



Cereal and Canola Crop Trials and Technical Information.

Wheat and Canola Trial Updates

1.0 Australia: Blackwood Partnership Penshurst Victoria.

For three years trials of Ectol on wheat and canola were conducted at "Blackwood" by J. Richie and W. Veering.

Wheat Trials Results 2009:

APW wheat price 25/2/09	291				less Ectol	net return
			gain over	\$ benefit	at \$7/ltr	
		yield	control			
\$ return	6ltrs/h	5.65	0.75	218.25	84	134.25
	4ltrs/h	5.4	0.5	145.5	56	89.5
	2ltrs/h	5.2	0.3	87.3	28	59.3
	control	4.9	0	0	0	0

- 2 applications at 2L/ha increased yields by 6% and a return per \$1 of Ectol of \$3.21.
- 2 applications of 4L/ha increased yields by 10% and a return per \$1 of Ectol of \$2.68
- 2 applications of 6L/ha increased yields by 15% and a return per \$1 of Ectol of \$2.67

Canola Trial Results 2009

price of \$556/t									
as of 25/2/09		increase	yeild	oil	total benefit	less Ectol	total \$ benefit per hectare		
	yeild	on control	\$ benefit	bonus		at \$7/ltr			
area 1 6ltr	2.45	0.55	305.8	49.0392	354.8392	84	298.83		
area 2 4 ltr	2.15	0.25	139	59.77	198.77	56	142.77		
area 3 2 ltr	2.05	0.15	83.4	39.893	123.293	28	95.293		
control	1.9	0	0	14.7896	14.7896	0	14.789		

- 2 applications at 2L/ha increased yields by 8%, oil by 4.8% and a return per \$1 of Ectol of \$3.85.

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- 2 applications of 4L/ha increased yields by 13%, oil by 8.2% and a return per \$1 of Ectol of \$3.28
- 2 applications of 6L/ha increased yields by 29%, oil by 5% and a return per \$1 of Ectol of \$4.08

Wheat (Sentinel) Trial Results 2010.

The 2009/10 harvest season was the third year of consecutive trials conducted on Blackwood, and the results were consistent with previous years and expectations, however the very wet conditions interrupted the canola trials and created some additional variation in weed pressure and crop performance.

Summary: Two applications were applied to this earlier maturing variety. The first at GS 5 "Leaf sheaths strongly erect" and GS 10 "Ripening".

The trial evaluated the two applications at 2L/ha, 4L/ha and 6L/ha and whilst there was only a minimal increase in yield at 2L and 4L/ha at 6L/ha yields increased by 15.8%.

In addition all the treated blocks showed a significant reduction in lodging that was strongly evident in the untreated control

Two applications on wheat. Varying rates at growth stages 5 and 10.

Variety: Sentinel – Mid season wheat

spray date	1st			
app.		17/08/2009		
spray date	2nd			
app.		19/10/2009		
		4		
rates applied	2ltrs/ha	ltrs/ha	6ltrs/ha	control
yield	5.4	5.5	6.59	5.46
Corrected Yield	5.62	5.57	6.32	5.46
Yield to Control	102.9%	102.1%	115.8%	100.0%
moisture	13.4	12.6	12.7	14.6
test weight	77	75	71	74
protein	12.2	12.4	13.3	12.9
screening	1.1	1.2	3.2	2.1

Trial: Ectol vs. Calcium/Nitrogen fertiliser single application comparative.

Single application of 3 Ltrs/ha Ectol applied to wheat at growth stage 10.5, this trial was run to compare crop response to a single application of Ectol and Calcium/Nitrogen foliar fertilisers.

spray date	6/11/2009			
Product	A	Ectol	B	control
rate	5 +5	3	3	
water rates	150	150	150	
yield	2.6	2.6	2.3	2.8
moisture	12.1	12.3	12.3	12.2
test weight	66	72	65	64
Corrected Yield	2.68	2.93	2.34	2.80

Yield to Control	95.8%	104.5%	83.4%	100.0%
protein	11.8	10.6	10.6	13.2
screenings	14.9	11	21.2	23.4
Grade	Fed1	Fed1	HPS1	HPS1

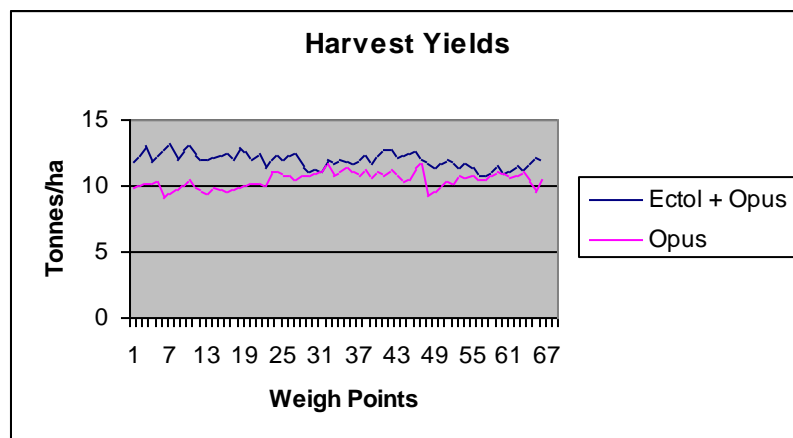
Summary: A single application of Ectol at 3L/ha increased yields by 4.5% and halved the screenings versus the untreated control. There was no response to the foliar fertilisers. A single application of Ectol is effective in anticipation of drying or hot conditions, and should be applied at “mid-milk” but this may be bought forward if conditions are deteriorating.

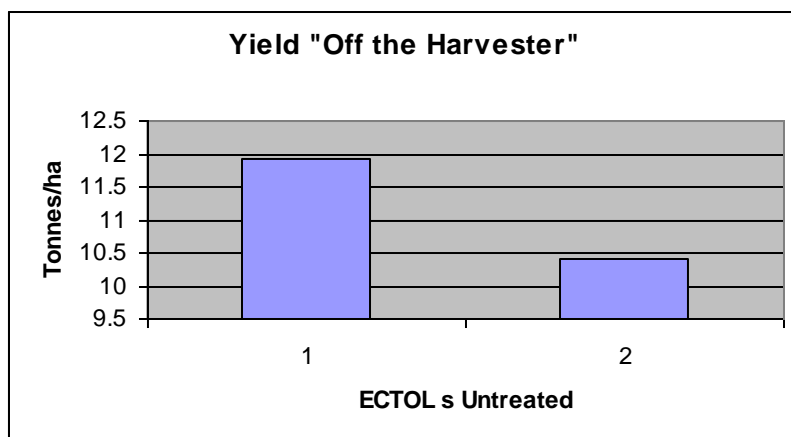
2.0 New Zealand: Trials conducted in the Sth Island by Roger Welsh of Weldon studies Limited to measure the effects of Ectol on Wheat grown in high production NZ conditions.

