

# The Signpost Series

## ‘Pointing the way to a low emissions agriculture’

### Protected Urea

**Dr Patrick Forrestal & Dr David Wall**

*Teagasc,  
Crops, Environment and Land-Use Programme,  
Johnstown Castle, Co Wexford*



# Sources of N?

- Biological fixation from legumes
- Manure – mineral and organic N
- Fertilisers
- Atmospheric deposition



# Nutrients including N fertiliser: Where are the signs pointing over the next decade?



The Farm to Fork Strategy is at the heart of the European Green Deal

States the EU Commission's intention to:

“act to reduce nutrient losses by at least 50%”

Signals “will reduce the use of fertilisers by at least a 20% by 2030”

## Why?

Because, as outlined, nutrients not absorbed by plants are a  
“major source of **air, soil and water pollution** and of **climate impacts**”  
and

“It (fertiliser) has **reduced biodiversity** in rivers, lakes, wetlands and seas”

# Why Protected Urea Now?

We need to show progress towards reduced emissions  
Protected urea is the largest single tool on the table

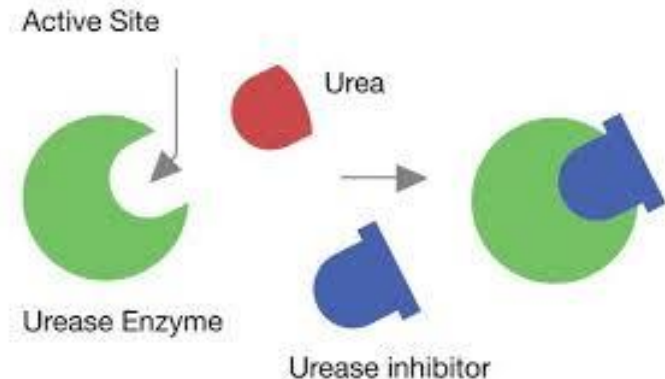
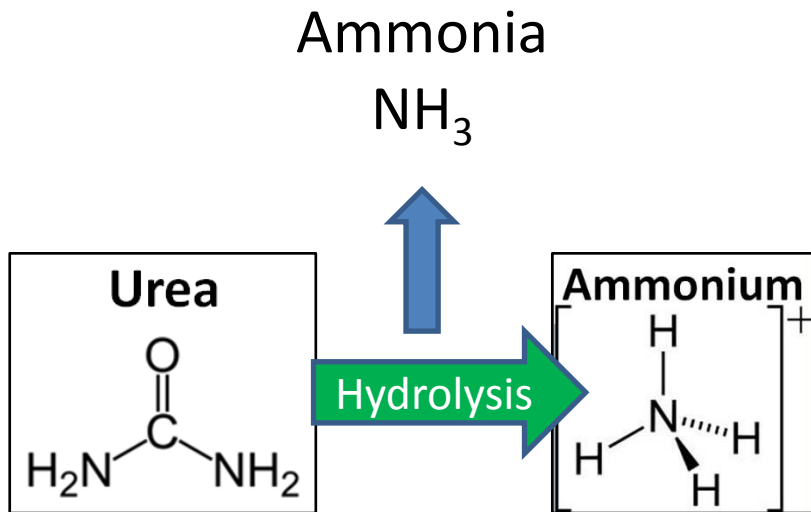
- Yield – grows top yields ☒
- Cost – costs less than CAN ☒
- Greenhouse Gas – reduces emissions ☒
- Ammonia – holds onto N to grow grass ☒
- We get credit for reduced emissions ☒





# What is protected N/urea?

- Urea N fertiliser made safe from ammonia gas loss with a urease inhibitor on surface or in melt



Schematic of the mode of action of  
A urease inhibitor Credit: BASF

# Urease inhibitors

- Three urease inhibitors are registered under the EU fertiliser regulations
  - NBPT (from: Koch & others)
  - NBPT+NPPT (from: BASF)
  - 2-NPT (from: SKW)
- Department of Ag. will be carrying out surveillance to check that regulatory levels are met at the point of sale



