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New Concepts in Onions

Matt Wetherall
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Strong presents & experienced team in Onions

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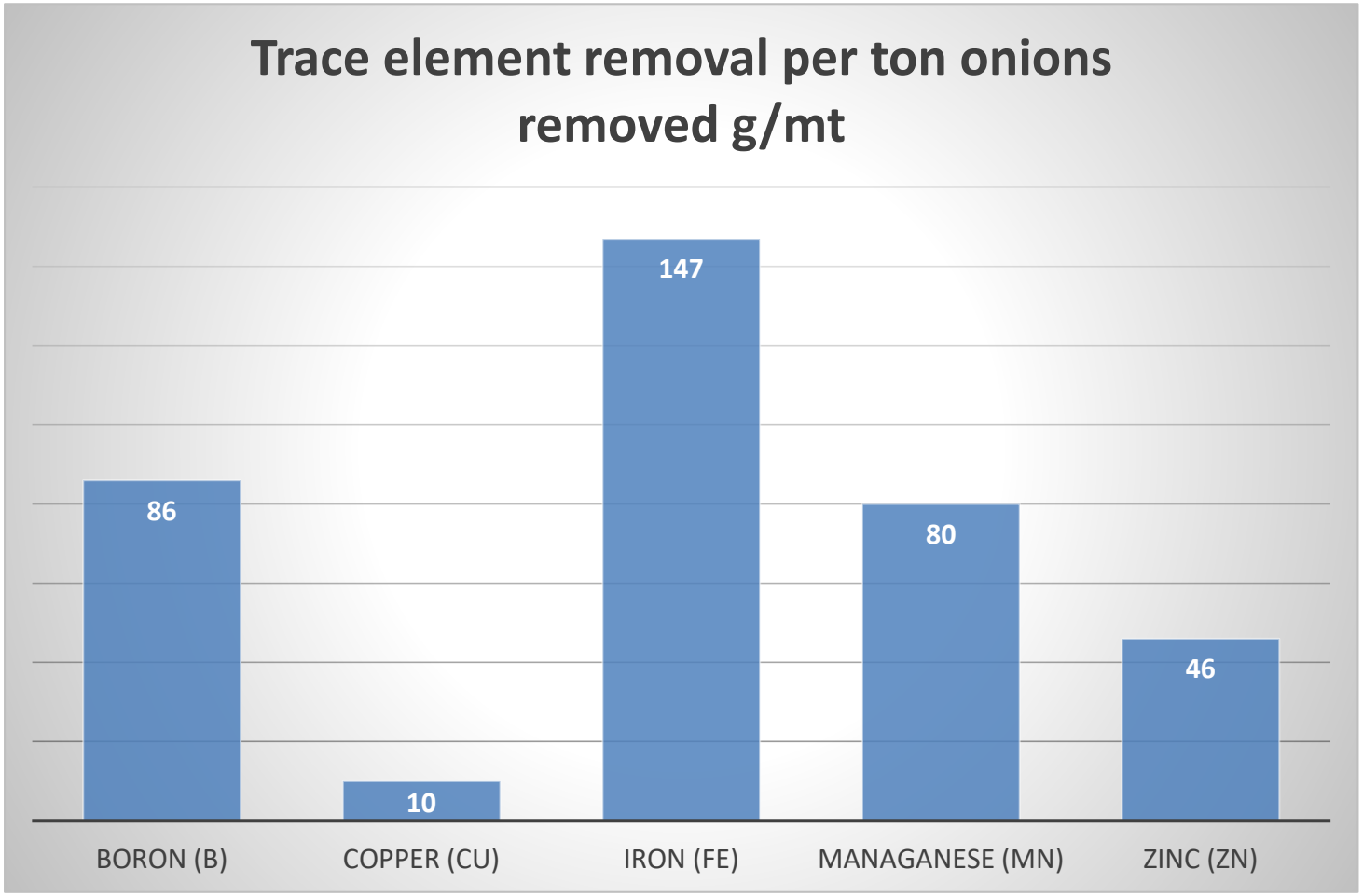
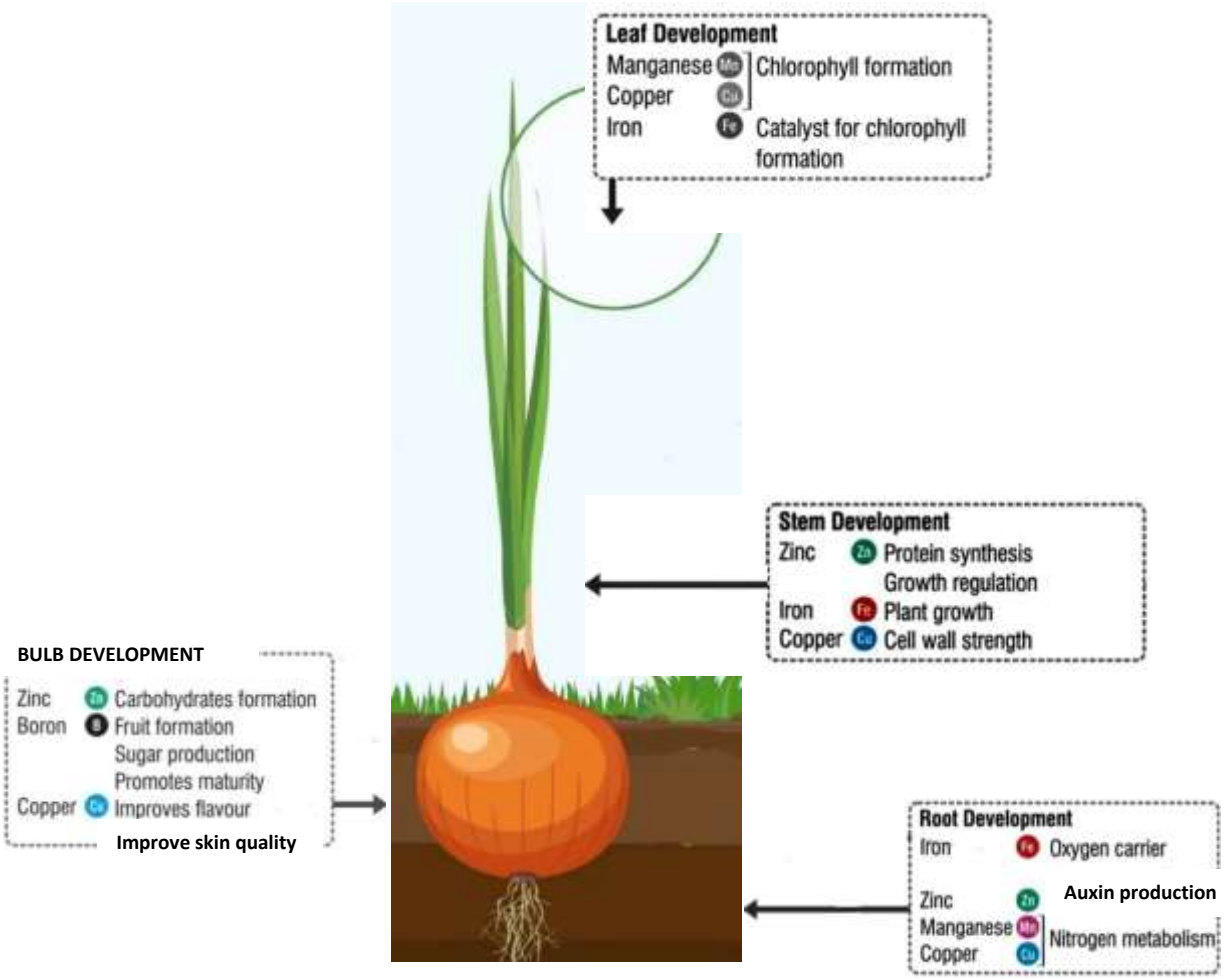
Trace Elements Fe, Mn & Zn