Two Applications of 4L/ha were applied as follows:

Application 1: 13th of October at Full Flag (T1) 4L/ha+opus.

Application 2: 4th of December at Flowering (T2) 4l/ha+Opus+Amistar.





NZ Trial Results:

	Screenings	Protein	TSW	Tonnes/ha
Ectol+Opus	8.8%	11.3%	53.9	11.93
Opus only	10.1%	10.7%	50.5	10.42
Change	-12.8%	+5.6%	+6.7%	+14.49%

Financial Return:

	Yields T/ha	Protein %
Control	10.42	10.7
Ectol	11.93	11.3
Difference	+14.49%	+5.6%
Additional G. Income (\$300/t)	\$453,00/ha	
Cost of Ectol (8L*\$NZ8/L)	\$64.00	
Additional Net Return	\$389.00	
Payback	6 times.	

3.0 Delta Ag Trials - Harden NSW

Delta Ag Pty Ltd conducted trials in NSW looking at 42 different commercial nutritional and fertilisers products on wheat. The products included conventional fertilisers, liquid fertilisers, seed dressings, conventional and biological foliar applications:

Measurements of yield, protein, test weight and grade were recorded for each treatment and compared against the "control" which only received 70Kg of MAP at sowing.

Results: of the 42 different treatments:

- Ectol results were in the top 3 for key measurements.
- Yield increased by 16%
- Gain test weight exceeded 74 Kg/HL and protein 11.5% and grain classified as H2.

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- Ectol treatment achieved the highest net revenue of \$1196.00/Ha an increase of 12.5% in terms of net revenue per hectare.

Delta / LFR - Nutrition trial 2010:

T/ment	Yield t/ha			Protein %	Test Wgt kg/hL	Grade	Gross \$/ha		Cost \$/ha	Net	
1	MAP @ 70 kg/ha MAP @ 35 kg/ha	3.27	efg	12.1	ab	75.1	a	H2	\$1,111.80	\$49.00	\$1,062.80
2		3.33	d-g	11.3	b-i	74.7	a-d	APW	\$1,065.60	\$24.50	\$1,041.10
3		3.43	d-g	11.9	abc	74.6	a-f	H2	\$1,166.20	\$70.00	\$1,096.20
4		3.41	d-g	11.3	b-h	73.9	b-i	AGP1	\$954.80	\$32.50	\$922.30
5		3.55	b-g	11.4	a-g	74.9	ab	APW	\$1,136.00	\$57.00	\$1,079.00
6		3.73	b-f	10.6	e-n	74.3	a-g	APW	\$1,193.60	\$25.58	\$1,168.02
7		3.36	d-g	11.6	a-e	74.4	a-g	H2	\$1,142.40	\$50.08	\$1,092.32
8		3.63	b-g	11.3	b-i	73.5	g-j	AGP1	\$1,016.40	\$95.66	\$920.74
9		3.75	b-f	10.9	d-m	74.8	abc	APW	\$1,200.00	\$54.18	\$1,145.82
10		3.61	b-g	11.1	c-k	74.7	a-d	APW	\$1,155.20	\$60.20	\$1,095.00
		3.74	b-f	10.9	d-l	74.4	a-g	APW	\$1,196.80		n/a
		3.87	b-e	10.9	d-l	74.7	a-d	APW	\$1,238.40		n/a
13		3.34	d-g	11.4	a-f	74.0	b-h	APW	\$1,068.80	\$50.08	\$1,018.72
14		3.78	b-f	11.2	b-i	74.5	a-f	APW	\$1,209.60	\$54.25	\$1,155.35
15		3.60	b-g	11.0	c-l	74.6	a-e	APW	\$1,152.00	\$70.25	\$1,081.75
16		3.24	efg	12.3	a	73.6	f-j	AUH2	\$939.60	\$86.25	\$853.35

17		3.72	b-f	11.7	a-d	74.6	a-f	H2	\$1,264.80	\$71.20	\$1,193.60
18		3.69	b-g	12.0	abc	74.5	a-g	H2	\$1,254.60	\$72.75	\$1,181.85
19		3.37	d-g	11.8	a-d	74.7	a-d	H2	\$1,145.80	\$70.15	\$1,075.65
20	MAP @ 70 kg/ha [Ectol]	3.78	b-f	11.6	a-e	74.2	a-g	H2	\$1,285.20	\$89.00	\$1,196.00
)											
21		3.68	b-g	11.5	a-e	74.6	a-f	H2	\$1,251.20	\$60.00	\$1,191.20
22		3.55	b-g	11.5	a-e	73.9	b-i	AUH2	\$1,029.50	\$79.00	\$950.50
23		3.42	d-g	11.5	a-e	73.7	e-j	AUH2	\$991.80	\$74.55	\$917.25
24		3.5	c-g	10.9	d-m	73.6	f-j	AGP1	\$980.00	\$110.70	\$869.30
25		3.66	b-g	11.3	b-h	73.6	f-j	AGP1	\$1,024.80	\$61.00	\$963.80
26		3.8	b-f	10.5	f-o	73.7	d-j	AGP1	\$1,064.00	\$73.00	\$991.00
27		3.43	d-g	10.9	d-l	73.8	c-i	AGP1	\$960.40	\$70.40	\$890.00

