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GREEN LIGHTNING[®]

www.greenlightning.ag

Trial Data 2024

Green Lightning is a low-cost, electricity-generated, salt-free nitrogen supplement applied primarily as a foliar spray or side dressing in crop sowing. All application methods are currently in trial phase. In 2024, GL was tested on a range of crops across the US. In all but one trial, yields gains were found and in all cases, Urea and UAN costs were significantly reduced.

Green Lightning Boosts Corn Yields in Manitoba Trial

Manitoba is the third largest corn producing province in Canada (right behind Quebec and Ontario), with only the southernmost quarter being a suitable climate for corn production. This year some growers were fortunate enough to add some **Green Lightning** to their program.

A 20-gallon foliar application was done at tasseling. This cost them less than \$0.44 in electricity to produce—yes, forty-four cents to add 20 gallons of product—figuring that it's about \$0.11 an hour to run their machine, which makes 6.25 gallons an hour.



Trial Summary

Location:	Carman, Manitoba
Crop:	Corn
Application Stage:	VT (Tasselling)
Application Date:	30 July 2024
GL Application Rate:	187 L/ha (20 gal)
Application Type:	Foliar-only
Cost to Produce:	\$1.09/ha
Fertility Program Applied	140 kg N 90 kg P 56 kg K 22 kg S - per hectare (Based on \$0.11/hr electricity and 23.66 L/hr output)



Yield Results

	Green Lightning	Untreated Check
Total Weight Harvested	4,145 kg	3,571 kg
Bushels Harvested	163.21 bu	140.54 bu
Area Harvested	0.283 ha	0.283 ha
Yield (t/ha)	8.22	7.00
Harvest Moisture (%)	21.4%	21.5%
Bushel Weight (as is)	52.20 lbs/bu	52.90 lbs/bu
Bushel Weight (15.5% MC)	56.00 lbs/bu	56.80 lbs/bu

Key Takeaways

- **+17% Yield Increase** with **Green Lightning**
- **+1.22 t/ha advantage** over untreated check
- Only **\$1.09/ha to produce** the **GL** used in this trial
- No tank mix required - applied foliar-only at VT stage

**An extra ton per Ha
for \$1.09 per Ha**

Green Lightning Efficiently Added to Program

A common way of adding **Green Lightning** to your regular program is using it as a carrier for fungicide instead of water. This will add nitrogen efficiently and affordably to your current program and can increase the health of the plant as well as increase protein content.

The **GL** form of nitrogen has not been seen to burn plants due to the lack of salt, which is another plus giving the crop an extra dose of nitrogen without adding an overload of salt to the plant or soil. As we all know, adding nitrogen typically will increase yield in any crop or plant, so providing the crop with additional nitrogen in a pure form towards the end of the growing season may increase yield, which is something every grower wants.

This way of adding nitrogen is becoming popular on some farms across North America, including these Canadian growers below. There are three charts below which are all very similar programs. Something interesting is that the lowest increase was 8 extra bushels per acre which was the (orange) chart which had **Green Lightning** sprayed a few weeks earlier than the other two other charts which had 11 and 15 bushels higher per acre. Does this clearly indicate that a later application is more effective? Possibly, but we do need more data to be sure of that assumption. See charts below!

	Fungicide Date	Yield (t/ha) – Water	Yield (t/ha) – GL	Yield Gain w GL (kg/ha)	% Increase
◆ Orange	July 1	17.56 t/ha (280 bu/ac)	18.06 t/ha (288 bu/ac)	+500 kg/ha	+2.8%
● Red	July 24	15.06 t/ha (240 bu/ac)	15.76 t/ha (251 bu/ac)	+700 kg/ha	+4.6%
● Green	July 27	16.76 t/ha (267 bu/ac)	17.75 t/ha (282 bu/ac)	+990 kg/ha	+5.9%

(Conversion: 1 bu/ac corn ≈ 0.06277 t/ha)

Observations

- **Yield increased in all trials**, with the latest application producing the highest gain: **+990 kg/ha or +5.9%**.
- The **earliest application** showed the lowest gain: **+2.8%**.
- This may suggest **later-season GL timing boosts results more**, but more trial data is needed to confirm.

Key Takeaways

- **Efficient nitrogen delivery** without extra passes — just swap water for **GL**
- **No burn risk** thanks to salt-free profile
- **Yield increases of 2.8% to 5.9%** observed across all sites
- **Trend: Later GL application = better yield gain** (needs more data)

Corn Review With Green Lightning

We were fortunate enough to get permission from a grower in Southeast Pennsylvania to publish his 2024 corn trial data here. The side-by-side comparison was done on yellow corn using his conventional program of UAN vs. a 100% **Green Lightning** program.