Total Trace element removal in Onions



Trace elements requirements in Allium Plants



Iron - Role and deficiency symptoms

- Iron is important for chlorophyl formation and photosynthesis.
- Iron is the trace element that plant requires largest quantity.
- Plant struggle with uptake early season when soil temp is low.
- Symptoms- Chlorosis on young leaves

Manganese - Role and deficiency symptoms

- Plays major role photosynthesis.
- Deficiency could delay maturity.
- Severe deficiency could also cause thick necks at harvesting. This is due to too slow early development.
- Onions are highly sensitive to Mn deficiency.

Zinc- Role in plants

- Plays important role in nitrogen metabolism.
- Very important in production of growth hormones

Deficiency symptoms

- Young leaves show chlorosis and tipburn.
- The leaf blades are small, narrow and cupped upwards.
- Plants are stunted.

What's best soil or foliar applications?

Preferred application method in Onions

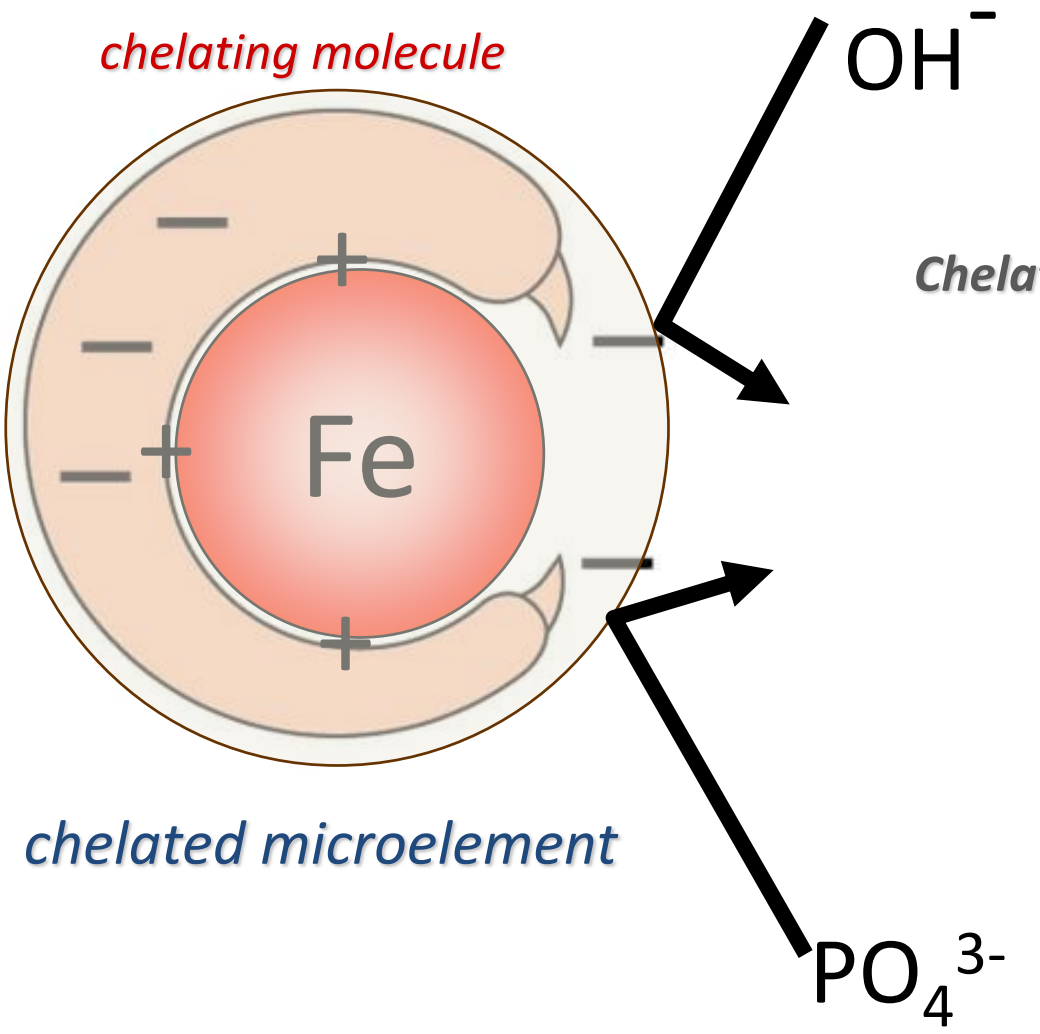
Element	Root applications	Leaf Applications
Iron	★★★	★★
Manganese	★	★★★
Zinc		★★★
Copper		★★★
Boron	★	★★★
Molybdenum		★★★
Magnesium	★★★	★★
Calcium	★★★	★

BREXIL line

FOLIAR APPLICATION

- BREXIL is a range of products that contain a **microelement complex with LSA** (ligninsulfonate). LSA is characteristic for its notable ability to **penetrate plant tissues, without the risk of phytotoxicity**;
- The granules are **completely soluble** and do not cause the accumulation of unstable suspensions in the irrigation tanks;
- Today, the BREXIL range is even more efficient than ever before, thanks to the combined action of a **specific carrier** that facilitates the passage of nutrients through the cuticles and increases cell absorption.