There are  
fertilisers

s from 6  
List



Company	Product Name	Inhibitor Type & Name	N %	P %	K %	S %
<b>Grassland Fertilisers (Kilkenny) IFI</b>	IFI Topper N-Sure	NBPT + NPPT (LIMUS)	46	-	-	-
	IFI Super Topper N-Sure	NBPT + NPPT (LIMUS)	38	-	-	7
	IFI Topper Boost N-Sure	NBPT + NPPT (LIMUS)	29	-	14	3.8
<b>Grassland Agro</b>	Eco Urea	NBPT + NPPT (LIMUS)	46	-	-	-
	Eco N 38	NBPT + NPPT (LIMUS)	38	-	-	7.6
	Eco 29-0-14 +S	NBPT + NPPT (LIMUS)	29	-	14	2
	Alzon Neo-N	2-NPT + MPA	46	-	-	-
<b>Goulding Fertiliser</b>	Alzon Neo-N + S	2-NPT + MPA	40	-	-	6
	Sustain / KaN	NBPT (Agrotain)	46	-	-	-
	Sustain / KaN	NBPT (Agrotain)	38	-	-	7
<b>NitroFert</b>	Sustain / KaN	NBPT (Agrotain)	29	-	14	3.5
	Nitro Guard	NBPT + NPPT (LIMUS)	46	-	-	-
	Nitro Guard	NBPT + NPPT (LIMUS)	38	-	-	7
<b>Target Fertilisers</b>	Nitro Guard	NBPT + NPPT (LIMUS)	30	-	15	2
	UreaMax	NBPT + NPPT (LIMUS)	46	-	-	-
	UreaMax + S	NBPT + NPPT (LIMUS)	38	-	-	7
<b>Yara</b>	29-0-14+4% S Max	NBPT + NPPT (LIMUS)	29	-	14	4
	Yara Vera AMIPLUS	NBPT (AMIPLUS)	46	-	-	-

