



## PERFORMANCE SUMMARY

- Proven 10 - 30 % yield gains in trials across USA, Canada, South America and Indian subcontinent.
- Measurable improvements in root biomass, leaf area, and canopy development.
- Noticeable plant response within 7 - 10 days of application.
- Successfully used on ~16 million ha each year; now adapted for New Zealand pasture and arable conditions



# RATCHET

## LCO PROMOTER TECHNOLOGY FOR GROWTH, YIELD & RESILIENCE

### KEY BENEFITS

- **Improved nodulation in legumes and mycorrhization:** Improve N fixation in legumes and supply of P and other nutrients and legume and non-legume crops
- **Improved seed germination:** Better crop establishment, earlier canopy closure and higher crop yields
- **Better root development:** Enhanced lateral root growth giving better access to water and nutrients, and tolerance of stresses
- **Improvement of crop yield potential:** Higher yields, especially in favourable growing conditions
- **Higher Photosynthetic Efficiency:** Improves CO<sub>2</sub> uptake and chlorophyll production.
- **Better Nutrient and Water Use:** Enhances uptake and reduces losses under stress.
- **Integrates Seamlessly with BPM Programs:** Complements Revv (flavonoid signal) and Attis (P-solubiliser) for a complete biological growth system.



**FORM:**  
Liquid concentrate

**PACKAGING:**  
1L bottle

**COMPATIBILITY:**  
Fully compatible with UAN, foliar fertilisers, and most crop-protection sprays (jar test recommended).

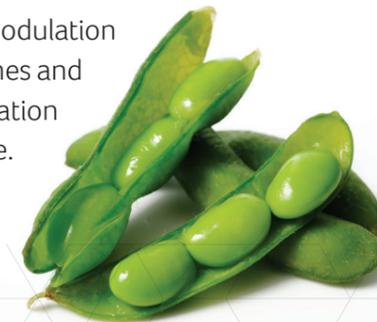
### LABEL & SAFETY INFORMATION

- *Product Type: Foliar LCO Promoter Technology - not a fertiliser or growth hormone.*
- *Safety: Non-phytotoxic; safe for plants and operators.*
- *Storage: Keep below 30°C, out of direct sunlight.*
- *Mixing: Conduct a jar test before tank mixing with chemicals or nutrients.*
- *Documentation: SDS and technical data available from BPM and Novonesis.*

**RATCHET** is a unique proprietary formulation of a Lipo-chitooligosaccharide (*pronounced lie-po-kai-to-oli-go-sack-a-ride*) molecule developed by Novonesis to enhance plant growth and increase the yield potential of crops and pastures.

The Novonesis LCO Promoter Technology uses natural signal molecules produced by beneficial microbes such as rhizobia and mycorrhiza. LCOs are the communication language between these soil microbes and plants triggering plant responses that lead to plants recruiting these symbiotic microbes.

In legumes, use of LCO enhances nodulation and nitrogen fixation, and in legumes and non-legumes, improves mycorrhization and nutrient availability and uptake.



### FEATURES:

- **Powered by LCO Technology:** Patented Novonesis formulation that naturally enhances plant signalling and nutrient efficiency
- **Crop establishment:** Stimulates seed germination, nodulation of legumes and mycorrhization. Enhances root development.
- **Promotes Yield and Uniformity:** Accelerates photosynthesis, increasing yield potential of crops and pastures.
- **Easy Foliar Application:** Works seamlessly with standard post-emergence spray programs; compatible with tank mixes.
- **Sustainable and Safe:** Uses natural biological signal molecules, not hormones or synthetics.
- **Proven Global Performance:** Validated in multiple crops worldwide - now adapted for New Zealand's pasture and arable systems.



SCAN QR FOR TRIALS & DEMONSTRATIONS

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**novonesis**

When applied as a foliar spray, application of **RATCHET** activates growth pathways independently of soil type and crop variety, particularly by enhancing photosynthesis and transpiration.

In New Zealand systems, **RATCHET** is ideal for pasture renovation, maize, cereals, and horticultural crops, helping farmers achieve higher yields in situations where crops have high yield potential.