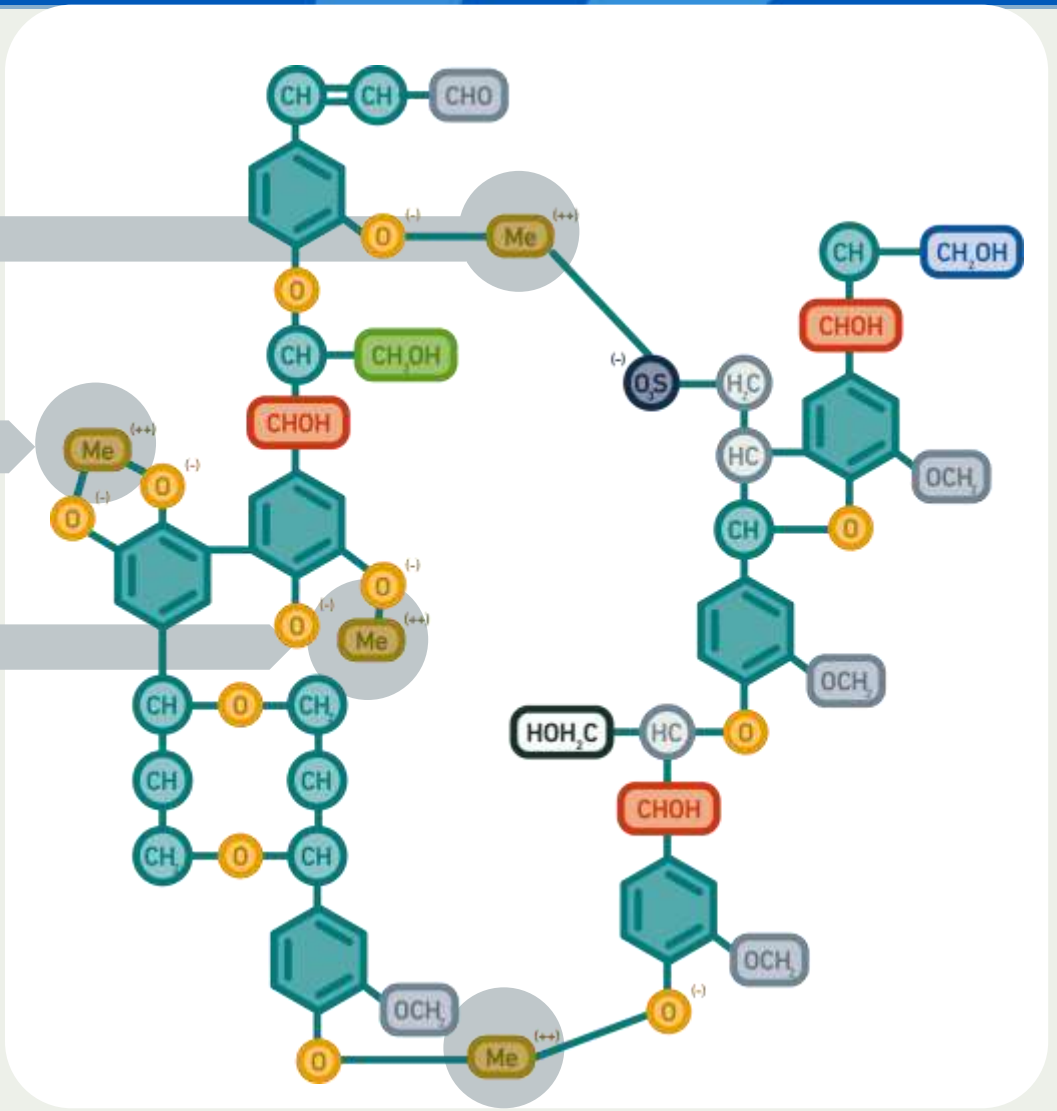
What is a chelating molecule?



Chelating agent protect the TE from the immobilization

LSA PATTERN

The metal can be complexed in one or more points by ionic interactions

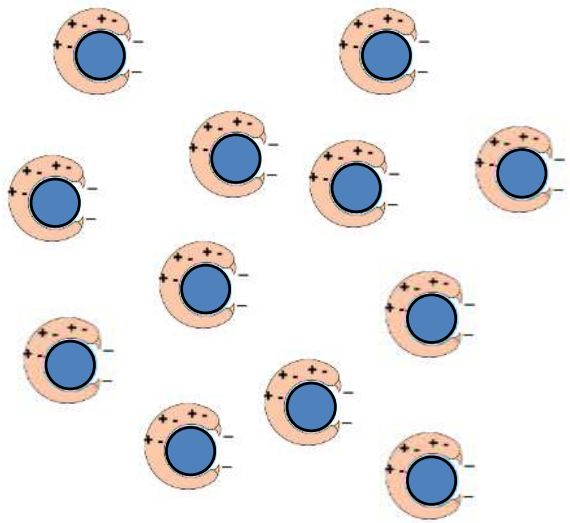


BREXIL

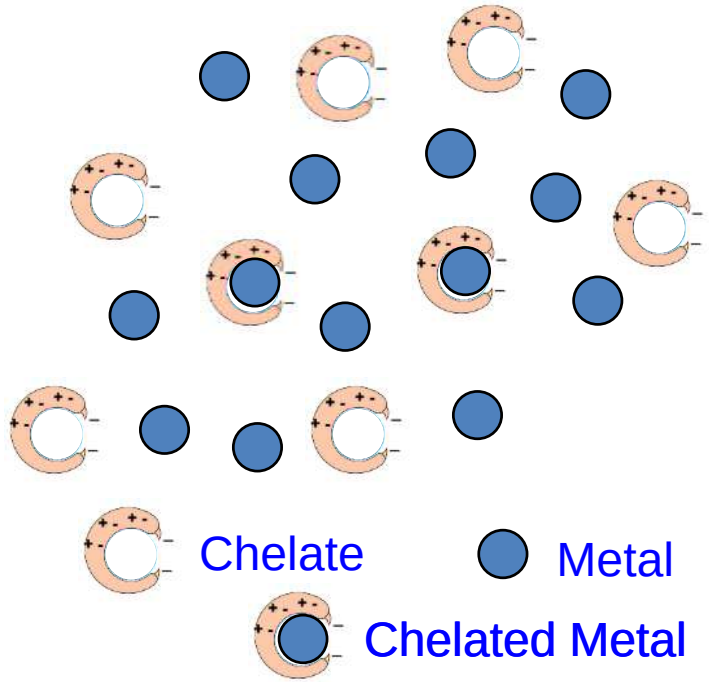
Stable Complex

What Makes BREXIL Unique?