1

2

3

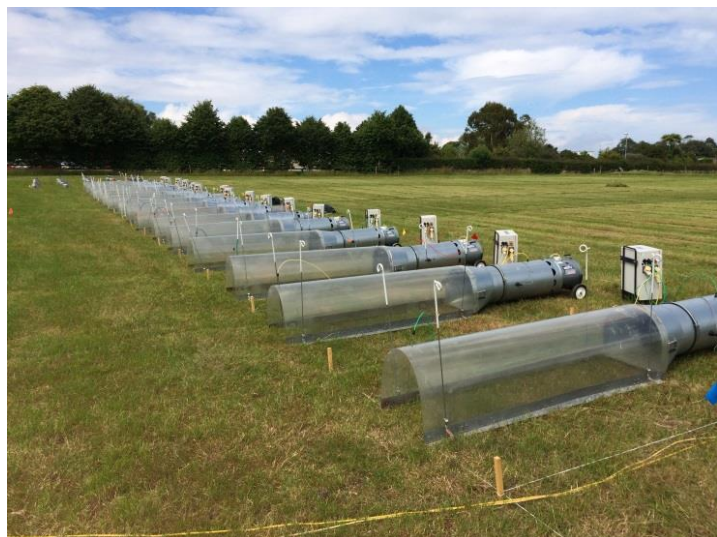
4

5

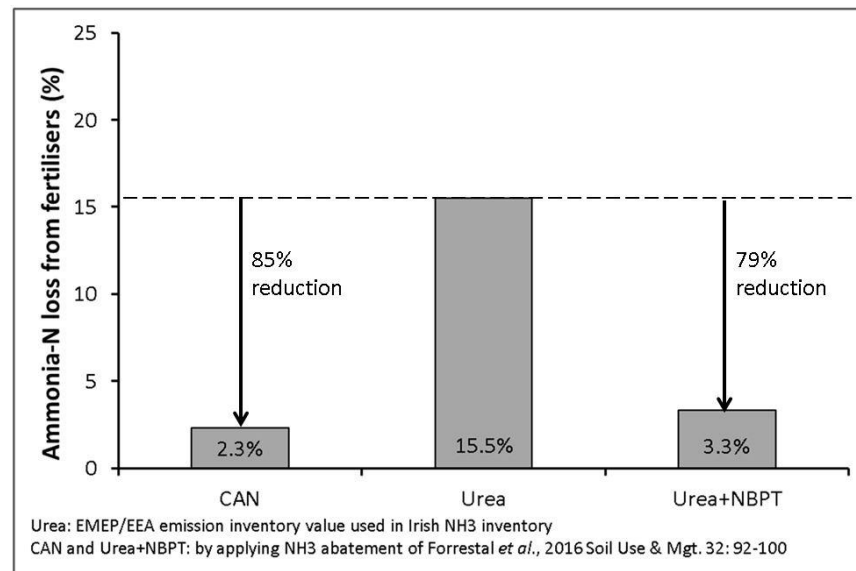
6



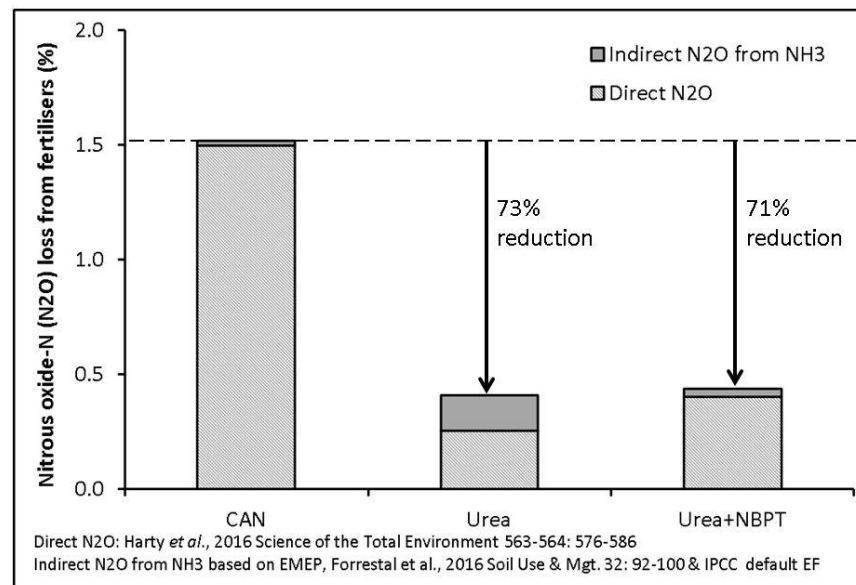
# Teagasc urea + NBPT Research - Gases



## Ammonia



## Nitrous oxide

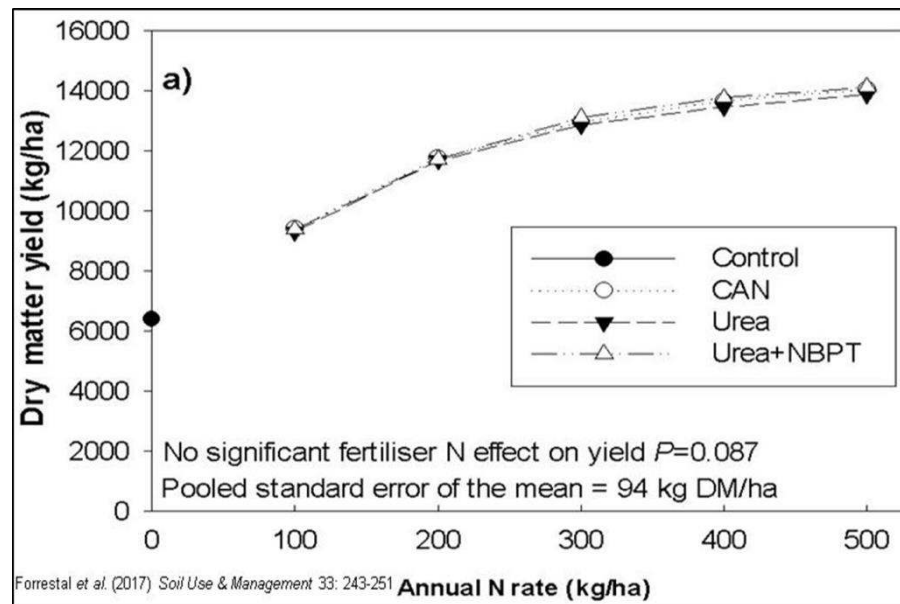




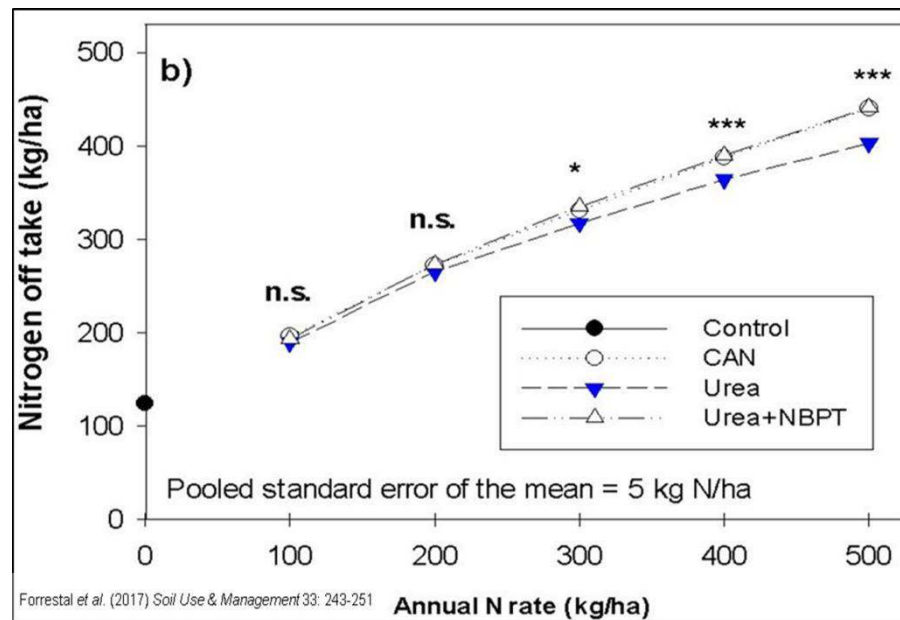
# Teagasc urea + NBPT Research – Grass Production