Treatment	Yield t/ha	Protein %	Test wt	kg/hL	Grade	Gross \$/ha	Cost \$/ha	Net		
28	3.43	d-g	11.1	b-j	74.7	a-e	APW	\$1,097.60	\$98.64	\$998.96
29	3.76	b-g	11.1	c-k	74.6	a-e	APW	\$1,203.20	\$69.50	\$1,133.70
30	3.57	b-g	11.0	d-l	73.9	b-i	AGP1	\$999.60	\$80.50	\$919.10
31	3.94	a-d	10.4	h-o	74.0	b-h	ASW	\$1,182.00	\$111.90	\$1,070.10
32	4.53	a	10.1	l-o	74.0	b-i	ASW	\$1,359.00	\$81.75	\$1,277.25
33	3.21	fg	11.1	c-k	74.3	a-g	APW	\$1,027.20	\$86.15	\$941.05
34	4.10	abc	10.5	g-o	74.1	a-g	ASW	\$1,230.00	\$90.44	\$1,139.56

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35	3.63	b-g	10.4	i-o	73.6	f-j	AGP1	\$1,016.40	\$63.52	\$952.88
36	4.14	abc	10.1	l-o	73.1	h-k	AGP1	\$1,159.20	\$76.50	\$1,082.70
37	3.73	b-f	10.0	mno	72.7	jk	AGP1	\$1,044.40	\$92.60	\$951.80
38	3.85	b-e	10.2	j-o	72.9	ijk	AGP1	\$1,078.00	\$153.80	\$924.20
39	3.42	d-g	10.2	k-o	72.2	kl	AGP1	\$957.60	\$202.75	\$754.85
40	3.35	d-g	9.8	no	71.7	l	AGP1	\$938.00	\$59.00	\$879.00
41	3.08	g	9.7	o	72.2	kl	AGP1	\$862.40	\$108.00	\$754.40
42	3.17	fg	10.1	l-o	71.6	l	AGP1	\$887.60	\$72.00	\$815.60

LSD (P=0.05) 0.64 t/ha 0.95 1.06

0.64 t/ha

CV 10.79 10.79 5.26 0.88

Treatment results followed by the same letter do not significantly differ

Base MAP price used is \$700/t

Lincoln Wheat sown @ 70 kg/ha

Sown 22 June KPPW - Boxer Gold @ 2.5 lt/ha IBS

Deep N 69 kg N/ha (26 kg 0-40 cm, 23 kg 40-75cm)

Urea applied @ 50 kg/ha - Aug 31

Urea applied @ 75 kg/ha - Oct 1

Bayleton @ 1.0 lt/ha - Sept 21

Grain Quality Data:

The grain quality data is presented above, the 2010 harvest was a wet one, with major influences on quality and prices.

This has heightened the relative differences between treatments and should be noted.

Grade	Price / t	Protein	Test wt
AGP1	\$280	< 11.5	< 74
AUH2	\$290	> 11.5	< 74
ASW	\$300	< 10.5	> 74
APW	\$320	10.5-11.5	> 74
H2	\$340	> 11.5	> 74

All screening were below 5.0 % so did not influence the outcome.

General Recommendations:

After 5 years of trials in Australia and New Zealand, the developing protocols for the application of Ectol determine that late applications provide the greatest benefit. Ideally the first application should be at full flag leaf around GS 39 and the second at flowering or about GS 59, but successful responses can be

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expected through to mid milk GS 75. In the case of barley the recommendation would be for the first application of GS33 and the second at GS50. These timings may be modified if the applications are to coincide with a fungicide or need to consider the withholding periods.

JH McKay
2012.

4.0 Red Wheat Demonstration Trial- Wayne Veering Victoria Australia

2017/2018

Variety: Revenue (Grown for Stock Feed)

This demonstration trial was a split paddock with identical soils and fertilisers. The treated area only had Ectol applied via boom spray.

Base Fertiliser:

2.5 Tonnes Lime

100kg MAP at planting

Side dressing: 2 * 2kg of P, 1*2kgs of K + Mg, Zn, B and Mn

Ectol: 2L/ha at 90% head emergence

Grain Corp "Grower Test Result" Site Lab: Hamilton Vic. Date 18/1/18. Grower: Wayne Veering.

	Moisture %w/w	Protein % w/w	Test weight kg/hl	SCRN5%w/w
Treated	9.1	12	74.4	9.8
Untreated	9.2	9.9	68.6	11.7
Difference		+21.2%	+8.4%	-16.2%

On the bases of the test results, the economics are as follows:

Grade Increase: Treated \$213/T Yield Increase (Test weight): 8.4% on \$213/T = \$18/T