Chemically Reacted (Brexil)



Simple Mix or Blend (Most Liquid Chelates)



- **Chemically-reacted chelates have stronger, more stable bonds.**
- **Chelate or metal molecules that are NOT combined will either tie up or be tied up in tank mixtures and can also cause plant phytotoxicity**

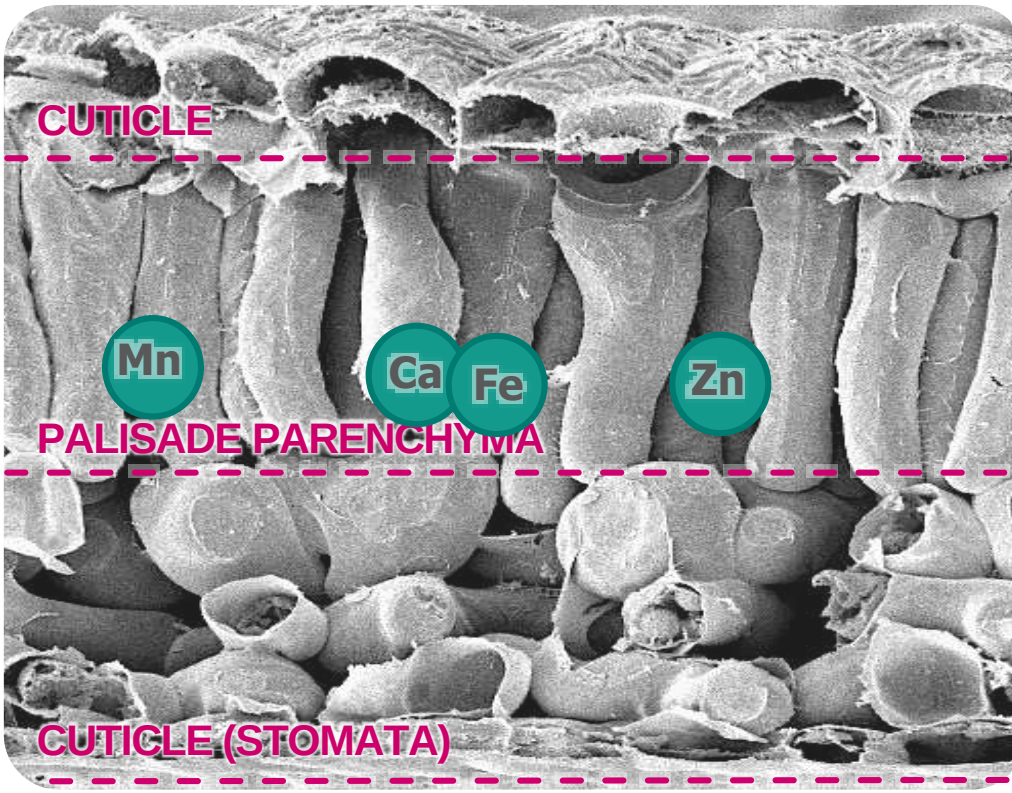
Product Uptake

1. The BREXIL solution is **rapidly absorbed** through the leaf's cùticle and **does not leave metal residues on the surface.**

2. LSA's complexing action not only favours the penetration of metal but also, once the metal has entered the vegetable tissue, **exercises its protective action** and therefore, **its bio-availability.**

3. The plant recognises LSA as a **source of energy or food**; therefore, the microelements that bind to the LSA are **released in the plant**, preventing and curing microelement deficiencies.

LSA-Metal = penetration and release of elements

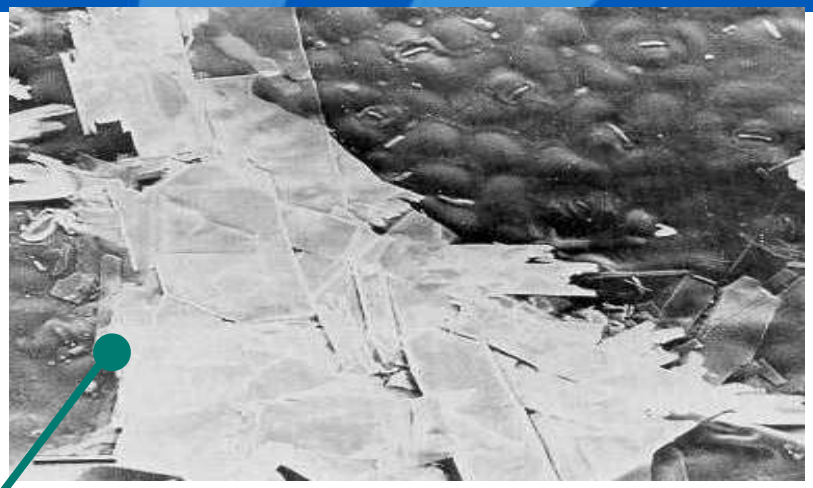


Leaf cross section (Dicotyledon)

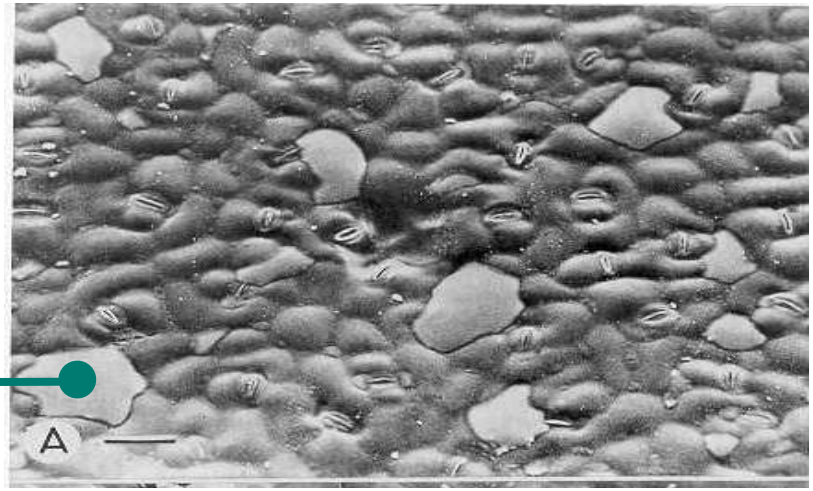
Insoluble salts = cannot penetrate the cuticle.

Oxides are insoluble elements and can only be absorbed through the stomatal openings. This means that they are only available to the plant in some cases and after lengthy periods of application. Following their application, abundant insoluble residues can be seen on the leaf's surface under a microscope.

Metallic residues remain on the outer surface (clusters the size of a few microns).



Strong amount of metal residues caused by oxides applications.



With Brexil the solution is rapidly adsorbed and does not leave residues on leaves

