

BioStart N & Digester Maize Grain Trial

Bay of Plenty 2012 - 2013
Increased yield with less units of conventional nitrogen fertiliser used



BioStart N is a new product containing nitrogen fixing bacteria which converts atmospheric nitrogen to plant-available ammonium nitrogen in the soil. A 2013 Bay of Plenty, New Zealand trial showed that combining BioStart N and BioStart Digester (a decomposer activator) resulted in less units of conventional nitrogen fertiliser being used, a yield increase of 19% over the control and an additional return of \$1,122/ha*.

BioStart N and Digester maize grain trial 2012/13

John Magee, Te Puke, Bay of Plenty, New Zealand

John Magee grows 24 ha of maize on his farm east of Te Puke. Maize Pioneer 34P88 was sown in October 2012 and harvested by Litchfield Contracting in May 2013.

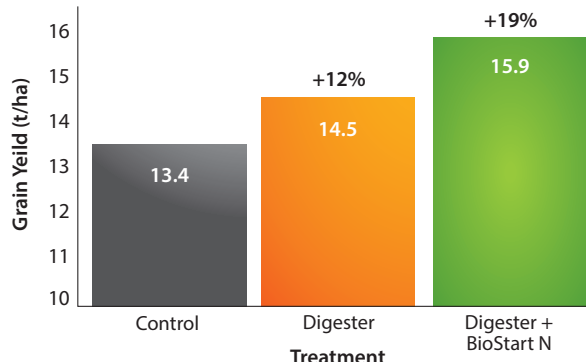
There were three trial blocks:

- Control block
- Block treated with 4L Digester/ha
- Block treated with 4L Digester/ha and 10mL BioStart N concentrate/ha

Treatments were applied on 26 July 2012.

Grain yield increased by +19% or 2.5 t/ha versus the control

Bay of Plenty Trial Maize Grain Yield (t/ha) 2013



Note: All treatments exceeded the 2013 maize grain yield national industry standard of 11.8t/ha.

Increased financial returns by \$1,122/ha* (based on 2013 pricing at the time of the trial)

- Financial returns increased by \$1,122/ha for an investment of Digester/BioStart N at \$106/ha.
- **Less units of conventional nitrogen fertiliser used, saving \$194/ha**
 All blocks had the same fertiliser program except the BioStart N and Digester block which did not receive the 300kg Urea side dressing. This saved \$194/ha which more than covered the cost of BioStart N/Digester at \$106/ha.

*All prices exclude GST. Gross return is based on a \$420/t contract maize grain price x grain yield t/ha. Fertiliser cost is based on Ballance's 2013 price book x actual application rates. BioStart Digester is costed at 2013 RRP of \$19/L x 4 L/ha. BioStart N is costed \$30/ha (at 10 mL/ha). All other costs are assumed to be the same for the crop.

Returns	Control	Digester	Digester + BioStart N
Yield (t/ha)	13.4	14.5	15.9
Yield increase (t/ha)		1.1	2.5
Gross return (\$/ha)	\$5,628	\$6,090	\$6,678
Fertiliser cost (\$/ha)	\$566	\$566	\$388
Digester cost (\$/ha)		\$76	\$76
BioStart N cost (\$/ha)			\$37.50
Total fertiliser + BioStart costs	\$566	\$642	\$501.50
Return after fertiliser/BioStart costs (\$/ha)	\$5,062	\$5,448	\$6,184
Increased return (\$/ha)		\$386	\$1,085

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Increased grain mineral levels

2013 kernel mineral analysis results show the Digester and BioStart N treatment produced kernels with more minerals in the grain resulting in a higher nutritive value for livestock.

- **Kernel crude protein levels + 65%.**
This reflects a better BioStart N availability.
- **Kernel ash content + 25%.**
This means there are more minerals in the grains.

Note: Dry matter, fibre and metabolisable energy for all of the grain samples were similar across all treatments.

2013 Kernel Mineral Analysis	Crude Protein	Ash
Control	5.1%	1.2%
Digester	7.6%	1.4%
BioStart N & Digester	8.4%	1.5%

Relative to the control	Crude Protein	Ash
Digester	149%	117%
BioStart N & Digester	165%	125%

Improved N, P, S levels for plant growth

2013 leaf mineral analysis results show that the Digester and the Digester and BioStart N treatments increased the levels of anionic macro elements N, P and S versus the control.

This is important as N, P and S often limit plant growth and are missing from most New Zealand soils.

2013 Leaf Mineral Tests	Nitrogen	Phosphorus	Sulphur
Control	2.3%	19%	16%
Digester	2.6%	21%	19%
BioStart N & Digester	2.7%	23%	19%

Relative to the control	Nitrogen	Phosphorus	Sulphur
Digester	113%	111%	119%
BioStart N & Digester	117%	121%	119%

About BioStart N and Digester

Digester is a biological decomposition activator which contains extracts from the fermentation of *Pseudomonas putid*, a soil microbe. When Digester is sprayed onto the soil it activates the naturally occurring soil microbes responsible for decomposition to increase in number. The increased number of decomposition microbes then convert crop trash and dead roots into humus. This helps improve soil structure for minimal tillage and creates an available carbon source for BioStart N.

BioStart N contains *Azotobacter chroococcum*, a free-living nitrogen fixing bacteria which converts atmospheric nitrogen to plant-available ammonium nitrogen in the soil. BioStart N produces nitrogen over a prolonged period unlike conventional nitrogen inputs, and as a biological product, works in sync with the plant's growth periods. BioStart N can be used to complement conventional nitrogen inputs.

Directions for use for maize grain crops

After harvest: Co-apply 4L/ha of Digester and 10 mL of BioStart N Concentrate onto crop trash through standard spray equipment and lightly incorporate. BioStart N contains living microbes, and should be applied directly onto the soil in the late afternoon. Refer to the BioStart N label for further application instructions.

This trial used BioStart N 20 L (cfu 10^7 /ml) applied at 2 L/ha = 2×10^{10} /ha. This has been converted to the equivalent rate of BioStart N Concentrate (cfu 2×10^9 /ml) applied at 10 mL/ha = 2×10^{10} /ha or 20 billion N-fixing bacteria per ha.



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