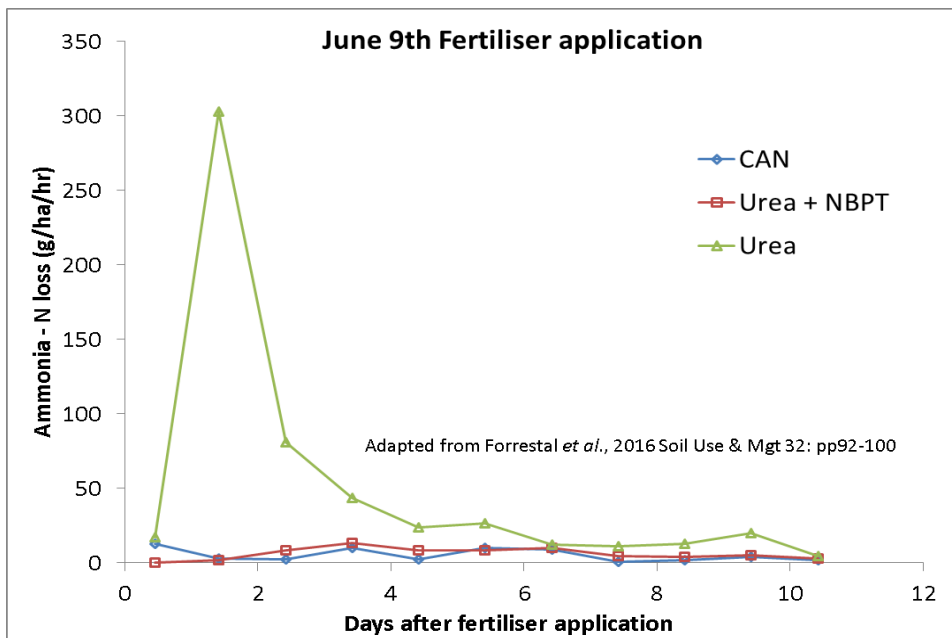
## Yield



## N recovery

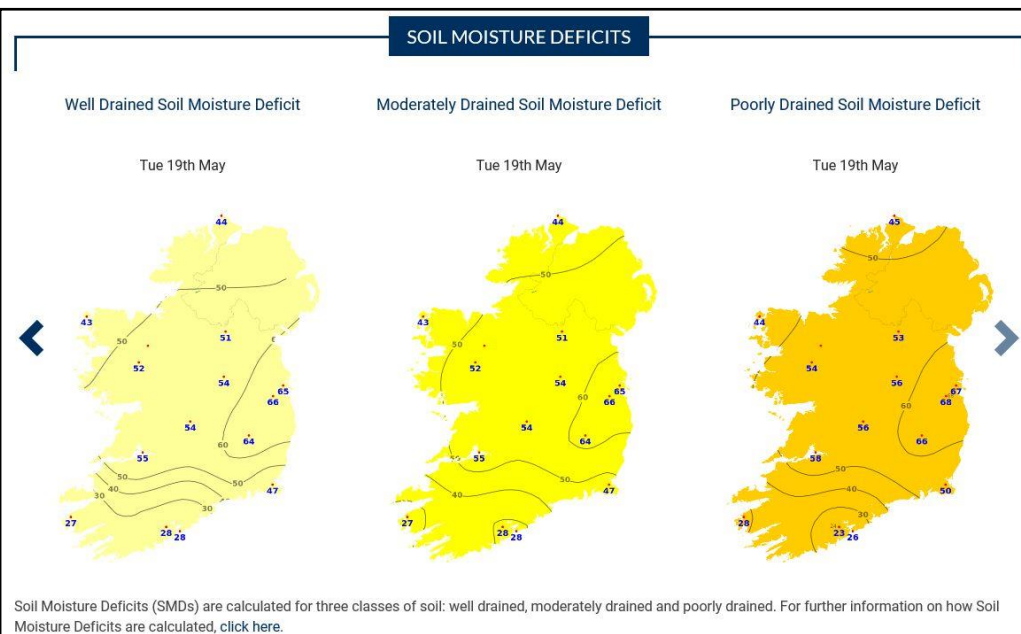


# Protection from Ammonia loss in dry summer weather



**Will a urease inhibitor protect urea from loss in dry summer conditions?**

Yes, this is what it is what protected urea products are designed to do



**What happens to N response with High and climbing Soil Moisture Deficit?**

Nitrogen is not a substitute for water (think 2018) growth response to protected urea and other N forms will be disappointing until Deficits decline, adding more N won't change this