Brexil Vs Competitor

Trial 2017

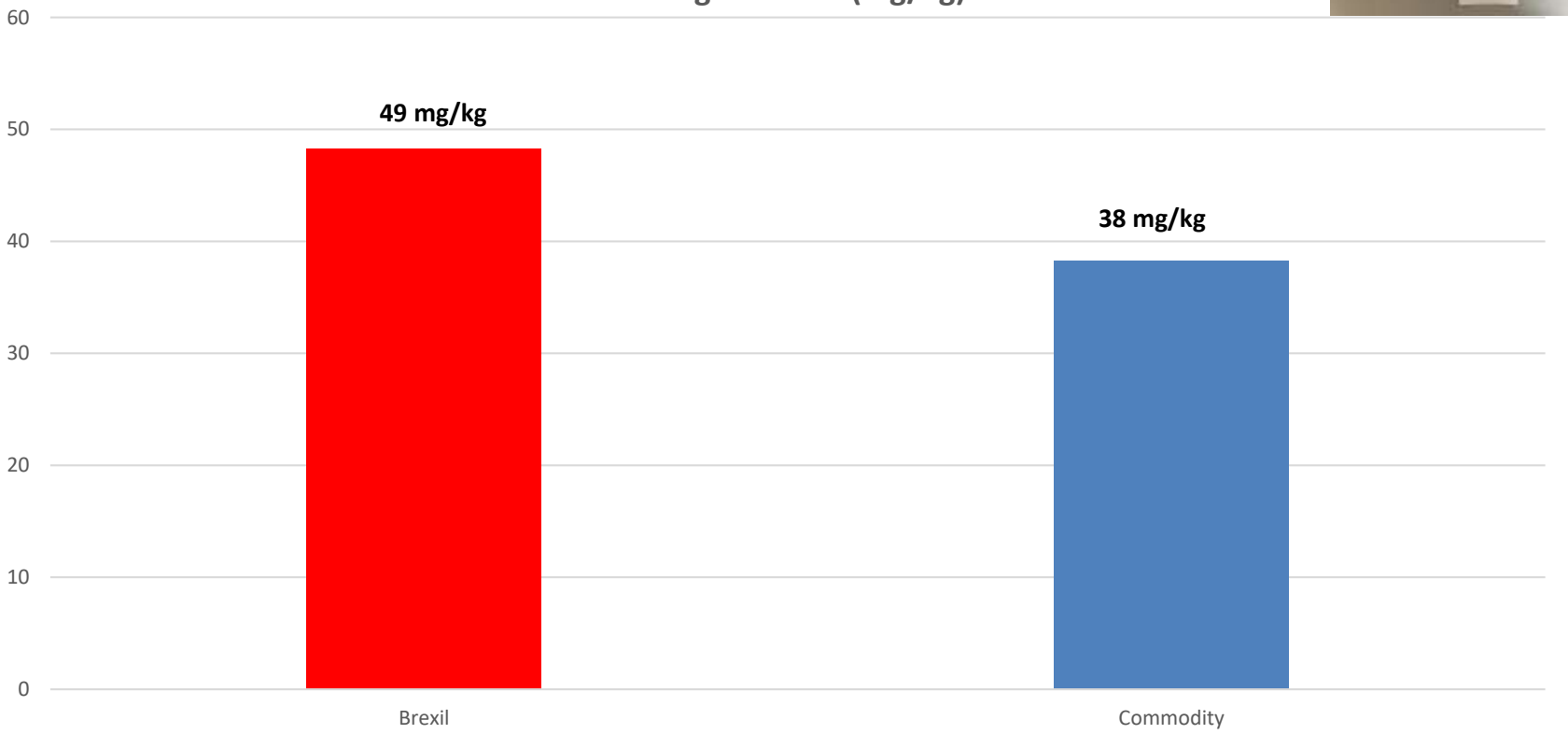
Brexil Vs Commodity – Foliar Programs

Valagro Program %	Fe	Cu	Mn	Zn	B	Mo	S	N
Brexil Combi 1kg x 10 Apps	6.8	0.3	2.6	1.1	0.9	0.2		
Brexil Mn 1kg x 10 Apps			10.0					
Total 1 application	6.8	0.3	12.6	1.1	0.9	0.2		
Commodity Program %								
Multi Product 5L x 10 Apps	6.0	1.0	2.0	3.0	0.77	0.05	5.0	5
Product Zn & Mn 5L x 10 Apps			10.0	5.0			8.0	
Total 1 application	6.0	1.0	12.0	8.0	0.77	0.05	13.0	5

