NP-CaS

Controlled Release Fertilizer

CRF

www.tripoliven.com

Nutrients Efficiency in NPK Fertilizers

Technical and Scientifical data

Only a fraction of the macro nutrients *released* by fertilizers are *absorbed* by plants(*)

Nutrient	Absorption efficiency
N	40% - 60%
P	10% - 30%
K	50% - 70%

Major Economical and Environmental impact

(*) Nutrient in the biomass harvested / Nutrient applied to soil as NPK fertilizer

Low absorption efficiency of nutrients

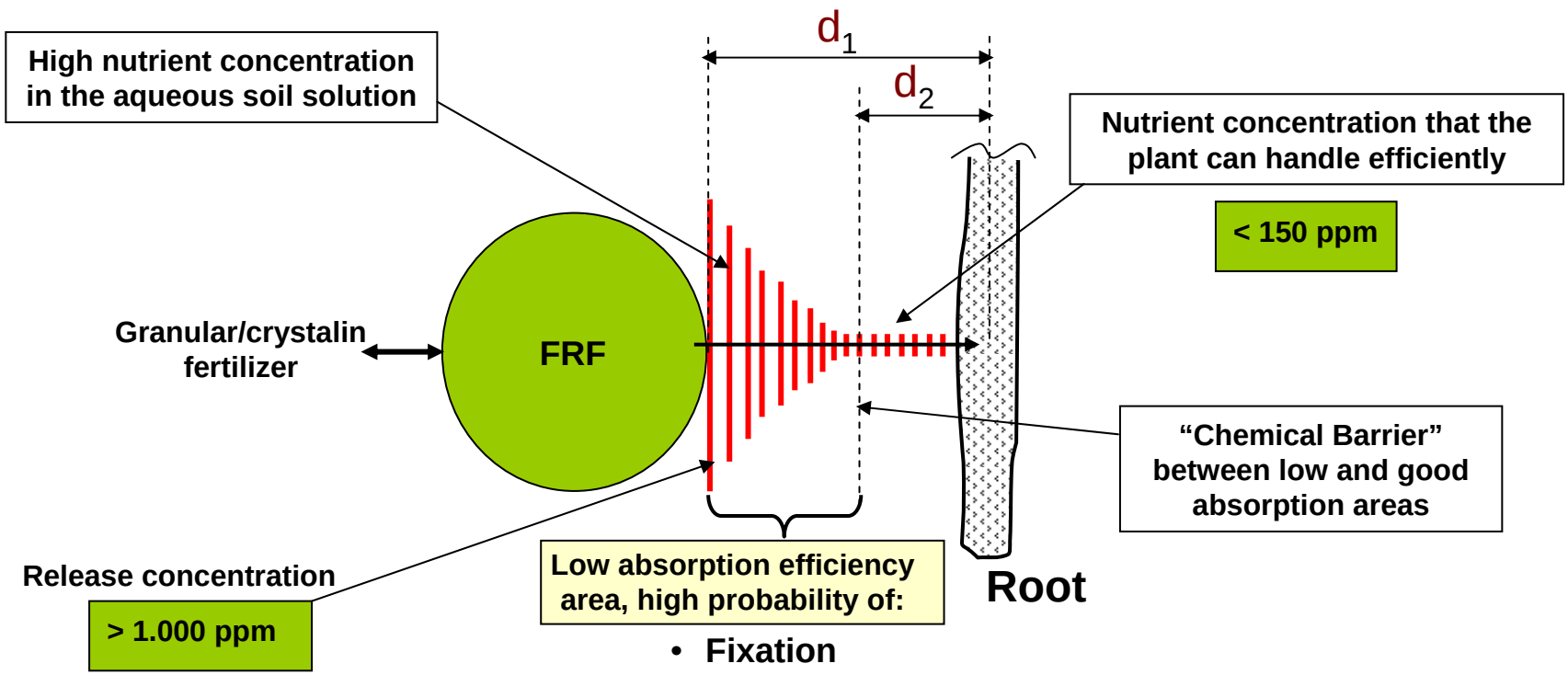
Most important reason:

(Technical and Scientifical data)

High solubility and fast release of nutrient from conventional NPK fertilizers, generates a high nutrient concentration in the aqueous soil solution that the plant can not handle properly during its nutrition

Fast nutrient release and low absorption efficiency

(FRF: Fast Release Fertilizer)



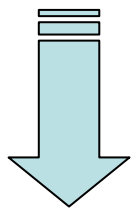
- **Fixation**
- **Volatilization**
- **Lixiviation**
- **Toxicity**
- **Conversion to non available species**

d

- Root – fertilizer distance, at where root moves, as a response to the generated "chemical barrier" by fertilizer dissolution
- As bigger **d** is, bigger will be the probability of low absorption efficiency