# Will protected urea cost more?

Work it out per kg/unit of N not per tonne

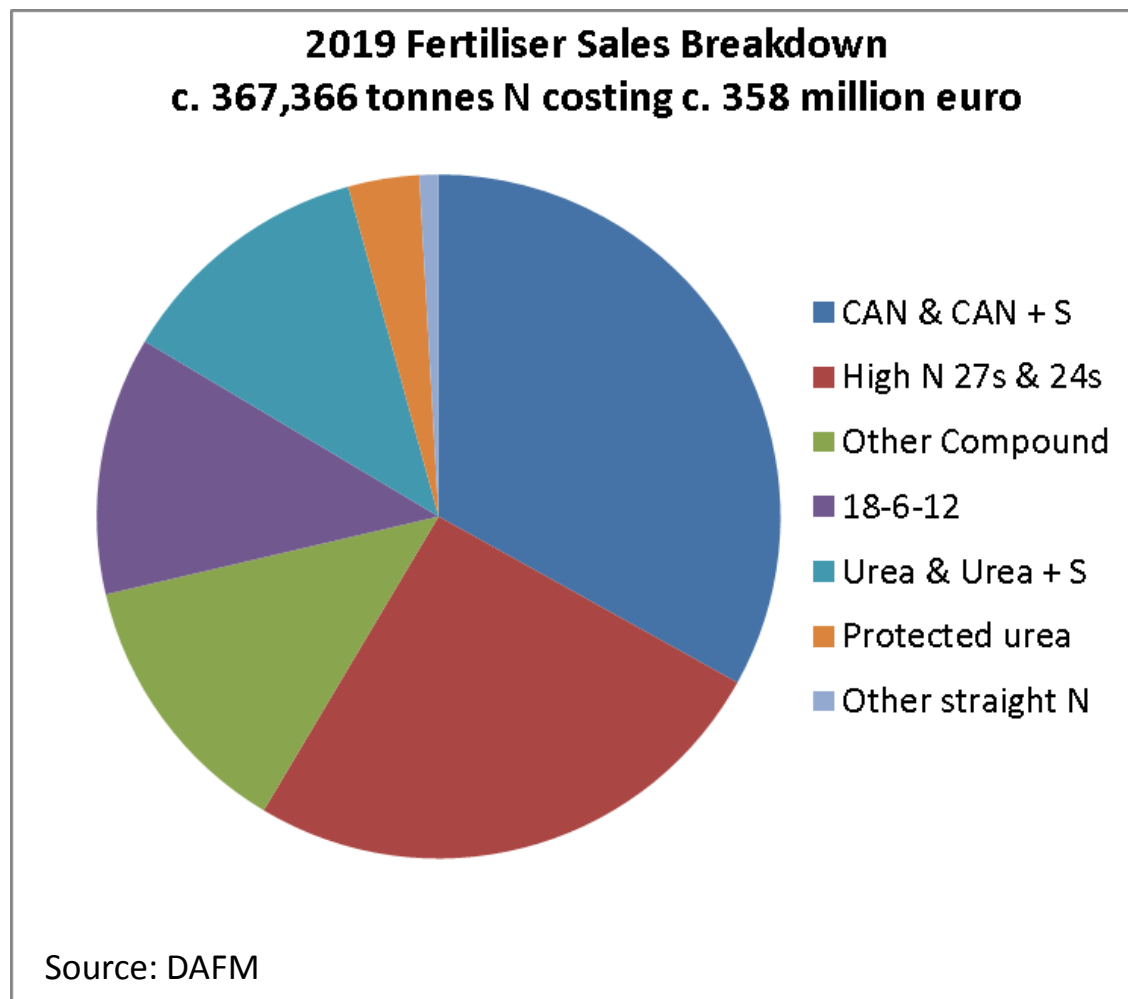
- E.g. Protected urea @  $385/\text{t} \div 460\text{kgN}/\text{t} = \text{€}0.84/\text{kg N}$
- E.g. CAN @  $240/\text{t} \div 270\text{kgN}/\text{t} = \text{€}0.89/\text{kg N}$

Fertiliser		CAN	Protected urea
Big bag	(kg)	500	375
Nitrogen	(%)	27	46
Big bag	(kg N)	135	172.5
At 30 kg N/ha covers	(ha)	4.5	5.7
At 24 units/ac covers	(ac)	11.1	14.1





If the Greenhouse Gas and Ammonia abatement from fertiliser identified by Teagasc is to be availed of substantial change in fertiliser selection will be need.