Untreated \$188/T

Increase \$25/T

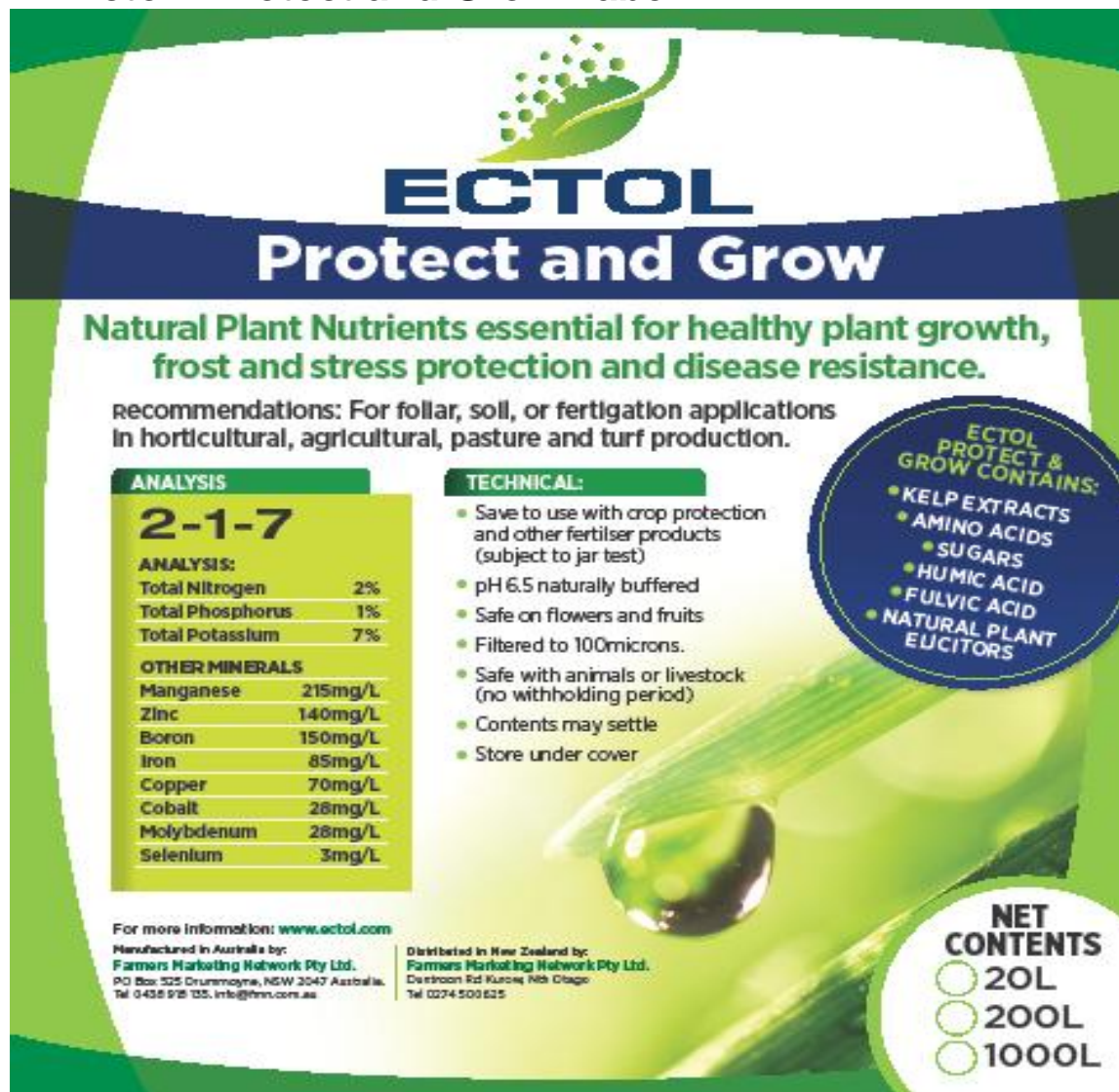
Total Increase: \$25 + \$18= \$43/T

Average Yields across the crop was 2 tonnes/ha, therefore gross increase was \$43/T * 2 = \$86/Ha.

The cost of the Ectol was \$6/L at 2L/ha = \$12/Ha.

Therefore Net Revenue was \$86-\$12= \$74/Ha (Represents a 6 X payback on the cost of the Ectol)

Ectol - Protect and Grow Label.



ECTOL
Protect and Grow

Natural Plant Nutrients essential for healthy plant growth, frost and stress protection and disease resistance.

recommendations: For foliar, soil, or fertigation applications in horticultural, agricultural, pasture and turf production.

ANALYSIS

2-1-7

ANALYSIS:

Total Nitrogen	2%
Total Phosphorus	1%
Total Potassium	7%

OTHER MINERALS

Manganese	215mg/L
Zinc	140mg/L
Boron	150mg/L
Iron	85mg/L
Copper	70mg/L
Cobalt	28mg/L
Molybdenum	28mg/L
Selenium	3mg/L

TECHNICAL:

- Safe to use with crop protection and other fertiliser products (subject to jar test)
- pH 6.5 naturally buffered
- Safe on flowers and fruits
- Filtered to 100microns.
- Safe with animals or livestock (no withholding period)
- Contents may settle
- Store under cover

ECTOL PROTECT & GROW CONTAINS:

- KELP EXTRACTS
- AMINO ACIDS
- SUGARS
- HUMIC ACID
- FULVIC ACID
- NATURAL PLANT EUCITORS

NET CONTENTS

- ☐ 20L
- ☐ 200L
- ☐ 1000L

For more information: www.ectol.com

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TRIAL RESULTS IN WHEAT AND PASTURE

ECTOL PROTECT AND GROW assists plants resist key external stresses, including heat stress, frost, wind, flooding, disease, chemicals and salinity, by supplying the plant key elicitors that stimulates plant self protection or will directly protect the cell contents. Additionally the osmoprotectants, natural regulators, amino acids, organic acids, sugars and minerals will increase cell hydration, photosynthesis and change metabolic processes to increase crop and pasture yields and quality.

ECTOL PROTECT AND GROW is a sustainable plant foliar nutrient derived from natural plant extracts, including marine Algae or kelp, plant extract amino acids, organic acids, sugars and organically chelated minerals.

Arable Crop Applications:

Wheat:

Many factors impact the crop returns, the more notable include the time of planting, soil moisture, rainfall and irrigation, fertilisers, stress and disease, with the net effect on the plants metabolic processes. But by maximizing productive capacity in any given circumstances, crop yields and returns are consequently maximized.

ECTOL PROTECT AND GROW will maximize the plants potential in various conditions ranging from dryland farming to irrigated cropping.

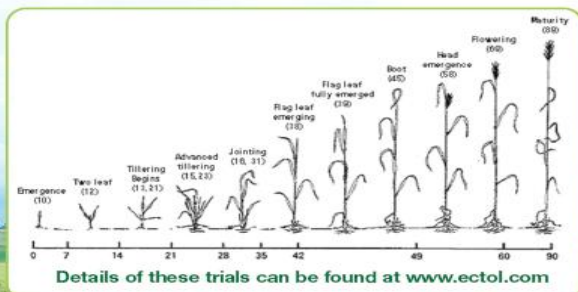
Independent trials have been conducted in Penshurst Victoria by Blackwood Estates, in Canterbury NZ by Weldon Studies and in Harden NSW by Delta Ag., in order to determine the responses and protocol for the use of Ectol in wheat crops

Protocol:

ECTOL PROTECT AND GROW has consistently increased yields in the order of 10% when applied at the rate of 4L/ha at "full flag" (GS39) and 4L/ha at "early flowering" (GS59). In addition Ectol has been shown to increase protein level and test weights and reduce screenings. There is also some evidence to suggest a reduction in lodging.



Ectol pack label - Available in 5, 20, 200 and 1000 litre containers



Economics:

ECTOL PROTECT AND GROW is applied as a foliar and may be mixed with other crop protection products. The net payback on the cost of Ectol ranges from 3 times to 6 times and importantly need only be applied when crop returns and market prices, are known.

Other Broadacre Crops:

ECTOL PROTECT AND GROW can be applied to all photosynthesizing crops, following the same protocol recommended for wheat. That is applying 2 applications at the early development of reproductive parts and at early flowering.