**RATCHET** can also be used as a seed treatment or for application in-furrow.

## THE SCIENCE - HOW LCOS WORK

Lipo-chitooligosaccharides (LCOs) are naturally occurring “conversation molecules” used by soil microbes and plants to recognise and cooperate with one another

**RATCHET** applies these signals directly to the crop, stimulating microbial colonisation, and activating beneficial plant responses that boost growth and resilience.

### Mechanism of Action:

- 1. Signal Recognition:**  
Plant receptors in leaves and roots detect the LCO molecule.
- 2. Cellular Activation:**  
Alters plant immune response to permit colonization of legumes by rhizobia, and by legumes and non-legumes by mycorrhiza. Genes controlling nutrient uptake, photosynthesis, and root expansion are switched on.
- 3. Physiological Response:**
  - o Greater stomatal conductance → higher CO<sub>2</sub> assimilation.
  - o Enhanced chlorophyll synthesis → more efficient photosynthesis.
  - o Activation of antioxidant enzymes → improved defence against abiotic stress.
- 4. Outcome:**  
Accelerated establishment, improved nutrient efficiency, and increased yield potential.

## TARGET CUSTOMERS

- Arable and horticultural crop farmers seeking to maximize yield potential
- Dairy farmers seeking new pathways for maximizing productivity of pastures without requirements for additional fertilizer inputs.
- Agronomists and retail advisors integrating biosolutions with traditional fertility programs.
- Contractors and liquid fertiliser applicators wanting biological additives to enhance plant response.

**FOR**  
**ARABLE AND**  
**HORTICULTURAL**  
**CROP FARMERS**  
**SEEKING TO**  
**MAXIMISE YIELD**  
**POTENTIAL**



## GLOBAL PERFORMANCE DATA

Field and greenhouse research consistently demonstrates **RATCHET'S** ability to improve growth, yield, and stress resilience across diverse crops.

CROP	APPLICATION METHOD	APPLICATION RATE	TIMING	TYPICAL RESULT
Corn	Seed treatment	7.4 ml / seed unit	On seed	300-500 kg/ha yield improvement
Rice	Foliar	120 ml/ha	20 + 50 days after sowing	Higher tillering and grain yield
Tomato / Chilli / Capsicum	Foliar	120 ml/ha	40 + 60 days after sowing	Improved fruit size and uniformity
Tea	Foliar	60 ml/ha (multiple)	Every 30–40 days	Greater leaf area and flush density
Cotton (India)	Foliar	120 ml/ha (2x foliar)	Mid-vegetative stage	+13 % average yield gain (Novonesis data)

### OBSERVED RESULTS:

- Improved nodulation in legumes and mycorrhization in mycorrhiza responsive crops
- Improved seed germination, crop establishment and crop yields
- Better root development and tolerance of stresses
- Improvement of crop yield potential

## APPLICATION FOR NEW ZEALAND CONDITIONS

	APPLICATION METHOD	APPLICATION RATE	TIMING	TYPICAL RESULT
Wheat / barley / corn	On seed; in-furrow, foliar	3 ml / ha 140-280 ml/ha	On seed; At planting; 20 & 40 days after planting	Wheat / barley 300 kg/ha Corn 400 kg/ha
Horticultural crops (Tomato / Capsicum)	Foliar	120 ml/ha	40 + 60 days after sowing	Improved fruit size and uniformity
Horticultural crops (Kiwifruit / wine grapes)	Foliar	60 ml/ha (multiple)	2 weeks before commencement of flowering and 4 weeks later	Improved pollination, fruit set and fruit retention
Pastures	Foliar	120 ml/ha (2x foliar) or 80 ml/ha + 40 ml/ha Revv	Mid-vegetative stage	+13 % average yield gain (Novonesis data)
Vegetable and pasture seed production	On seed; in-furrow, foliar	3 ml / ha 140-280 ml/ha	On seed; At planting; 20 & 40 days after planting	Wheat / barley 300 kg/ha Corn 400 kg/ha