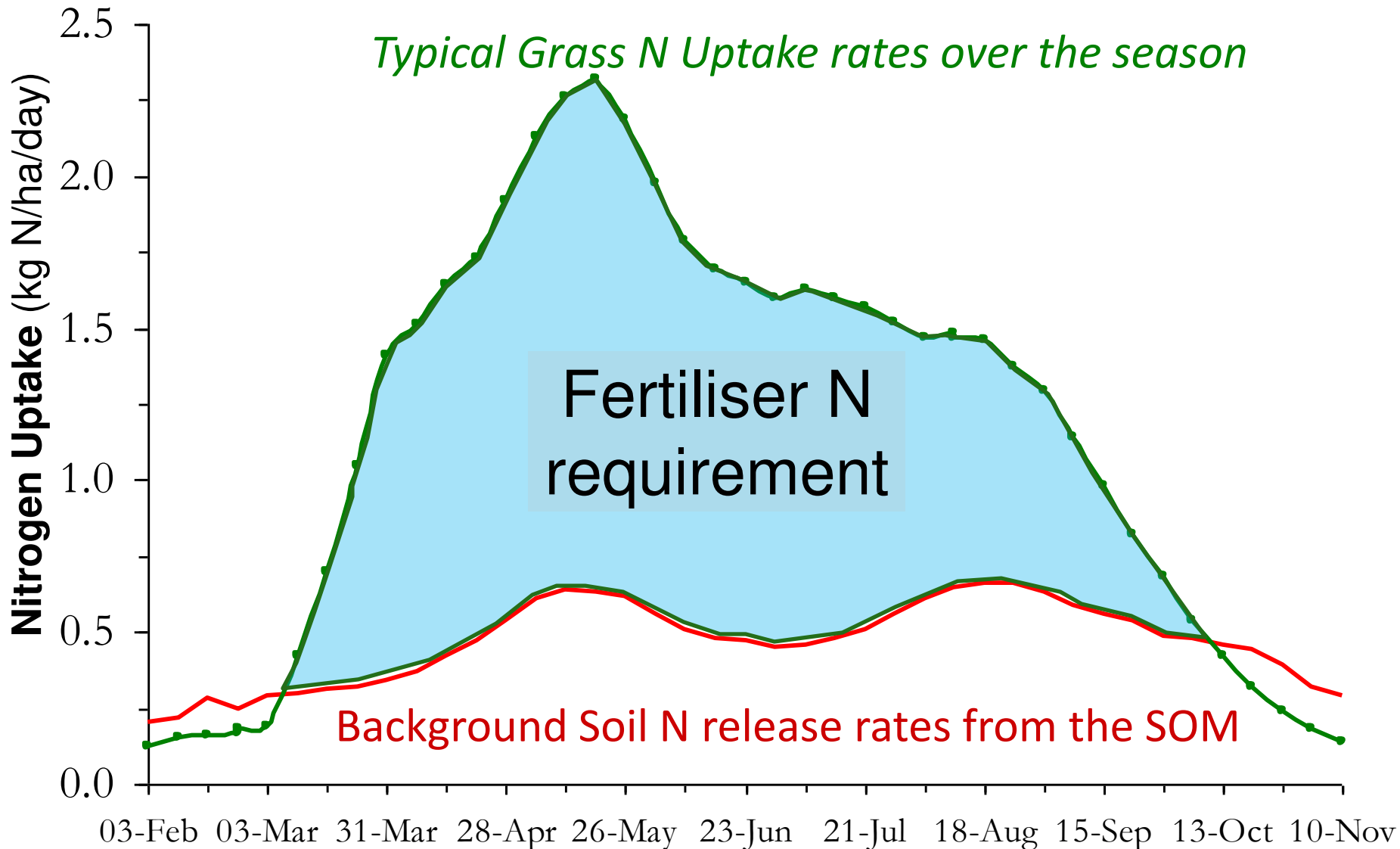


# Nutrient advice ?

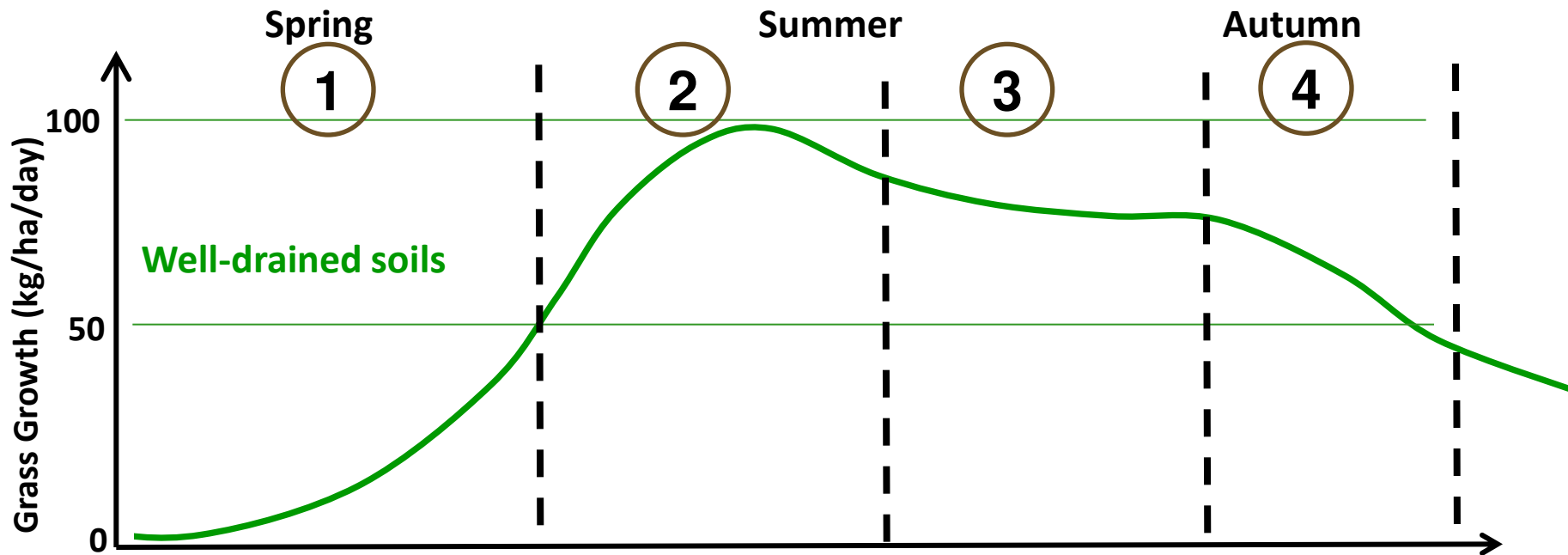
## One soil does not fit all!



