https://www.agricentre.basf.co.uk/limusperform

Limus®
Urease Inhibitor

Frontier

BASF
We create chemistry

TECHNICAL SUPPORT DOCUMENT LIMUS® PERFORM

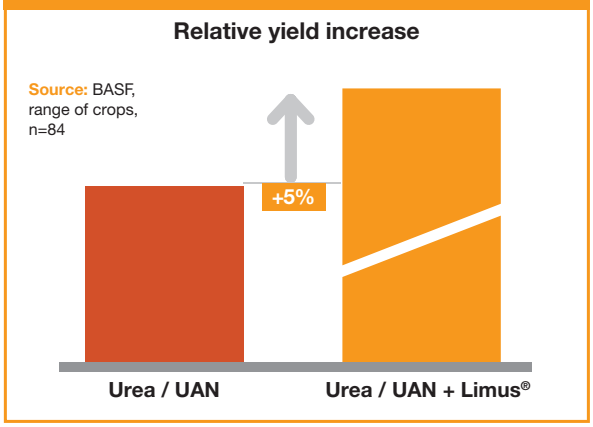
What is Limus®?

Urease inhibitor technology from BASF, Limus® Perform, was introduced to the UK market over five years ago.

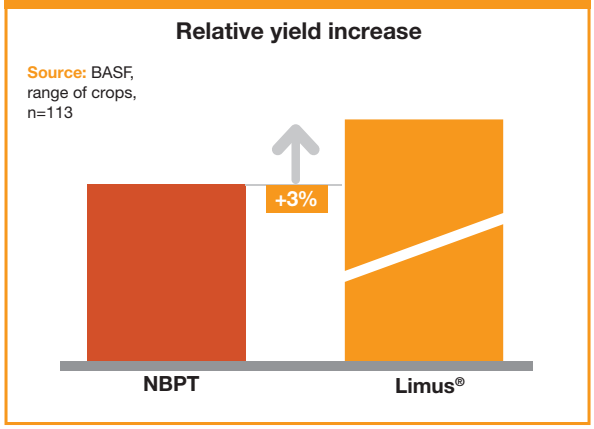
BASF has been working closely with Frontier to demonstrate how inhibited solid urea and liquid UAN fertiliser can benefit the grower. Optimal inhibitor technology improves nitrogen use efficiency whilst improving air quality by reducing ammonia emissions.

- Reduction in ammonia emission by up to 98% and improvement in nitrogen use efficiency
- Yield improvements of over 5% from straight UAN in a variety of crops
- The only urease inhibitor product containing the NPPT active
- Compared to straight NBPT products, efficacy is increased by 40% translating into a proven 3% yield uplift, according to ADAS trials

Limus® increases yield by 5% compared to standard urea

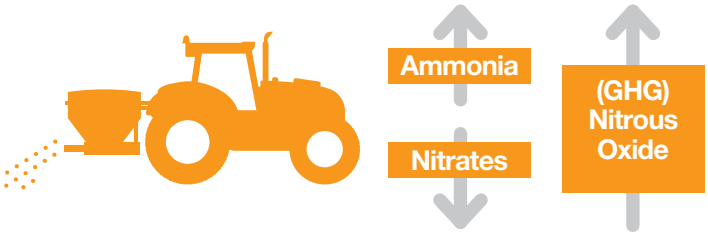


Over 113 trials, Limus® provides a yield uplift over single active urease inhibitors



Why use a urease inhibitor?

Nitrogen, whilst essential for crop growth, often comes with an economic and environmental cost.



In March 2022, DEFRA published its response to the consultation on reducing ammonia emissions, in which it supports the industry led proposal “option 4” which will utilise the use of urease inhibitors to protect solid urea and liquid UAN fertilisers, along with farm assurance schemes.

The current guidelines are aimed at reducing 11kt of ammonia emissions by this year, and the government has started collecting data of fertiliser sales, urease inhibitor sales as well as ammonia emissions. If sufficient ammonia reductions are not achieved the government will consult on regulations.

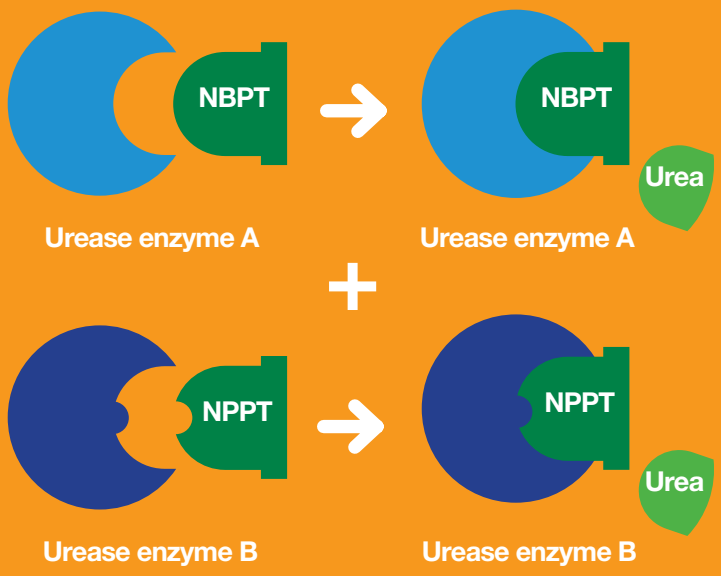
Policy makers may reconsider options that had previously been discussed. Such options had included a complete ban for urea use.