To start, he put 6 gallons of **Green Lightning** in-furrow, then began adding 25 gallons of **Green Lightning** foliar at a time for four applications as the corn began to grow. On the traditional program, he put 18 gallons of UAN with the planter, then 40 gallons of UAN side dressed. The corn was very comparable in terms of growth rate and color.

Trial Summary

Trial Date: 2024 Season
Crop: Yellow Corn
Location: Southeast Pennsylvania



Treatment Programs

	Green Lightning	Traditional
First N Application	56 L/ha in-furrow	169 L/ha with planter
Additional N	234 L/ha foliar total	375 L/ha side-dressed w drop tube
Total Nitrogen Source	100% Green Lightning	100% UAN (27-0-0-3)

Yield Results

	Green Lightning	Traditional
Yield (t/ha)	15.30 t/ha	15.68 t/ha
Yield Difference	-0.38 t/ha	
Yield Difference	-2.4%	(Assuming 1 bu/ac = 0.06277 t/ha for corn)

Grower Comment

"With the savings of nitrogen and current grain prices, we profited **\$49 per acre** on the **Green Lightning** even with the yield loss."

— *Pennsylvania grower*

Converted: \$49 USD per acre = **\$121 per hectare**

Key Takeaways

- **2.4% yield decrease** with **Green Lightning** (-0.38 t/ha)
- Total **profit gain = \$121 per hectare** with the **GL** program



Drone Applied Green Lightning Corn in Kansas

A grower in Central Kansas decided to see if he could cut out part of his nitrogen cost by trialing **Green Lightning** beside his regular program. He'll typically band UAN-28 on both sides of the row at planting and apply 135 pounds of N per acre.

He saved a plot to see how well **Green Lightning** performs and applied the product by drone.

"First application was 52 gal/**Green Lightning** applied at 3 feet tall with 1 gal/boost of sugar on 6/3/2024" says the Kansas grower.

The second application was on 7/3/2024 and was 35 gal/**Green Lightning** again with a gallon of boost.

"Then on 7/6/2024 we applied 1 gallon of Amino acid-15 and 1/2 gallon of Liquilife" says the grower.

The part of Kansas is near Wichita, in Harvey County where they can expect 100–120 bushel of corn per acre.

	Traditional	Green Lightning
Nitrogen Source	UAN 28	GL + amino acid
Nitrogen Applied	151 kg N/ha	~812 L/ha GL + 9.4 L/ha amino acid
Application Method	Banded between rows	Foliar (drone-applied)
Yield (t/ha)	8.61 t/ha	8.85 t/ha
Yield Difference	—	+0.24 t/ha
% Increase	—	+2.8%

*Conversion: 137.11 bu/ac = 8.61 t/ha, 141.03 bu/ac = 8.85 t/ha (corn)
Application total: 87 gal/ac **GL** = 812 L/ha; 1 gal/ac = 9.4 L/ha*

Key Takeaways

- **Green Lightning** foliar program **beat UAN 28 by 0.24 t/ha**
- Delivered via **drones** — cost-effective, compaction-free
- Applied **less total nitrogen** but achieved **higher yield**
- Yield exceeded local average (6.3–7.5 t/ha) by over **1.3–2.5 t/ha**

Green Lightning vs. UAN-32 in Corn-on-Corn Rotation

A trial was done in Cass County, North Dakota, earlier this year with a side-by-side comparison of **Green Lightning** vs UAN 32. The trial went surprisingly well considering the fact that it was corn planted after corn last year. The grower is a master at his work, with a wide variety of crops over thousands of acres near a small town in the southeastern portion of North Dakota.

*"Both fields had some urea applied in fall, but everything else is **GL** vs 32... I was very surprised to see what I saw in this trial,"* says the North Dakota grower.

According to the USDA, Cass County can expect 161 bushel per acre on an average year, so seeing the chart below shows the trial went very well. He applied **Green Lightning** at knee high, all foliar with the sprayer, and decided the UAN 32 would be knifed in on the traditional program. *"The corn looked identical in growth and appearance,"* says the grower.

Trial Summary

Date:	2024 Season
Crop:	Corn (following corn)
Location:	Cass County, ND
Soil Prep:	Fall urea applied to <u>both plots</u>



Trial Comparison

(Conversion: $208 \text{ bu/ac} \times 0.06277 = 13.05 \text{ t/ha}$)

	UAN 32	Green Lightning
Nitrogen Source	Fall Urea and UAN 32	Fall Urea and Green Lightning
Application Type	Knifed in	Foliar spray at V6 (knee-high)
Application Rate	187 L/ha (20 gal/ac)	281 L/ha (30 gal/ac)
Yield (t/ha)	13.05 t/ha	13.05 t/ha
Power Cost	—	\$1.24 per hectare

Key Takeaways

- **Same yield** using foliar **Green Lightning** vs UAN 32
- **Electricity cost** to produce **GL**: only **\$1.24/ha**
- **GL** applied with sprayer — no need for knife injection or UAN handling
- Potential benefit to **soil and plant health** from low-salt input
- Both crops yield was **29% above county average** (USDA avg. = ~10.1 t/ha)

At \$1.20p/L AUD for UAN 32 Vs. \$0.22p/L had this been in Australia, the grower would have saved \$162 p/Ha

Washington Wheat

If you're not ready to use Green Lightning as your full N application, consider adding it to your program. A grower in Eastern Washington simply added 20 gallons of **Green Lightning** to their regular program and saw a 4.23 bushel increase in yield in comparison to the field that had no **Green Lightning** added.



