant hormones. Newton is also a valuable source of organic nitrogen delivering an energy boost to seed reserves for uniform and efficient seedling growth.

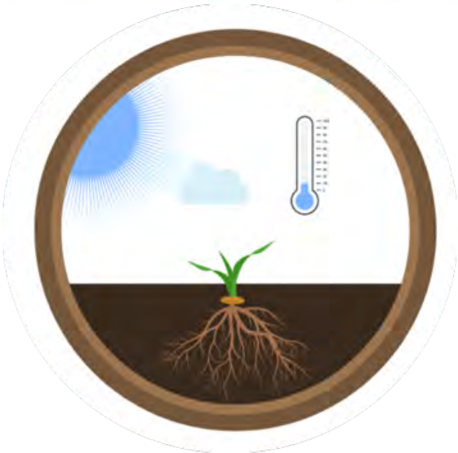
IMPROVES ESTABLISHMENT



Stimulates root & shoot growth

Early access to nutrition and moisture is critical for the healthy and rapid development of the crop. Nutrition must be accessible to the roots, while the healthy development of true leaves will help optimise photosynthesis. Signalling peptides in Newton stimulate root and shoot growth, driving better crop establishment.

STRESS TOLERANCE



Provides resilience to abiotic stress

The exposure of seed to abiotic stress often results in lower seed viability, reduced germination and poor seedling establishment. Peptides in Newton trigger defence signals which help to promote abiotic stress tolerance.

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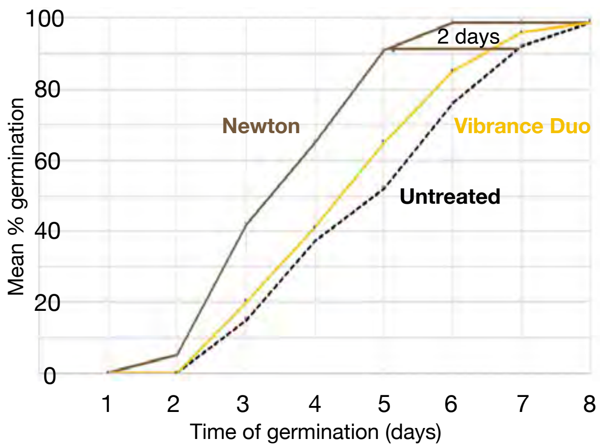
Awaken seed, emerge with speed

Accelerated germination by 2 days

The effect of Newton on speed of germination was researched at the University of Nottingham. At 7ºC Newton treated seed germinated 2 days faster than naked seed and was 1.5 days faster than Vibrance Duo treated seed.

Effect of seed treatment on Winter Wheat germination at 7ºC

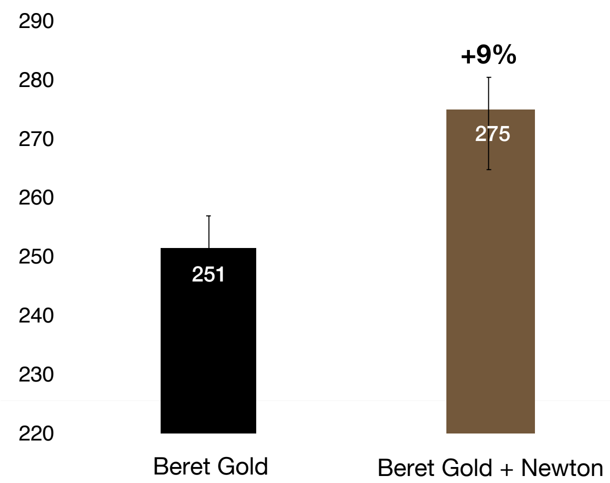


University of Nottingham 2019. Winter Wheat cv Siskin, 10 replicates.

Significant increase in number of plants

Newton increased the number of plants per sqm by 9% which was a significant increase over Beret Gold alone.

Effect of Newton on number of plants / sqm

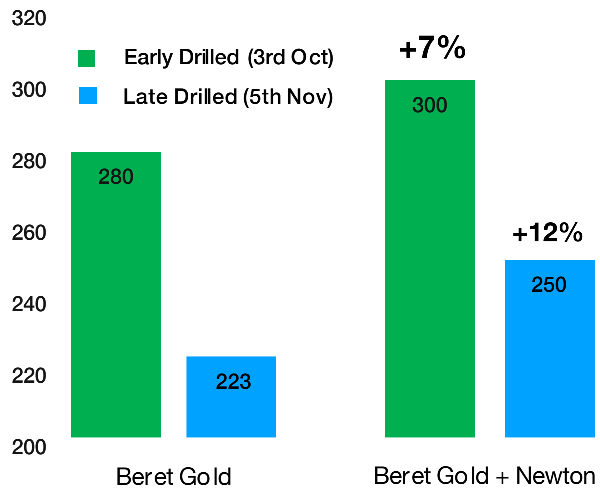


Trial 2019. Results averaged across seed rates & drilling dates.. Newton applied at a rate of 1 litre per tonne of seed.