What makes Limus® unique?

Urease enzymes bind to urea and convert it to ammonium. This creates a pH spike and ammonia gas is often lost.

Urease inhibitors temporarily block urease enzymes, giving time for the urea to move into the soil, buffering the pH spike and minimising losses.

However, different urease enzymes require different urease inhibitors. Limus® is the only urease inhibitor available with two active ingredients (NBPT and NPPT), enabling it to bind to a wider variety of urease enzymes.



How does Limus® compare in trials?

Frontier & grower trials confirm Limus® Perform increases yield and quality

Trial	Yield increase (t/ha)	Grain Protein/ Grain N(%)	NUE (%)
2020 Winter Wheat (220kg N)	+0.40	+0.28	+7.3
2021 Winter Wheat (220kg N)	+0.23	+0.56	+7.0
2021 Spring Wheat (150kg N)	+0.36	-0.03	+4.0
2021 Spring Barley (110kg N)	+0.36	+0.08	+6.6

Source: Frontier replicated small plot trials – Bleasby & Haywold

2021 Maize (79kg N)	Fresh Yield (adjusted to 32% moisture)
UAN	52t/ha
UAN + Limus® Perform	58t/ha

Source: Grower trial - Essex - DAP & organic manure also applied to both areas

2024 TRIAL RESULTS : Frontier find that Limus® makes economic sense. An uplift too good to miss

Treatment	Yield (t/ha)	Yield Increase (t/ha)	MOIC
UAN Control	6.70	-	-
Limus Perform	6.87	+0.17	£22.99
NBPT 1	6.82	+0.12	£15.74
NBPT 2	6.81	+0.11	£14.71
NBPT 3	6.80	+0.10	£11.80
NBPT 4	6.71	+0.01	Loss

Source: Frontier
Spring Barley, Laureate - Bara Scotland
110kg N/ha
Spring Barley at £185/t

MOIC = Margin Over Input Cost

Limus® Perform FAQs

Will the nitrogen release from solid urea and liquid UAN in cold weather conditions be too slow for an optimal nitrogen supply?
No. If the temperature is so low that there is no transition of urea to ammonia, plants are also not actively taking up nitrogen. Under such conditions, there is also enough plant available nitrogen in the soil to cover the low needs of the crop.

Limus® can be applied throughout the season

Can be applied independent of weather conditions*

*As with all fertiliser, avoid use during periods of drought and snow and when ground is waterlogged.

How long will Limus® remain active once sprayed in the field?
The application rate of Limus® has been assessed to ensure a duration time of at least 14 days. Conditions, particularly temperature and moisture after application of the fertiliser will affect the length of activity, for instance, cool and dry conditions may extend the effectiveness beyond 14 days.

Does soil type and soil pH affect product performance?
Soils differ in many parameters. Soil properties that can change the rate of ammonia volatilisation and the interaction with Limus® are:

- pH - higher soil pH results in greater ammonia losses, therefore the greater the need for Limus®
- CEC (cation exchange capacity) - the lower the CEC, the higher the ammonia losses, therefore the greater the need for Limus®
- Urease activity in the soil - the higher the activity, also depending on the urease enzyme composition, the greater the losses of ammonia, therefore the greater the need for more Limus®

Is Limus® also suitable for no-till crop production systems?
Yes, it is particularly suitable for no-till systems as incorporation of urea into the soil will mitigate ammonia losses. Urease activity in no-till systems is higher compared to conventional cropping systems.

Two actives, too good to miss

Many will have liquid fertiliser containing urea, untreated and sat in farm stores. To enhance yields and ensure alignment with urea stewardship guidelines, Limus® Perform can be added to each sprayer load that is going to be applied. Limus® Perform is available from Frontier Agriculture-DON'T FORGET TO USE IT!

Compatibility with Crop Protection Products

Several crop protection products have been tested with Limus® Perform and liquid fertiliser. The addition of the Limus® Perform did not alter the existing compatibility of the product & liquid fertiliser. Best advice for mixing crop protection products into a spray tank with liquid fertiliser and Limus® Perform is not to use water, and to follow the sequence of: Liquid Fertiliser > Limus® Perform > Crop Protection Products.

If water is required to improve the compatibility of crop protection products with liquid fertiliser, then add the water, followed by crop protection products then half fill the spray tank with Liquid Fertiliser before adding the Limus® Perform.