The cost of electricity is about \$0.10/kWh in their area and their machine takes 1,100 watts per hour, meaning it cost them \$0.11 per hour to run their unit, and their machine style makes 6.25 gallons of product per hour, so in 4 hours that's about 25 gallons of product, which means less than \$0.44 in electricity yielded an additional 4.23 bushels per acre.

Green Lightning Added

187 L/ha (20 gal/ac)

Electricity Rate

\$0.10 USD per kWh

Machine Power Consumption

1.1 kWh per hour

Output Rate

6.25 gal/hr ($\approx$ 59 L/hr)

Cost to Produce 187 L/ha GL

\$1.03/ha (4 hr run = \$0.44 total)

	Yield Gain (bu/ac)	Yield Gain (t/ha)*	% Increase
Green Lightning	+4.23 bu/ac	+0.284 t/ha	6.7%

Conversion: 1 bu/ac wheat $\approx$ 0.0671 t/ha

Key Takeaways

- For **just \$1.03/ha**, the grower gained **+0.284 t/ha** of wheat
- Ultra low-cost nitrogen supplement using **Green Lightning**
- No salt, no burn
- Simple foliar addition
- Strong ROI for **minimal cost and zero field disruption**

Canola with Green Lightning

In addition to the popular way of applying **GL** by adding it towards the end of the season on corn and wheat this year, canola was another major crop. Canada is the world's largest exporter of canola, growing over 30% of the entire canola market in mainly five of their provinces. **Green Lightning** was fortunate to cover and add nitrogen to many large operations in Saskatchewan, Manitoba, Ontario and other provinces this year and it sounds like they are liking what they see. Shown below are programs which had **GL** added to their program.

Trial Summary

Date: 2024 Season
Crop: Canola (LR 354PC Invigor Choice)
Location(s): Swan River, MB and additional operations in SK, ON, MB

Trial 1: Swan River, MB – Herbicide Timing Application

	Green Lightning	Control
Application Timing	June 29, 2024 (pre-bolting)	—
GL Rate	93.5 L/ha (10 gal/ac)	—
Fertility Applied (per Ha)	Same as control	154 kg N 45 kg P 28 kg K 28 kg S
Area Harvested	1.56 hectares	1.56 hectares
Yield (kg/ha)	2,174 kg/ha	2,035 kg/ha
Yield Difference	+139 kg/ha	—
% Yield Increase	+6.83%	—

+139kg/ha for \$20 per Ha.

Trial 2: Fungicide Carrier Comparison

	Water Carrier Only	Green Lightning Carrier
Urea Applied	292 kg/ha	292 kg/ha
Fungicide Application Date	May 16, 2024	May 16, 2024
GL in Tank Mix	No	Yes (187 L/ha or 20 gal/ac)
Yield (kg/ha)	2,980 kg/ha	3,368 kg/ha
Yield Difference	—	+388 kg/ha
% Yield Increase	—	+13.0%

+388kg/Ha for \$40 per Ha.

Key Takeaways

- **Green Lightning increased canola yields.**
- Effective both **pre-bolting** and as a **fungicide carrier**
- Replacing water with **GL** in fungicide pass **added measurable performance**



Potatoes in Washington State

The Columbia Basin in Washington is home to a wide variety of crops thanks to its temperate climate with a long growing season. Potatoes are a massively grown crop here with well over 160,000 acres in this small portion of the state. **Green Lightning** sparked growers' interest when they heard of the potential price cut of nitrogen in this highly nitrogen-requiring crop. The question is, does it work on potatoes and how should it be applied...

	Amount Applied	Application Type	Yield (t/ha)
No Fertilizer	None	—	26.89 t/ha
UAN 28	336 kg N/ha	In-furrow / sidedress / foliar	57.81 t/ha
Green Lightning	337 L/ha (side) + 1120 L/ha (foliar)	Sidedress + foliar	60.45 t/ha
Green Lightning	1490 L/ha total (foliar)	Foliar only	62.72 t/ha

Conversions: 1 ton/ac = 2.2417 t/ha; 300 lbs N/ac = 336 kg/ha; 160 gal/ac = 1490 L/ha

Now if you're wondering if **Green Lightning** is cost effective, let's do the math.