Higher emergence in early & late sown

The effect of Newton on emergence was investigated in early (drilled 3rd October) and late sown (drilled 5th November) Wheats. In the early sown, Newton treated seed had 7% more plants per sqm, and in the late sown there were 12% more plants per sqm.

Effect of Newton on number of plants / sqm



Trial 2019. Results averaged across seed rates. Newton applied at a rate of 1 litre per tonne of seed.

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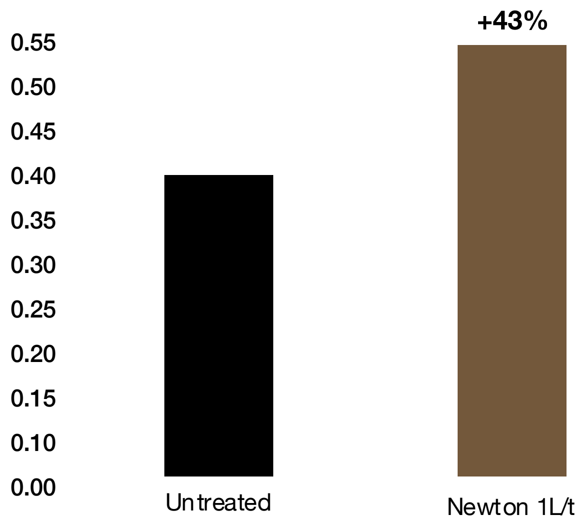
Stimulate roots, activate shoots

43% increase in root growth

The effect of Newton on root growth was studied in 4 replicated trials at the University of Nottingham. Newton increased root growth significantly in each trial, with a mean increase of 43% over the 4 trials.

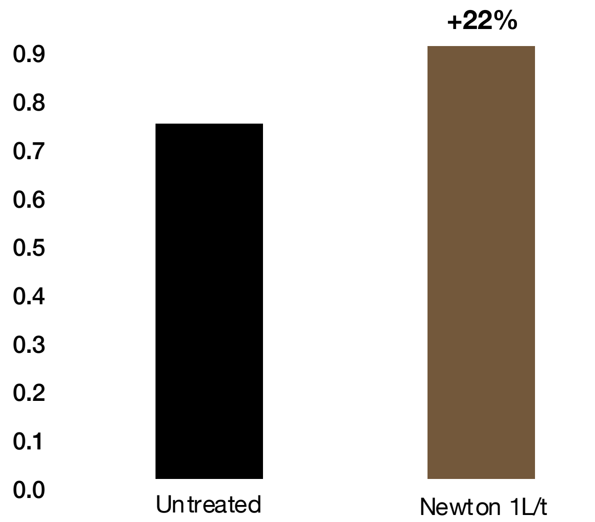
Effect of Newton on early root growth in Wheat & Barley
Mean root dry weight (g) at 95% CI



22% increase in shoot growth

Shoot growth was also analysed in the trials with Newton increasing shooting by an average of 22% across the 4 studies.

Effect of Newton on early shoot growth in Wheat & Barley
Mean shoot dry weight (g) at 95% CI

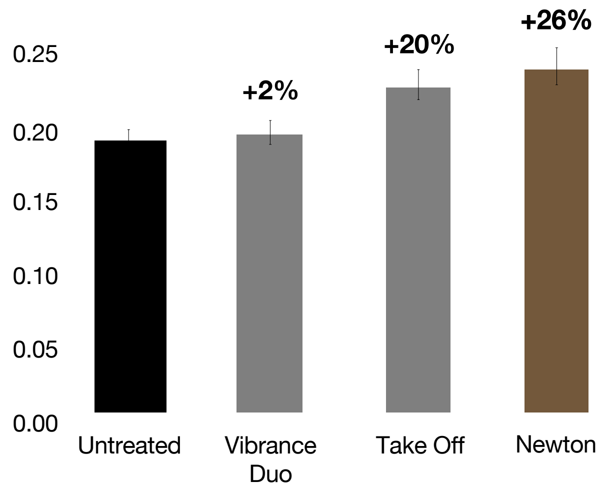


University of Nottingham 2018 & 2019.
Above: N=4 (3x Winter Wheat cv Siskin; 1x Spring Barley cv Concerto) Bottom right: 2019. Winter Wheat cv Siskin, 10 replicates. Vibrance Duo applied at 2L/t. Take Off and Newton applied at 1L/t.

Most roots compared to competitors

Newton increased root growth significantly more than Vibrance Duo and improved it over Take Off.

Effect of seed treatments on root growth in Winter Wheat
Mean root dry weight (g) at 95% CI



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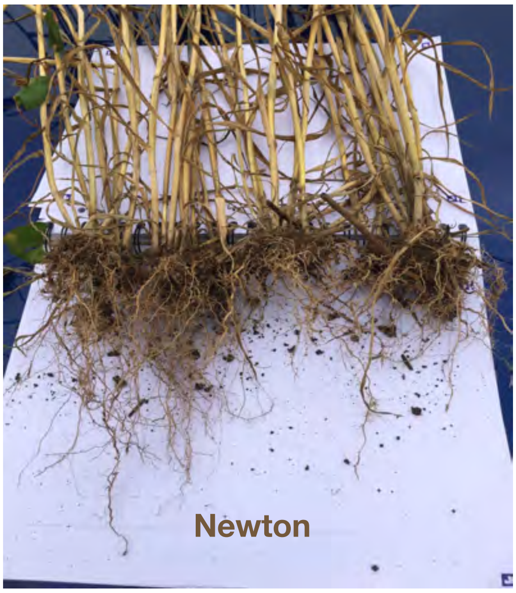
Stimulate roots, activate shoots

Newton increased rooting at Faccombe Estate

A tramline trial was conducted at Faccombe Estate in Hampshire to assess the rooting benefits of Newton on Winter Wheat grown in very brash soils. Clear rooting benefits were observed with both an increase in lateral roots and root length density.