Both programs where similar in costs

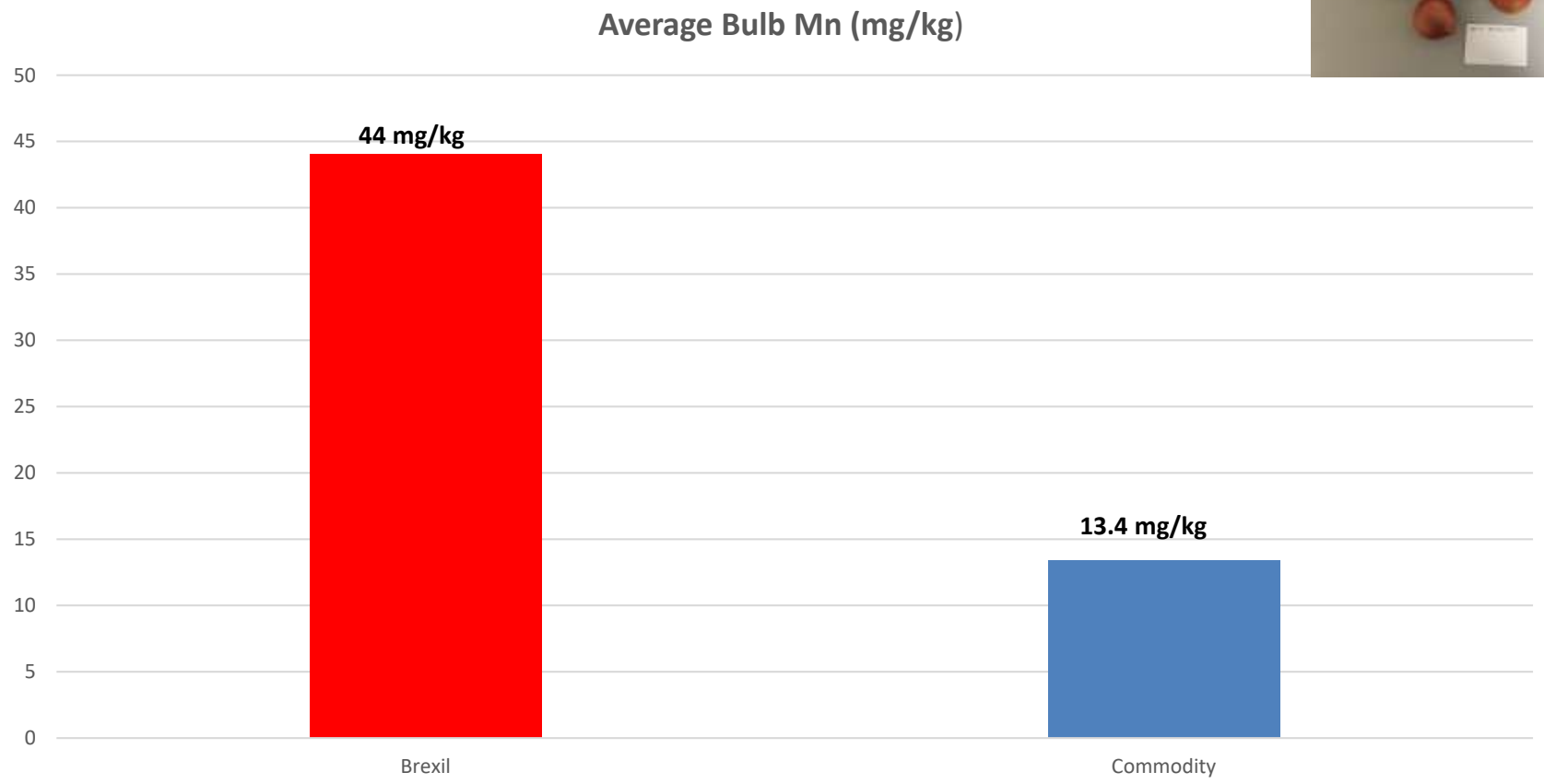
Iron

Site	Average Fe (mg/kg)	% diff.
Brexil	48.29229	**26.3%**
Commodity	38.23323	



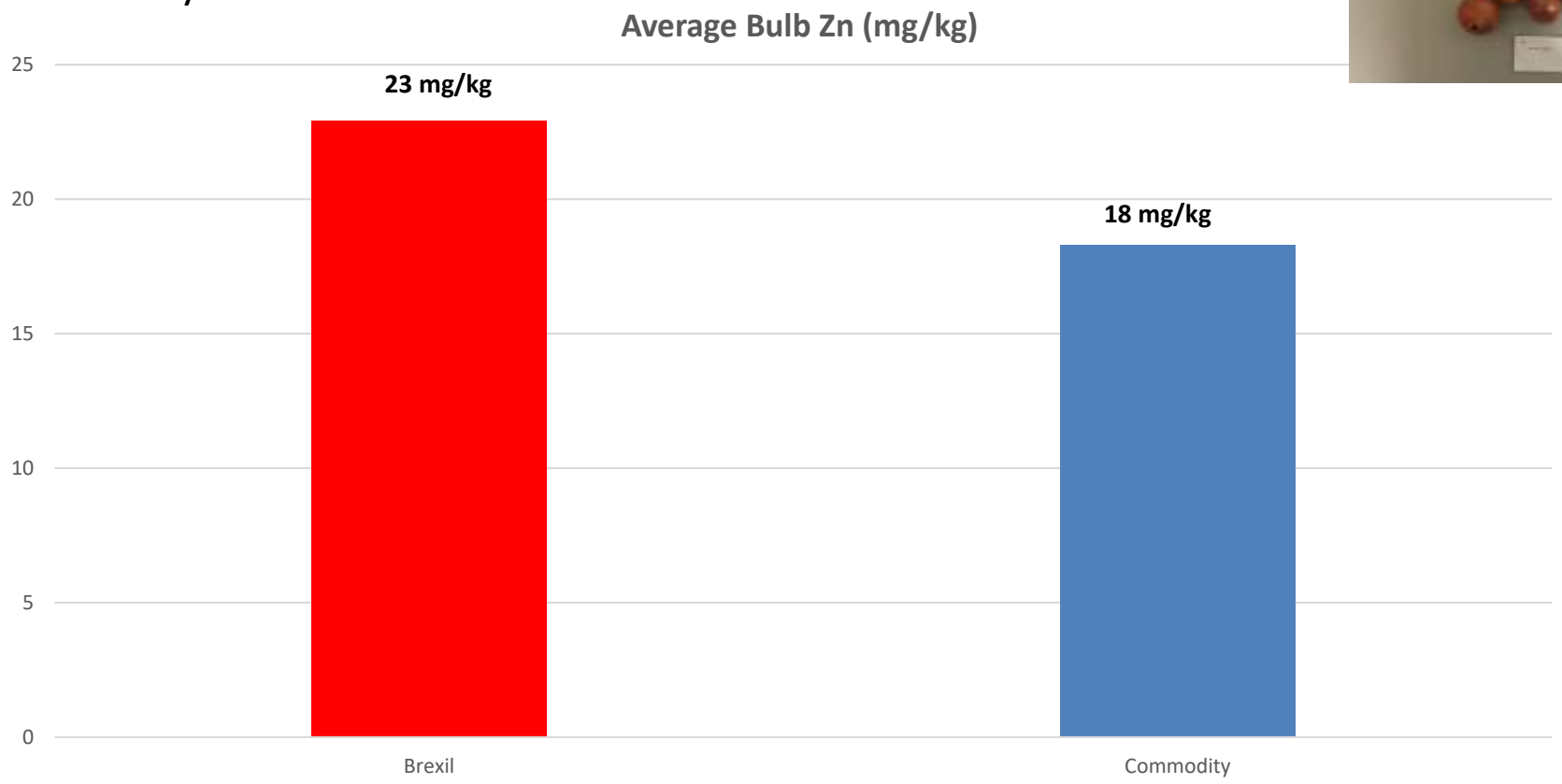
Manganese

Site	Mn (mg/kg)	% diff.
Brexil	44.06171	**229%**
Commodity	13.38946	



Zinc

Site	Average Zn (mg/kg)	% diff.
Brexil	22.92729	**25.4%**
Commodity	18.28485	



The Formulations Available

PRODUCTS (Composition%)	CaO	MgO	B	Cu	Fe	Mo	Mn	Zn
Brexil Ca	20,0	-	0,5	-	-	-	-	-
Brexil Combi	-	-	0,9	0,3	6,8	0,2	2,6	1,1
Brexil Fe	-	-	-	-	10,0	-	-	-
Brexil Mg	-	8,0	-	-	-	-	-	-
Brexil Mn	-	-	-	-	-	-	10,0	-
Brexil Zn	-	-	-	-	-	-	-	10,0
Brexil Mix	-	6,0	1,2	0,8	0,6	1,0	0,7	5,0
Brexil Multi	-	8,5	0,5	-	4,0	-	4,0	1,5
Brexil Duo	20,0	4,0	0,5	0,5	-	-	0,5	1
Brexil Nutre	-	-	-	-	2	-	6	6
Brexil Top	-	-	2	-	-	-	5	6

Quick N

ASN – Ammonium Sulphate Nitrate

Nitrogen forms from mineral fertilisers

- Nitrate (NO_3^-) Anion -
  - Approx. 90 % of nitrogen uptake of crops is in the nitrate form
  - nitrate from fertilizer is readily available to crops from soil solution
  - high nitrate concentration is required to feed fast growing crops
  - nitrate uptake enhance uptake of cations like Ca, Mg, K