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Pasture Applications:

ECTOL PROTECT AND GROW affects significant nutritional improvements to feed-pasture grasses.

In order to measure this grass response a trial was undertaken by Weldon Studies Ltd on a ryegrass crop sown for grass seed. The variety is specifically designated for dairy application and the use of a single variety was determined so as to avoid variation in the trial.

Two applications of **ECTOL PROTECT AND GROW** were applied at tillering and node development and harvested 13 days later.

Key Results

- Digestible organic matter increased by 6.5%
- Metabolisable energy increased by 6.1%
- Sugar increased by 42%
- Total starch and protein increased by 40%

Consider the Economics of Metabolisable Energy (ME).

Assumptions:

- pasture production at 1200Kg DM/ha/day
- 5 MJ ME per litre of milk (at 3.2% Protein, 3.8% BF)

Trial data:

Control	1Kg DM * 11.4MJME * 1200KgDM/ha/day = 13,680 MJME/ha
Treatment	1Kg DM * 12.1MJME * 1200KgDM/ha/day = <u>14,520</u> MJME/ha
Increase on first grazing	840 MJME/ha

Potential impact = 840/5
= 168 litres/ha/day potential increase in milk (litres)
Or 11.76 kg MS/ha/day.

Pasture Recommendations:

- For new pasture apply 2 applications of **ECTOL PROTECT AND GROW** at 5L/ha, before grazing or harvesting.
- For established pasture apply 5L/ha after grazing.

Application:

ECTOL PROTECT AND GROW can be applied by boom spray or through the centre-pivot. The amount of water is not critical but should be sufficient to ensure coverage. Ectol can be mixed with other crop protection products or fertiliser but a jar test is recommended.



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CROPS, PASTURE AND LUCERNE

Liquid Nitrogen, Potassium and Trace Elements; nutrition, for foliar, soil or fertigation applications. **Nitrotain™TE** retains nitrogen in the plant or within the soil, minimising atmospheric and leaching loss or the acidification of soils.

CROPS:

Tree fruits, vines, vegetables, cereal crops, pasture and lucerne.

NITROTAIN™ + TRACE ELEMENTS

Nitrotain™TE is formulated to protect the ammonium and nitrate forms of nitrogen, providing a slower/longer nitrogen characteristic. The trace elements address deficiencies which often limit the utilisation and conversion of Nitrogen to protein within the plant.

NITROTAIN™ + Trace Elements				
	w/v %			
Nitrogen	(N)	as Carboxyl-amide Complex	93 g/L	9.3
Nitrogen	(N)	as Ammonium Lignonitrate	25 g/L	2.5
Nitrogen	(N)	as Potassium Lignonitrate	35 g/L	3.5
Nitrogen	(N)	as Ammonium Lignoureate	55 g/L	5.5
Potassium	(K)	as Potassium Lignosulphonate	40 g/L	4.0
Sulphur	(S)	as Ammonium Lignosulphonate	15 g/L	1.5
Magnesium	(Mg)	as Magnesium Lignosulphonate	15 g/L	1.5
Manganese	(Mn)	as Manganese Lignosulphonate	750 mg/L	0.075
Iron	(Fe)	as Iron Lignosulphonate	300 mg/L	0.030
Boron	(B)	as Ammonium Lignoborate	520 mg/L	0.052
Copper	(Cu)	as Copper Lignosulphonate	250 mg/L	0.025
Zinc	(Zn)	as Zinc Lignosulphonate	250 mg/L	0.025
Molybdenum	(Mo)	as Ammonium Lignomolybdate	100 mg/L	0.010
Cobalt	(Co)	as Cobalt Lignosulphonate	120 mg/L	0.012
Selenium	(Se)	as Ammonium Lignoselenate	25 mg/L	0.002

NITROGEN EFFICIENCY:

Nitrogen is an essential element for the production of amino acids, nucleic acids, proteins, vitamins and is essential for plant growth, energy reactions and the production of Carbohydrates.

Nitrogen Fertilisers tend to be inefficient as they are highly soluble with Nitrate Nitrogen being leached from soils especially under irrigation, or ammonium Nitrogen being lost to the air as ammonia. Both forms are also acidifying by carrying Calcium and Magnesium out of soils or by the build up of H⁺ ions. Acidification deep in the soil is extremely difficult to rectify.

Nitrotain™TE, is formulated to negate Nitrogen loss by chelating or complexing the Nitrogen, avoiding the atmospheric or leaching losses and soil acidification. These stable forms of organic nitrogen are rapidly transferred into the plant via leaves or roots.

Nitrotain™TE may be applied as a foliar, by fertigation or via hydroponics.

POTASSIUM:

Nitrotain™TE contains Potassium. As an essential element, Potassium is critical to the synthesis of proteins from applied Nitrogen and the Potassium in **Nitrotain™TE** further enhances the efficiency of Nitrogen utilisation. The low mobility of potassium may limit its availability to plants in sandy soils or dry conditions.

TRACE ELEMENTS, MAGNESIUM AND SULPHUR:

Although trace elements are only required in very small quantities, they are often overlooked and may be a limiting factor in plant growth. Trace elements are often bound in soils and are best applied as a foliar spray.

crop retained nitrogen



Nitrotain™TE ON CEREAL CROPS.

Late applications of Nitrogen enhance grain protein production; whereas earlier applications increase vegetative growth and yield and may considerably reduce the protein levels.

Applications of Nitrogen from the boot stage until slightly after anthesis notably increased the protein content in wheat, with the greatest increase occurring when applied closest to anthesis. (Ref: Grant and Johnson 2001).

If applications of nitrogen are delayed latter in the growing season, when the soils are dry and there is less time for plant take-up and translocation, foliar applied Nitrogen may have a greater impact on the grain protein.

When crops are sown early into high soil moisture a split application of N is recommended as a soil application followed by a foliar application at, or from, boot stage. Late sown crops have been shown to respond better to foliar Nitrogen.

Nitrotain™TE may be used in any situation where crop Nitrogen is required. It has a notable advantage over soil applied nitrogen in dry conditions and should be routinely used as the second application from boot stage to anthesis.