Winter Oats emerged 2.5 days faster & grew more roots & shoots

Winter Oats cv Gerald were drilled into a cover crop of oil radish, phacelia, vetch, berseem clover and crimson clover cover crop by 4Front Farming Company Ltd in Fife in the autumn of 2020. The untreated and treated fields were adjacent and drilled on the same day. Newton treated seed emerged 2.5 days faster than naked seed and established with a better root system and improved shoot growth.

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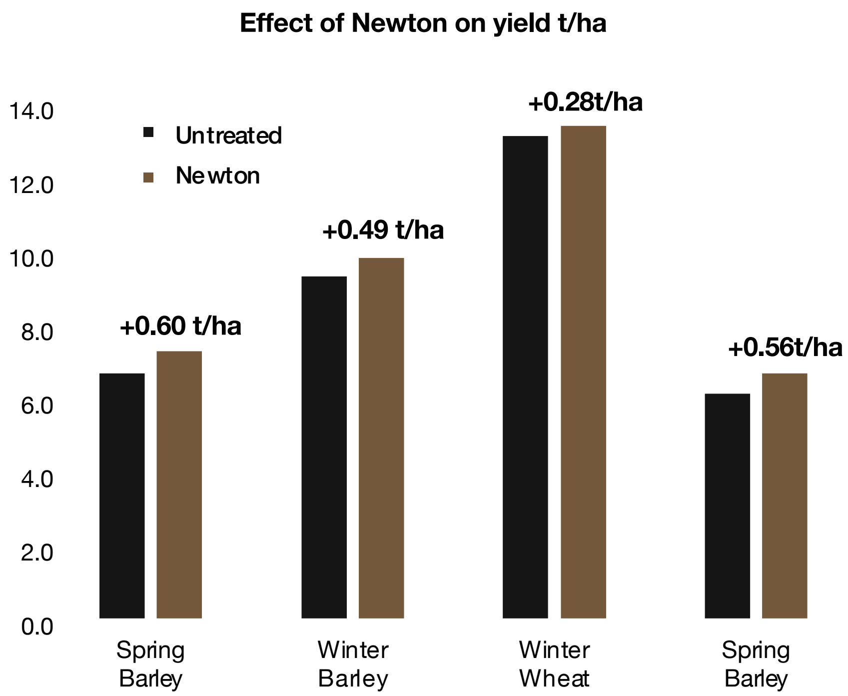
Overcome stress for seed success

Stress protection has helped to increase yields by up to 0.6 t/ha

Keith Challen of Belvoir Farming Company in Grantham has seen consistent yield increases in winter and spring cereals as a result of treating seed with Newton.

KEY TAKEAWAYS

- Left: Winter Barley cv Bazooka treated with Newton established faster with increased vigour into spring compared to the untreated strip.



KEY TAKEAWAYS

- **Left 1: Spring Barley cv Planet 2018** Newton treated had 30% more roots with improved vigour, according to Mr. Challen. Leaf tissue tests confirmed Newton increased uptake of all nutrients except phosphorous. Newton increased yield by 0.6 t/ha
- **Left 2: Winter Barley cv Bazooka 2019** Newton increased yield by +0.49 t/ha
- **Left 3: Winter Wheat cv Graham 2019** Benefits were less visual. Newton increased yield by 0.28 t/ha.
- **Left 4: Spring Barley 2020** Newton benefits were less visual but yield increased by 0.56 t/ha.

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Newton Technical Summary

Revolutionary new seed treatment to maximise seed potential the natural way

Newton	Product Information
Classification	Biostimulant seed treatment
Composition	Vegetal derived peptides 4.2% organic nitrogen
Recommended crops	Winter and spring cereals Approved by Organic Farmers & Growers for unrestricted use on all organic crops
Rate per tonne	1.0 litre per tonne of seed
Application to seed	Apply Newton through a conventional seed treater suitable for handling liquids Seed should be of good quality and moisture content Do not apply Newton to cracked, split or sprouted seed Always re-calibrate your seed drill with treated seed before drilling If required, Newton may be watered down to aid application
Compatibility	Newton is compatible with a range of seed treatments when applied together
Pack size	3 litres or 200 litre drums
Key features / benefits	Accelerates germination & emergence, improving seedling vigor Stimulates root & shoot growth, improving crop establishment Builds resilience to abiotic stress, improving establishment in suboptimal growing conditions May increase yield

Technical Support

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