- Washington state price per kilowatt per hour: \$0.099
- Hours it takes to make 160 gallons of **GL** product: 26 hrs
- Cost in WA to run **GL** machine for 26 hours: \$2.57
- Cost per acre in **GL** to replace UAN 28: \$2.57

Ok, I don't know if those numbers blew your mind or not, but the trial shown above says **GL** was not only cheaper per acre (by a lot) but also **surpassed traditional N in yield by 2.2 tons per acre!**

Key Takeaways

- **Highest yield:** 62.72 t/ha with foliar-only **Green Lightning**
- **+2.2 tons/acre = +4.93 t/ha** over UAN 28
- **Cost to apply GL per hectare: just \$2.57** (vs. significantly more for UAN)
- **GL** is not only **cheaper**, but also **more effective** on a yield-per-cost basis

Wheat with Green Lightning

Everyone wants to see high yield and have low input cost no matter what crop you grow. Recently, Canadian growers have been harvesting their wheat, and not to mention the increase in yield by adding **Green Lightning** to their fields last year, this year they were fortunate to replace a big chunk of their nitrogen cost with **GL** and increase profit tremendously per acre on some fields.

	Green Lightning	Traditional
Spring N Application	44.8 kg/ha (ESN)	44.8 kg/ha (ESN)
Fall N Application	—	123.2 kg/ha (Super U broadcast)
GL Foliar Applications	93.5 L/ha on June 15 93.5 L/ha on July 7 187 L/ha on July 14	
Total GL Applied	374 L/ha	
Yield (t/ha)	5.36 t/ha	5.04 t/ha
Yield Advantage	+0.32 t/ha	—
Yield Advantage (%)	6.35%	

*Conversions: 1 bu/ac of wheat $\approx$ 0.0671 t/ha
0 gal/ac = 374 L/ha*

Cost Analysis (Saskatchewan)

- **Machine runtime:** 6.5 hours p/ha
- **Power cost:** \$0.20 CAD per kWh
- **Electricity used:** 6.5 hr $\times$ 1 kWh = 6.5 kWh
- **Electricity cost:** \$1.30 CAD/ha



Key Takeaways

- Yield increase of **+0.32 t/ha** using foliar **Green Lightning**
- Power cost per hectare: **only \$1.30 CAD**
- Higher profit, lower N cost, no fall N needed
- High-performing, efficient option for spring wheat in Canada

Chip Potatoes with Green Lightning

A large specialty crop grower in Eastern Washington's Columbia Plateau saw some excellent results after replacing their expensive calcium nitrate with **Green Lightning** water.

The machine they ran was the first style for 2024 which produced 2 equivalent pounds of N per gallon of product. The growers trialed the product side by side with their more traditional program which is typically 250 pounds of N per acre using calcium nitrate through pivot irrigation and added boron.

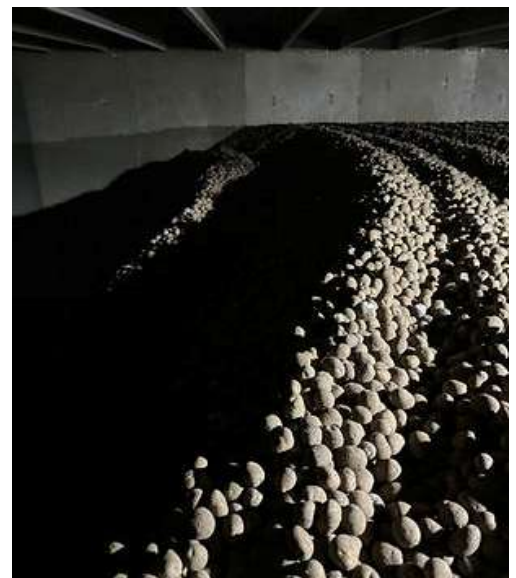
The **Green Lightning** was applied through pivot irrigation as well, but with no other source of N nor boron.

Regardless, even without the added micronutrients **Green Lightning** beat the traditional N in yield by over 3,800 pounds. The excellent performance in the **Green Lightning**-applied potatoes shows promising future harvests of high profit potatoes in Eastern Washington

Nitrogen Source	Green Lightning	Calcium Nitrate
Application Rate	1,215 L per Ha	280 kg of N per Ha
Application Method	Fertigation (pivot)	Fertigation (pivot)
Yield (ton/acre)	25.895	23.990
Yield (t/ha)	58.00 t/ha	53.78 t/ha
Yield Advantage	+4.22 t/ha	
Yield Advantage (%)	7.84%	

Key Takeaways

- **Green Lightning** yielded **+7.84%** while eliminating the cost of calcium nitrate and micronutrients
- High-efficiency, low-salt N delivery shows strong potential in potato crops





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