Always read the label and product information before use. For further product information including warning phrases and symbols refer to www.agricentre.basf.co.uk/limusperform

For further information, please do not hesitate to contact your local BASF Agronomy Manager or the **BASF Technical Services Hotline on +44 845 602 2553**. Limus® contains N-(n-butyl thiophosphoric triamide – NBPT and N-propyl-thiophosphoric triamide – NPPT.

How to use Limus® Perform

1. **Fill spray tank with half the desired amount of fertiliser**
2. **Add the correct rate of Limus® Perform and mix thoroughly.**
3. **Continue mixing while adding remaining fertiliser**
4. **Use tank mix within 5 days**

Please see the Application Guide overpage for the correct rate for each liquid fertliser type.

Always read the appropriate Safety Data Sheets and wear appropriate PPE to ensure good operator safety when handling UAN / Limus® Perform.

Application Guide

Omex Products

Product Name	Analysis % (w/w)		Analysis % (w/v)		Limus® Rate (lt/m³)
Nitroflo 30	30%N		39.0%N		1.00
Nitroflo 30N + 6SO_3	30%N	6%SO_3	39.3%N	7.9%SO_3	1.00
Nitroflo 30N + 10SO_3	30%N	10%SO_3	39.8%N	13.3%SO_3	1.00
Nitroflo 28N + 2.5SO_3	28%N	2.5%SO_3	36.1%N	3.2%SO_3	0.90
Nitroflo 26N + 5SO_3	26%N	5%SO_3	33.3%N	6.4%SO_3	0.80
Nitroflo 24N + 7.5SO_3	24%N	7.5%SO_3	30.5%N	9.5%SO_3	0.70
Nitroflo 22N + 10SO_3	22%N	10%SO_3	27.7%N	12.6%SO_3	0.60
Nitroflo 20N + 12.5SO_3	20%N	12.5%SO_3	25.0%N	15.6%SO_3	0.50
Nitroflo 15N + 15SO_3	15%N	15%SO_3	18.3%N	18.3%SO_3	0.35

NitraSol Products

Product Name	Analysis % (w/w)		Analysis % (w/v)		Limus® Rate (lt/m³)
NitraSol N30	30%N		39.2%N		1.00
NitraSol N28	28%N		36.0%N		0.90
NitraSol N30 + 6SO_3	30%N	6%SO_3	39.6%N	7.9%SO_3	1.00
NitraSol N30 + 8SO_3	30%N	8%SO_3	39.8%N	10.6%SO_3	1.00
NitraSol N30 + 10SO_3	30%N	10%SO_3	39.9%N	13.3%SO_3	1.00
NitraSol N27 + 5SO_3	27%N	5%SO_3	35.0%N	6.5%SO_3	0.85
NitraSol N24 + 8SO_3	24%N	8%SO_3	30.1%N	10.0%SO_3	0.70
NitraSol N22 + 12SO_3	22%N	12% SO_3	27.6%N	15.1%SO_3	0.60
NitraSol N15 + 15SO_3	15%N	15%SO_3	18.0%N	18.0%SO_3	0.35

BFS Products

Product Name	Analysis % (w/w)		Analysis % (w/v)		Limus® Rate (lt/m³)
UAN N30	30%N		38.7%N		1.00
UAN N28	28%N		35.0%N		0.95
BFS 26 + 5SO_3	26%N	5%SO_3	32.3%N	6.2%SO_3	0.80
BFS 22 + 12SO_3	22%N	12%SO_3	27.1%N	14.8%SO_3	0.60
NitroSulph 30 + 6SO_3	30%N	6% SO_3	39.2%N	7.8%SO_3	1.00
NitroSulph 30 + 8SO_3	30%N	8%SO_3	39.3%N	10.5%SO_3	1.00
NitroSulph 30 + 10SO_3	30%N	10%SO_3	39.5%N	13.2%SO_3	1.00
NitroSulph 28 + 4SO_3	28%N	4%SO_3	35.7%N	5.1%SO_3	0.90
NitroSulph 26 + 10SO_3	26%N	10%SO_3	33.1%N	12.7%SO_3	0.80
NitroSulph 24 + 20SO_3	24%N	20%SO_3	31.4%N	26.2%SO_3	0.75

Other Liquid Fertiliser Products

Product Name	Analysis % (w/w)		Analysis % (w/v)		Limus® Rate (lt/m³)
Nuram 37N			37.0%N		0.95
Nuram 35N + 7SO_3			35.0%N	7.0%SO_3	0.85
Nuram 32N + 9.4SO_3			32.0%N	9.4%SO_3	0.75
Nuram 30.3N + 10.8SO_3			30.3%N	10.8%SO_3	0.70
Nuram 29N + 11.9SO_3			29.0%N	11.9%SO_3	0.65
Nuram 25N + 14.3SO_3			25.0%N	14.3%SO_3	0.50
Nuram 19N + 19SO_3			19.0%N	19.0%SO_3	0.30

For more information, visit agricentre.basf.co.uk/limusperform

Limus® contains NBPT + NPPT. Limus is a registered Trade Mark of BASF. Always read the label and product information before use. Ensure all warnings and restrictions on all labels are adhered to.