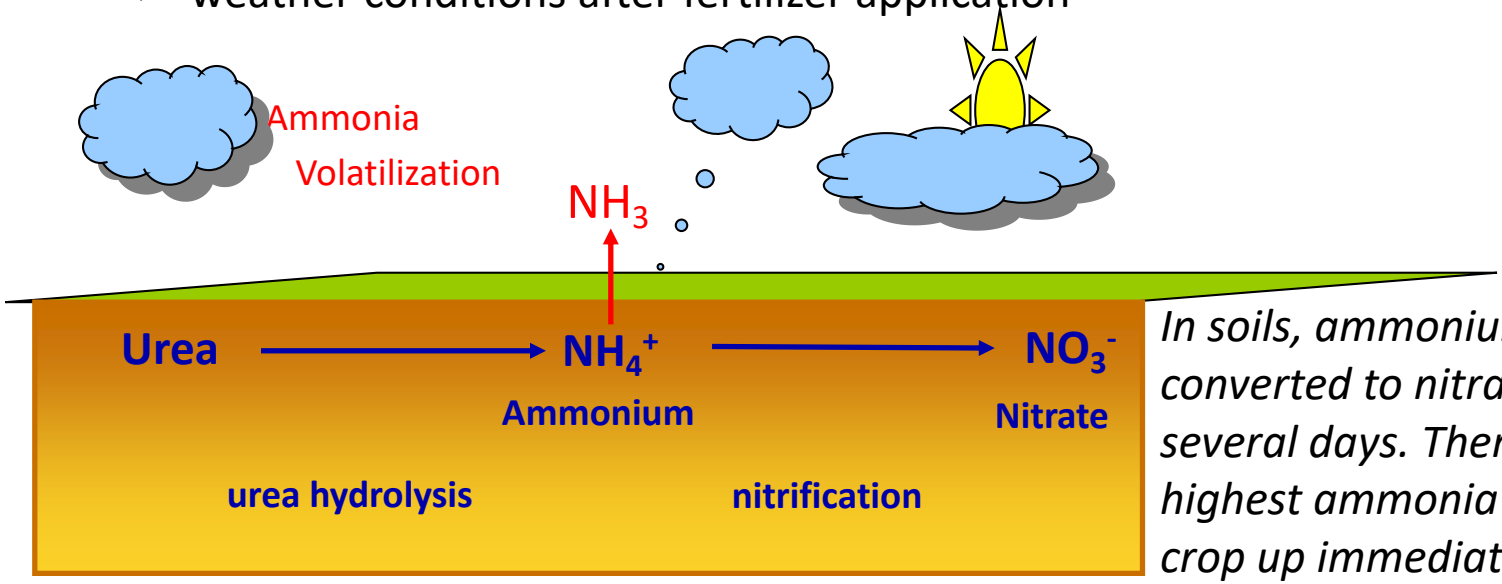
- Ammonium (NH_4^+) Cation +
  - has a positive charge and attaches strongly to negatively charged soil particles.
  - NH_4^+ mobility in the soil is limited
  - In the soil, ammonium is converted to nitrate by soil bacteria in a two step process (nitrification)
  - Nitrification has biological dependency and is environmentally controlled

- Urea ($CO(NH_2)$) Neutral
  - urea is converted to ammonium by urea hydrolysis
  - during this conversion 20 % or more of N as ammonia can be lost to the atmosphere

Origin of ammonia losses

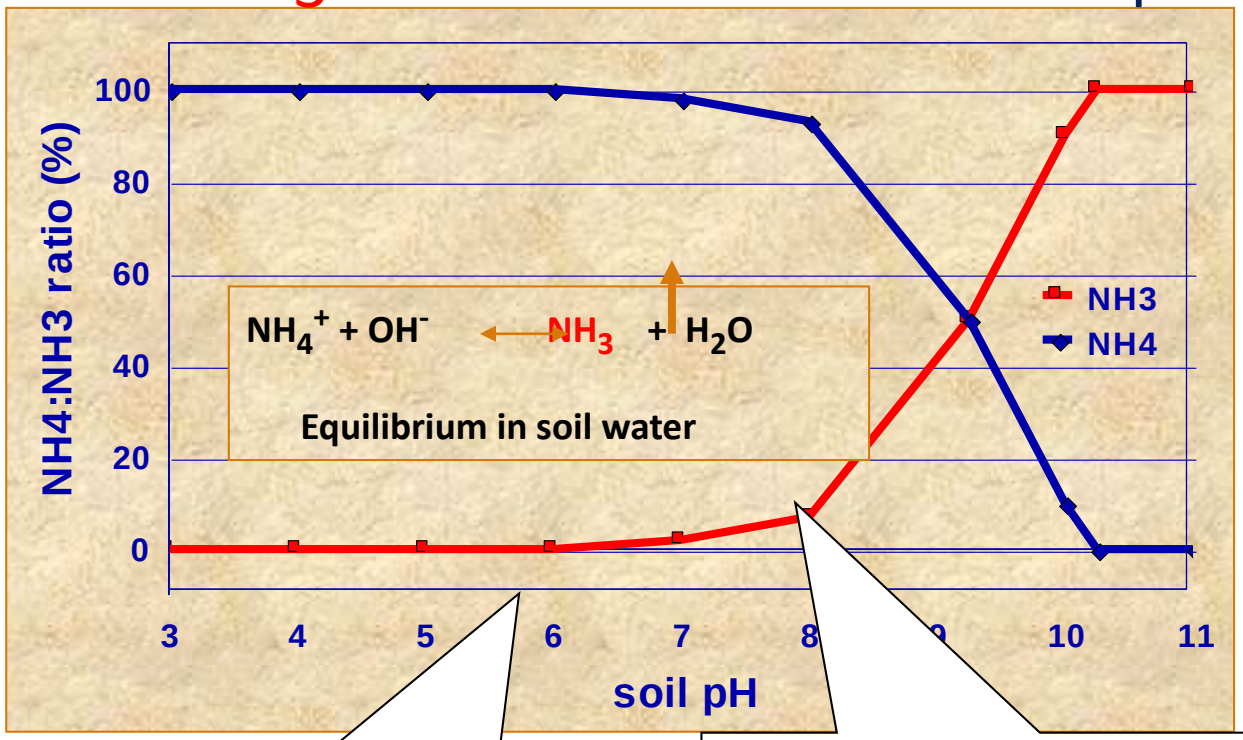
- ✓ Ammonia (NH_3) losses derive from ammonium (NH_4) either applied as fertilizer ammonium or created by urea hydrolysis from urea
- ✓ Ammonium volatilisation risk decreases in this order:
- ✓ *(Urea) > AS > (UAN) > ASN = AN = CN*

- ✓ Quantity of ammonia (NH_3) evolved from ammonium (NH_4) depends on
  - ✓ soil pH
  - ✓ weather conditions after fertilizer application



In soils, ammonium is converted to nitrate within several days. Therefore, highest ammonia losses crop up immediately after fertiliser application.