CROP RECOMMENDATIONS:

- Early sowing with high soil moisture: Soil nitrogen at sowing followed by **Nitrotain™TE** from boot to anthesis.
- Late sowing: Apply **Nitrotain™TE** at second leaf and again after boot stage until anthesis.

The rate will vary from 6L/ha to 20L/ha as split applications depending on crop requirements and economics.

Nitrotain™TE ON PASTURE AND LUCERNE.

Conventional Nitrogen fertilisers applied to pasture, have demonstrated responses from 5 to 20 kg of DM/ kg of N applied. On average 50% of soil applied Nitrogen fertiliser is used by the growing crop with the remainder immobilized, leached or lost to the atmosphere. **Nitrotain™TE** is efficiently absorbed through the leaves and any runoff that reaches the soil is retained in the root zone and is available to the plant.

ADDITIONAL ESSENTIAL PASTURE AND LUCERNE NUTRIENTS IN Nitrotain™TE

Many micro-nutrients, which are essential to pasture growth, may not be available to the plant from the soil. Micro-nutrients are frequently bound in clays and organic matter, or as insoluble deposits, and therefore are best applied as a chelated foliar spray.

Potassium: A major element essential for many enzymatic processes.

Sulphur: Essential for protein formation, chlorophyll production, Nitrogen fixation in legumes and ruminant micro-organisms.

Magnesium: Involved in Chlorophyll function, respiration, Phosphate metabolism, enzymatic processes.

Manganese: Involved in enzymatic processes, increases availability of Phosphorous and Calcium.

Iron: Important for the formation of Chlorophyll and the carriage of oxygen.

Boron: Essential for pollination, seed and cell wall formation, sugar translocation and protein formation.

Zinc: Essential for the synthesis of plant growth regulators, enzymatic functions and some metabolite processes.

Molybdenum: Required for the synthesis and function of nitrate reductase an enzyme that reduces nitrates to ammonium within the plant. Important for nitrogen fixation in clovers and similar plants.

Cobalt: Important for all plant growth and animal nutrition.

Selenium: Important for animal nutrition.

Pasture and Lucerne Recommendations: 5L/ha after grazing or cutting.

Application with **Ectol PROTECT AND GROW**, is a unique plant organic fertiliser, that stimulates growth, and increases starch, protein and yields in wheat and total metabolisable dry matter in pasture. **Nitrotain™TE** is ideally suited to be combined with **Ectol PROTECT AND GROW** and may be applied to all photosynthesizing crops. Apply 3L/ha of **Nitrotain™TE** + 5L/ha of **Ectol PROTECT AND GROW** after emergence, grazing or cutting.

Mixing with other crop protection products:

Nitrotain™TE may be mixed with most crop protection products, but a jar test is recommended.





Crop Application

Ectol effects the growth of plants by increasing the production of sugars via photosynthesis and the production of proteins.

The crop benefits are more about crop quality rather than dry matter production.

The higher concentration of crop sugars assists the plant resist pathogenic diseases.

General Protocol:

Cereal crops: one to two applications of 4L/ha between run-up and dough stages.

Lucerne: 5L/ha mid-way between cutting or grazing.

Trial data: The following trial data relates to trials conducted by Weldon Studies in NZ, Landmark Young and Delta Ag, Harden.



**Frost Protection
Heat Protection
Disease Protection**

HEALTHY PLANT GROWTH

Ectol Crop Stress Protection for Wheat and Canola.

The natural bio-protectants found in Ectol are derived from plant extracts including deep ocean kelp. Ectol assists crop protection from stresses caused by frost, cold, heat, salinity and disease.

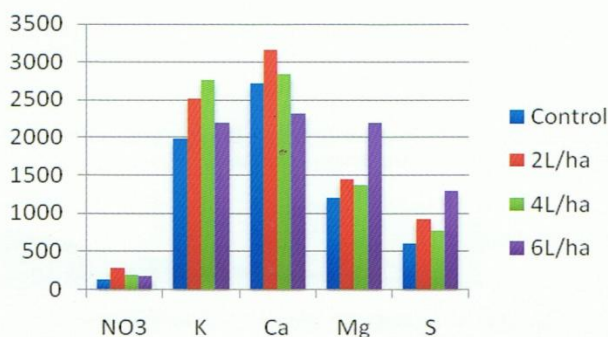
Stress is the "hidden enemy" of plant health, growth and yield, usually unseen by the naked eye and is instrumental to the onset of crop disease.

Osmoprotectants, amino acids, complex sugars, Potassium, Phosphorous, Nitrogen and a selection of micro-nutrients contained in Ectol, help to boost the resistance to disease and increase yields in broad acre crops by up to 10% and more.

Ectol is an easy to handle liquid foliar that may be mixed with most crop protection products.

Wheat and Canola Production Benefits

Wheat and Canola crops can come under extreme stress from frost and cold wet soils in spring, drought, heat, and fungal diseases. At lower rates of application Ectol will increase the uptake of essential elements from the soil, improving the effectiveness of fertiliser applications. As rates increase this uptake is reflected in higher growth rates, with the response reflecting growing conditions.



Crop trials conducted in Victoria Australia in 2008, demonstrated increased nutrient levels of Nitrogen, Potassium, Calcium, Magnesium and Sulphur plus a number of key micronutrients.

Healthy crops protected with Ectol have higher rates of photosynthesis and growth, with improved yields and crop quality.

Financial Benefits

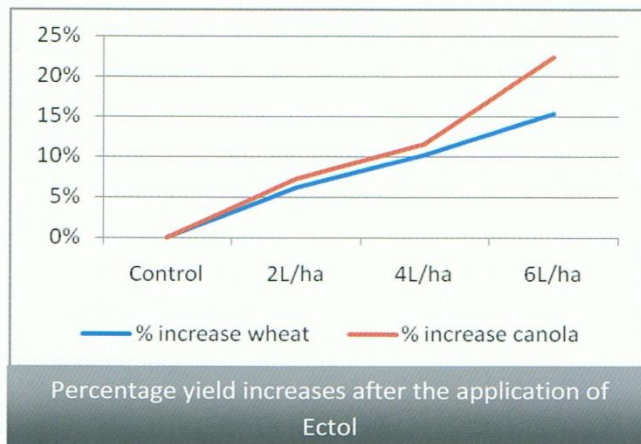
When Ectol is applied to Wheat, it is recommended the predicted crop yield is over 3 tonnes per hectare, with a market price of \$200 or more per tonne.