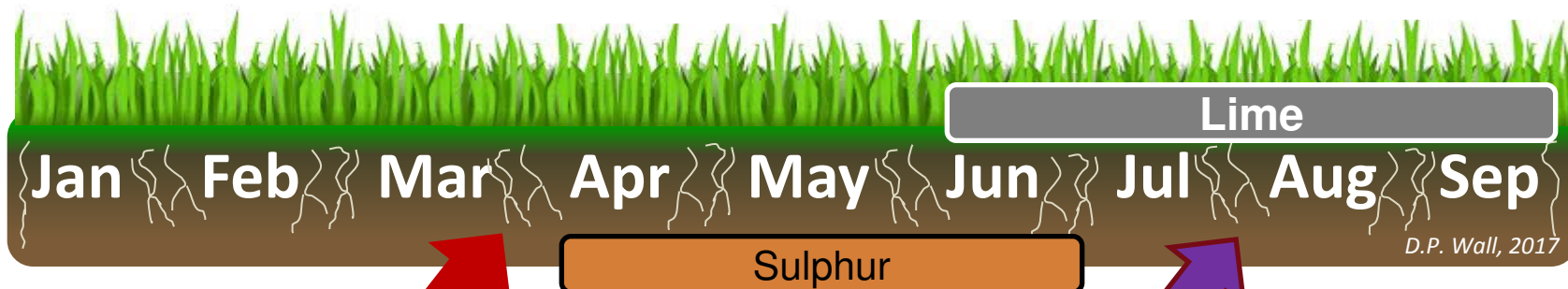
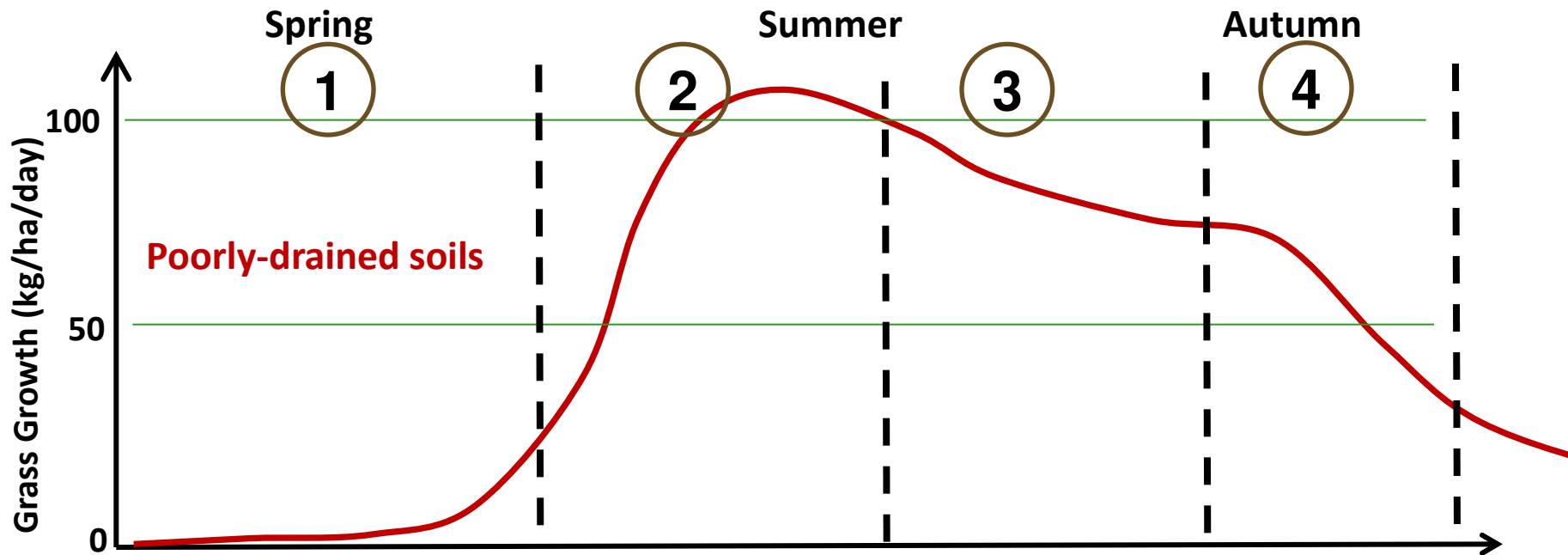
# Fertiliser N Requirement by Grass Swards







*Pro Urea = Urea + Urease Inhibitor*



*Pro Urea = Urea + Urease Inhibitor*

# Protected Urea - Grazing Fertiliser Programmes

*Example fertiliser programmes integrating protected urea during the growing season for dairy and drystock farms at different stocking rates and soil test levels*

<u>Dairy</u>		Table 1. Recommended rates of N, P & K (kg/ha) & fertiliser products (kg/ha). Farm stocked at 210kg Org N/ha or 2.5LU/ha. Soil P & K levels assumed to be index 1						
Advice		Feb	March	April	May	June / July	Sept	Total kg/ha
Product (kg/ha)		55 kg/ha Pro-Urea	310 kg/ha 18-6-12+S	125 kg/ha Pro-Urea	310 kg/ha 18-6-12	60 kg/ha Pro-Urea	55 kg/ha Pro-Urea	
N	250	25	56	58	56	28	25	
P	39		19		19			
K	95		37		37			
S	15		9		9			
Cost €/ha		21	115	48	115	23	21	€343ha
Pro-Urea = Urea 46% + NBPT / 2-NBPT, Cost/tonne = €380/t, Pro-Urea+S (40% N & 6% S)= €380t/, 18-6-12+ 3% S = €370, To convert units/ac to kg/ha multiply by 1.25. Apply 125kg/ha of MOP 50% once every 4 years.								

Further information available on the Teagasc Website

<https://www.teagasc.ie/crops/soil--soil-fertility/protected-urea/>

*Note: Complete a farm fertiliser plan to determine max. N & P allowances as per Nitrates Legislation*



# Summary: why Protected Urea Now?

We need to show progress towards reduced emissions  
Protected urea is the largest single tool on the table

- Yield – grows top yields ☒
- Cost – costs less than CAN ☒
- Greenhouse Gas – reduces emissions ☒
- Ammonia – holds onto N to grow grass ☒
- We get credit for reduced emissions ☒