Soil pH determines the quantity of NH_3 released from NH_4

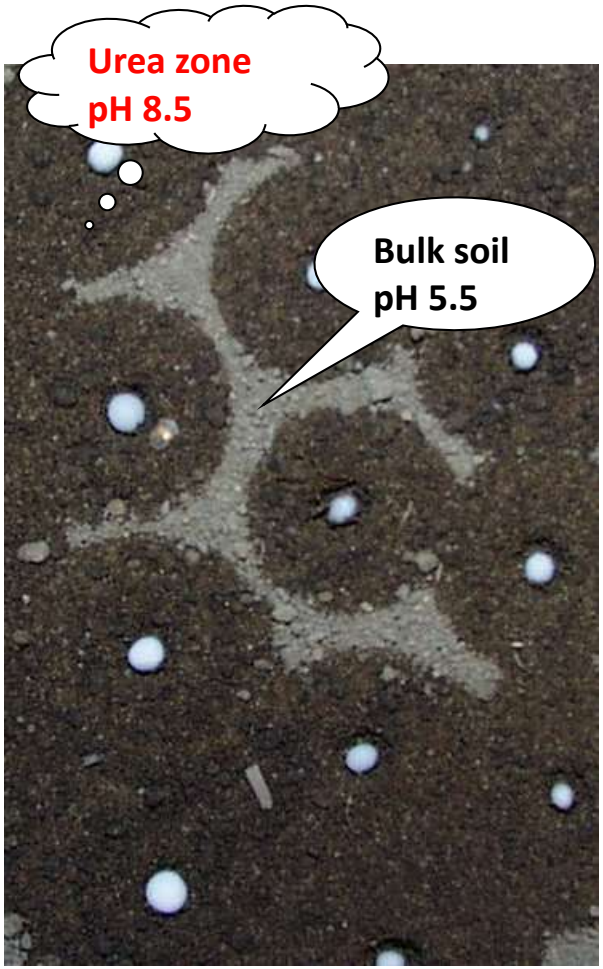


At pH < 7, almost no NH_3 available in the soil
minimal volatile loss from fertilizer ammonium

Increasing amounts of NH_3 are released from NH_4 at soil pH above 7

During urea hydrolysis soil pH increases

- Highest volatile ammonia losses occur after Urea application
  - pH increases temporary during urea hydrolysis due to proton consumption
  - Therefore, even at pH less than 7 in bulk soil, ammonia can be extensively volatilised due to transient pH rise in the urea affected zone
  - for instance 100 kg N/ha applied as urea changed the pH of 1 cm topsoil layer during urea hydrolysis
    - on sandy soil , 2% organic matter from 5.5 to about 8.5
    - on silty soil, 5% organic matter from 7.2 to about 8.5



Quantity of ammonia nitrogen losses from different fertilizer

- NH_3 losses from urea are estimated to be about 20% of urea nitrogen applied
- NH_3 losses from AS and UAN are at about 8% of nitrogen applied
- NH_3 losses from AN and CAN are marginal at about 2% of nitrogen applied
- **NOTE: Estimated loss of ASN is less than 3%**

* Volatile N loss in percentage of total N applied (gobal mean, Bouwman et al., 1997)

Estimated ammonia losses from urea after broadcast application

- Ammonia volatilisation increases with
  - Increasing soil pH
  - Decreasing soil buffer capacity
  - Increasing soil temperature
  - Decreasing soil moisture
- Range of ammonia losses
  - Temperate climate 12- 37%
  - Tropical climate 17- 55%
- Incorporation of urea either by tillage or rainfall reduces volatile nitrogen losses

Temperate climate

(figures in % of nitrogen applied)

soil pH	soil buffer* (cmol/kg) < 16	soil buffer (cmol/kg) 16 - 24	soil buffer (cmol/kg) >24
< 5.5	13	12	12
5.5 - 7.3	15	13	13
7.3 - 8.5	20	19	18
> 8.5	37	34	34

Tropical climate

soil pH	soil buffer (cmol/kg) < 16	soil buffer (cmol/kg) 16 - 24	soil buffer (cmol/kg) >24
< 5.5	19	17	17
5.5 - 7.3	22	20	20
7.3 - 8.5	30	28	28
> 8.5	55	51	51

Source: Bouwman et al., 2001

***Soil buffer capacity depends largely on organic matter and clay content**

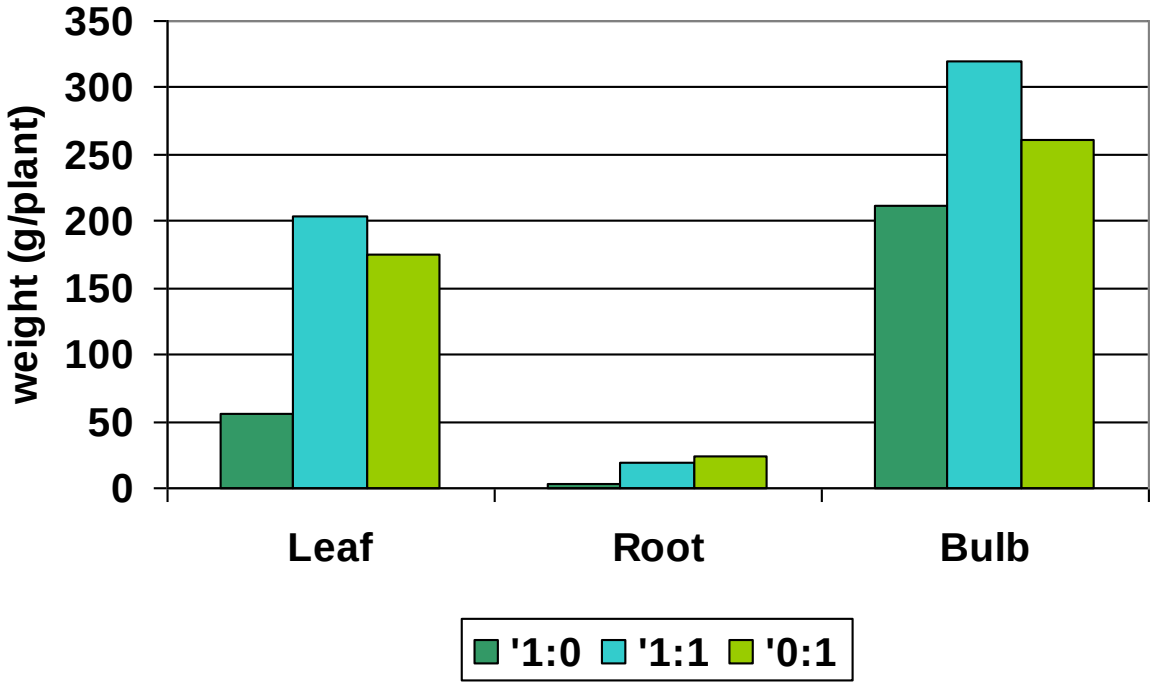
Campbells Quick-N

ASN (Ammonium Sulphate Nitrate)

- Spreadable product
- Used in place of Urea ,UAN & SOA when:
  - Cold weather
  - Need sulphur
  - Quick response
  - **Controlled nitrogen – (Very low volatilization)**

- **Total Nitrogen (N) 26.0%**
  - Nitrate 7.5%, Ammonium 18.5%
- **Total Sulphur (S) 13.0% (Ideal in onions)**

Leaf, root, bulb growth (g/plant)



N-source on growth & development

Thank you