Trials conducted in Victoria in 2008 demonstrated significant yield and revenue increases (based on an Ectol cost of \$8/L and wheat at \$291/tonne). At the recommended rate of 2 by 4 L/ha the net benefit was 82/ha.

Wheat: Application rates	Yield Increase from control	Increase %	\$ Benefit less application cost/ha
2L/ha	0.3 t/ha	6%	\$55
4L/ha	0.5 t/ha	10%	\$82
6L/ha	0.75 t/ha	15%	\$122

Ectol applied to Canola on parallel trials increased both yields and oil production. At the recommended rates of 2 by 4 L/ha the net benefit was \$134/ha.

Canola Appln rates	Yield increase from control	Inc. %	Oil yield increase	\$ Benefit less application cost/ha
2L/ha	0.15t/ha	8%	4.8%	\$91
4L/ha	0.25t/ha	13%	8.2%	\$134
6L/ha	.55t/ha	29%	5.1%	\$290



Ectol – Recommended foliar frost resistance and growth promotant programme

Wheat:

Frost Protection: 4L/ha 3 days before event for about 10 days protection.

Increased plant health and yields:

Recommended 2 applications at 4L/ha. (In high yielding soils higher applications may be applied.)

First application at stem elongation with the flag leaf visible .

Second application at anthesis complete.

For dryer climates one application at 2L/ha will provide some protection and yield benefit.

Compatibility: Ectol may be mixed into most pesticides and fungicides by addition to diluted spray tank. Ectol may also be mixed with foliar fertilisers.

Method: Boom spray.

Canola:

Frost Protection: 4L/ha 3 days before event for about 10 days protection.

Increased plant health and yields: Two applications, both applications at 4 to 6L/ha.

First application of Ectol at rosette stage.

Second application at the bud stage.

Application rates may vary with geographic location.

Compatibility: Ectol may be mixed into most pesticides and fungicides by addition to diluted spray tank. Ectol may also be mixed with foliar fertilizers.

Method: Boom spray.

Pack size: 200L and 20L drums.

Contact Us

Australia

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Or Visit www.ectol.com.au

Disclaimer: The above recommendations are based on trials and may vary depending on conditions



ECTOL STARTER

Crop nutrient for direct incorporation with seed or foliar application

General Information: Ectol Starter is a mixture of protected Phosphorus, Nitrogen and Potassium that is safely applied in furrow or sprayed onto crops as a foliar application. It will not "burn" sensitive seeds or seedlings. The Phosphorus complex avoids immobilisation and lock-up of Phosphorus in acid or alkaline soils and reduces the loss on Nitrogen from leaching and Phosphorus as run-off.

Recommendations: For application to the soil providing immediate nutrients on germination, to emerging seedlings and ongoing nutrients to crops.

ANALYSIS

14:12:8

Total Nitrogen	14%	Humates
Total Phosphorus	12%	Fulvates
Total Potassium	8%	Lignosulphonates
Molybdenum	0.0005%	Kelp
Boron	0.025%	

Compatibility: can be mixed with crop protection and herbicide products subject to a jar test.

Storage and Handling: Store under cover and out of direct sunlight. Contents may settle so mix before using. Best used within 12 Months of purchase. Non toxic and non inflammable. Avoid contact with skin and eyes. Avoid breathing spray and mist.

CROP	RATE/DILUTION	NOTES
Cereal Crops, Legumes, Pulses, Maize	10L/ha to 50L/ha	As determined by crop requirements, drill with seed or spray leaves.
Pasture, Turf	20L/ha	Spring and Autumn spray applications.
Potatoes	10L/ha to 50L/ha	Apply in furrow or post emergence.

Application: Add Ectol Starter to sufficient water to achieve cover.

MANUFACTURED BY
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www.ectol.com

**NET
CONTENTS**
○ 20L
○ 200L
○ 1000L



Analysis	14:12:8
Total Nitrogen 14%	Total Phosphorus 12%
Total Potassium 8%	Molybdenum 0.0005%
Boron 0.025%	Humates
Fulvates	Lignosulphonates
Kelp	

General Information: Ectol Starter is a mixture of protected Phosphorus, Nitrogen and Potassium that is safely applied in-furrow. It will not "burn" sensitive seeds or seedlings. The Phosphorus complex avoids immobilisation and lock-up of Phosphorus in acid soils and Calcareous soils (high buffering index) and reduces the loss from Phosphorus run-off in low buffering soils. The Nitrogen complex, avoids the atmospheric and leaching loss of Nitrogen and the acidification of soils. Ectol Starter is an efficient alternative to DAP use in broad-acre crops and where higher phosphorus applications are required.

Recommendations: For application to the soil, providing immediate nutrients to germinating seeds and emerging seedlings and supplying ongoing nutrients to the crop, or sprayed onto the leaves, preferably in the early growth stages.

Compatibility: Can be mixed with crop protection and herbicide products subject to a jar test.

Crop	Rate/Dilution	Notes
Cereal Crops, Legumes, Pulses, Maize, Fodder Crops	10L/ha to 50L/ha	As determined by the crop requirements. Apply in furrow or post emergence.
Pasture and Turf	20L/ha	Spring and Autumn spray applications
Potatoes	10L/ha to 50L/ha	Apply as crop planted, preferably in furrow. As a side dressing as required.

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Seedling and Crop Requirements:

Phosphorus:

Phosphorus (P) plays a role in photosynthesis, respiration, energy systems, early root development and growth and is a component of phospholipids and nucleic acids. It is an important plant macronutrient and makes up about 0.2% (0.002ppm) of the plants dry weight.

Most of the P is needed in the first six to eight weeks after sowing. In the case of cereal crops it helps set-up yield potential by maximising tiller numbers and head size. In some soils up to 65% of total plant P comes from the early applications of applied fertiliser. It is important therefore that adequate P is available to the emerging seedling.

Phosphorus is particularly immobile in the soil and most crops only recover 20 to 30% of the applied P fertiliser in the year of application. This is partly due to the fact that the placement of the fertiliser is away from the seedling and by the time the roots reach the fertiliser it has been immobilised in the soil. Immobilisation can be due to reactions with Aluminium, Iron and Manganese in acid soils, or Calcium in calcareous high pH soils. Complexes can also form with the organic matter and the P can be bound onto certain clay surfaces. Soil microbes are also responsible for the tying up and the releasing, or mineralisation, of organic P. Generally, between 20 to 80% of the total P in the soil is present in the organic fraction.

Total soil P may be up to 3000kg/ha, but the amount in solution and available to plants, typically, is less than 4kg/ha. The key to P fertility is to not only have the P in solution, but to have the necessary physical conditions and biological activity in the soil, to replenish it as it is taken up by the plants.

Total crop requirements vary, but the standard removal of P would be as follows:

Cereals: 3 to 4 kgs/tonne

Maize: 3 kgs/tonne

Maize Silage (DM): 2 kgs/tonne

Canola: 7 kgs/tonne

Cereal hay: 2kgs/tonne

The uptake of P by the plants is usually in the H_2PO_4 form and due to the low soil concentration of P and the relative high concentration in the plant, energy is required. There are a number of pathways into the plant, but once in the plant the P is moved up through the Xylem, but is also translocated as an organic compound to all parts of the plant via the Phloem.

Foliar Uptake of P: There is greater interest in the concept of applied liquid P as P fertilisers are becoming increasingly expensive and farmers are looking to reduce the up-front costs.

GRDC project code: UA00139. Take home messages:

- "Leaves need to be healthy to uptake foliar applied phosphorus. Wheat leaves that are severely deficient in phosphorus (P) cannot take up foliar applied P as the leaf structure is compromised. An adjuvant is required in the formulation for the P applied to stick to

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the leaf and be taken up. However, the type of adjuvant does not appear to be important, as long as it contains a surfactant and is compatible with the fertiliser. Earlier applications of foliar P (tillering) results in a lower fertiliser recovery than at flag leaf emergence through to mid-booting. It is possible to increase wheat P uptake using foliar P application but we have not increased grain yield (in the growth room and after one year of field trials). "

Mycorrhizae in P Uptake: There is a general view that P uptake by plants occurs as a direct consequence of uptake in the soil by the roots. However in 90% of land plants, symbiotic associations are formed with Mycorrhizae fungi. These beneficial fungi exchange carbohydrates for P with the plant and affect a significant increase in the roots absorption area. Managing soil conditions conducive to Mycorrhizae, or even the addition of Mycorrhizae to the soil, is a sound management practice.

Nitrogen:

Nitrogen is the most important macro-nutrient and impacts the root uptake of Phosphorus. Nitrogen is an essential element for the production of amino acids, nucleic acids, proteins, vitamins for plant growth, energy reactions and the production of Carbohydrates.

Nitrogen Efficiency:

Nitrogen Fertilisers tend to be inefficient as they are highly soluble with Nitrate Nitrogen being leached from soils especially under irrigation, or ammonium Nitrogen being lost to the air as ammonia. Both forms are also acidifying by carrying Calcium and Magnesium out of soils or by the buildup of H⁺ ions. Acidification deep in the soil is extremely difficult to rectify.

The Nitrogen in Ectol Starter is formulated to negate Nitrogen loss by chelating or complexing the Nitrogen, avoiding the atmospheric or leaching losses and soil acidification. These stable forms of organic nitrogen are rapidly transferred into the plant via leaves or roots and most importantly will not damage seeds or seedlings.

Potassium:

Ectol Starter contains Potassium, an essential element critical to the synthesis of proteins from applied Nitrogen. The Potassium in Ectol Starter further enhances the efficiency of Nitrogen utilisation. Potassium has limited mobility and is often unavailable to plants in sandy soils or dry conditions.

Potassium does not form organic complexes in the plant but is essential to many enzymatic processes and regulatory roles within the plant.

Molybdenum (Mo) :

The important micronutrient is held in Ectol Starter as an anionic chelate and is exceedingly important to the plant as the Mo containing enzymes reduce the Nitrate (No₃) molecules in the plant to an organic form as the first step to protein production. If this process does not occur there is a buildup of nitrate in the plant which impacts cell wall stability, leading to "leaky cells", a loss of cell sap and cell death.

The nitrogen absorption is highest in the first 4 weeks of plant life and the nitrate levels are 10 to 100 times higher than at the later stages of plant life. Even if Mo is at normal

or adequate levels, it's concentration should be above normal levels to ensure the maximum conversion of nitrates in the early stage of growth.

Boron (B)

Boron deficiency has been shown to affect most of the nutrient concentrations, uptake and balance in the plant tissues. The most important role for B is possibly its relationship with Calcium where it forms Calcium-Boron-Sugar complexes and directly affects the integrity of cell membranes and membrane permeability.

Humates and Fulvates:

These naturally occurring substances, which are derived from the aging of organic matter, have been shown to increase the uptake of minerals by roots and appear to have a stimulating or hormonal function within the plant.

Ectol Starter Smart Technology:

Ideally the germinating and emerging seedling needs an immediate source of nutrients and any restriction at this stage in the plant's life cycle significantly impacts yields. The application of Ectol Starter to the seed ensures the seed has a critical nutrient supply and unlike dry fertiliser will not damage the seed. Furthermore, the greater efficacy of Ectol Starter reduces the amount of crop nutrient that needs to be applied as a starter. However if the planter is not setup to allow for in-furrow planting, apply as a foliar with sufficient water to ensure cover.

Storage and Handling: Store under cover and out of direct sunlight. Contents may settle; mix before using. Best used within 12 Months of purchase. Nontoxic and nonflammable. Avoid contact with skin and eyes. Avoid breathing spray and mist.

For more information contact: John McKay 0438 918 135 (Aust) or +61 438918135 (NZ) or Russell Speed 0427 839369 (Vic) email: johnmckay@fmn.com.au

Guano Phosphate Rock

(Organic Certified)

Granulated Guano Phosphate Rock is a slow release natural form of phosphorus containing 9.4% Phosphorous of which 50.5% is readily available (50.5% citrate solubility) with the balance released over 3 to 5 years.

Key features:

- Reactive phosphate rock (9.4% P),
- Ideal for acid soils, non acidifying to soil,
- High liming index (21.9% CaO),
- Contains Mg, K and Trace Elements,
- Supports soil biota.

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