Technical and Scientifical data
Commercial expertise

Best way for increasing absorption efficiency



Controlled Release of NPK nutrients

Ways of controlling the release of nutrients

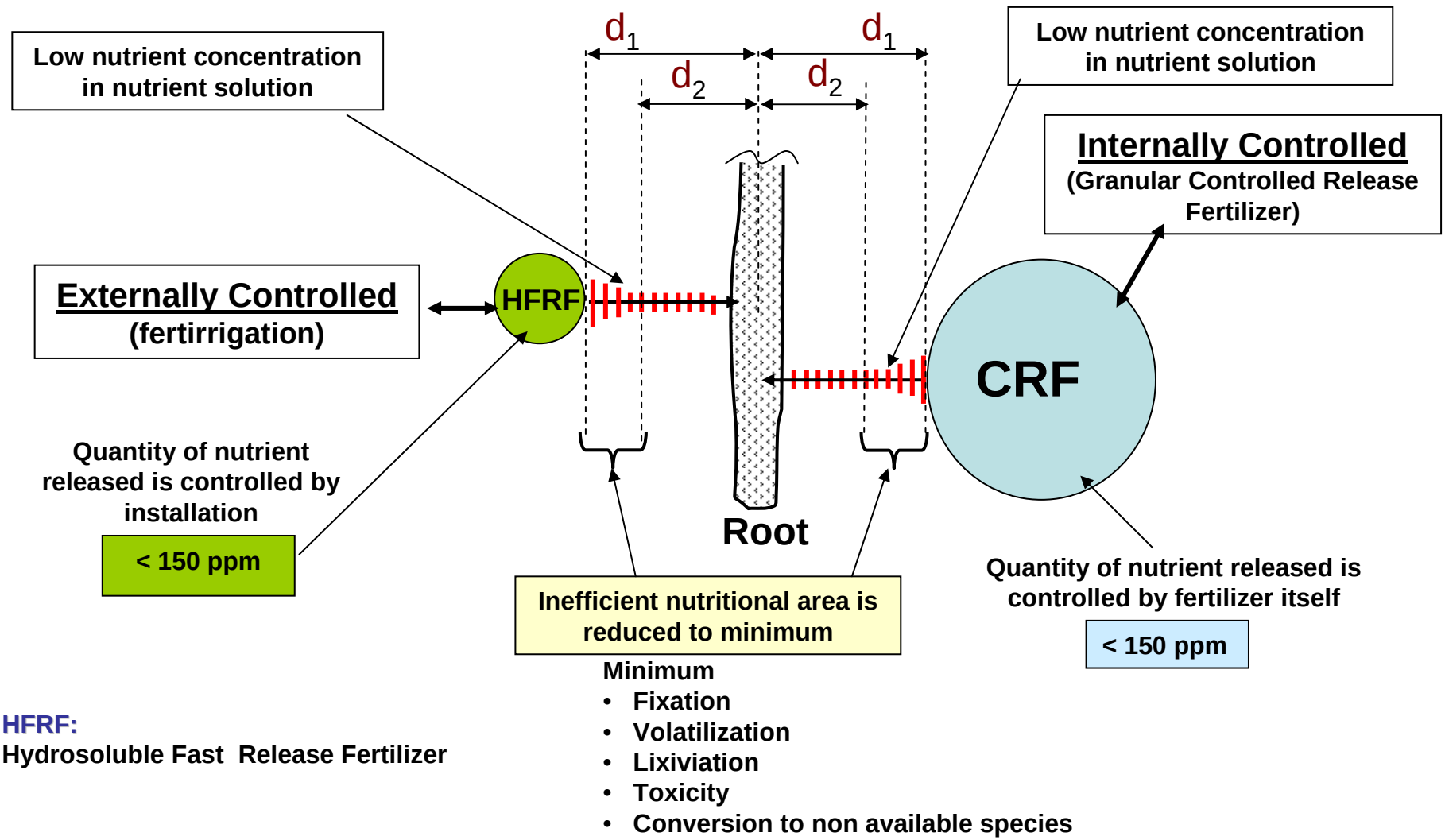
Externally: Using tools outside fertilizer

- **Fertirrigation**: For using this tool it is needed to have Hydrosoluble Fast Release Fertilizers (HFRF) (solubility > 100 g/lt water, total dissolution in few hours, maximum 0.5% non soluble materials)

Internally: Using tools inside fertilizer

- **Controlled Release Fertilizer (CRF):** Granular fertilizer containing high solubility NPK nutrients and also containing chemical or physical barriers as means of controlling the quantity and speed of NPK nutrient release

Controlled Release of Nutrients



HFRF:
Hydrosoluble Fast Release Fertilizer

Maximum Absorption Efficiency

Nutrients Efficiency in NPK Fertilizers

Technical and Scientifical data

Nutrient	Conventional Absorption Efficiency	Absorption Efficiency by Controlled Release of Nutrient
N	40%-60%	60%-90%
P	10%-30%	30%-60%
K	50%-70%	70%-90%

Major Economical and Environmental impact

Controlled Release fertilizer (CRF)

Controlled Release characteristics

- It allows more uniform nutrients release through entire crop cycle. It is done mainly by controlling the nutrient quantity released (flux and duration of release)
- Chemical quality and bioavailability of nutrients is maintained in the fertilizer

Controlled Release impact

- Increasing nutrient efficiency allows increassing yield at lower cost and at lower environmental impact (water, soil, air)
- Higher crop quality and less toxicity risks (foliar, seed, etc.)
- It allows reduction of tillage necessity

Edaphic Fertilization at maximum efficiency

CRF

Release Pattern

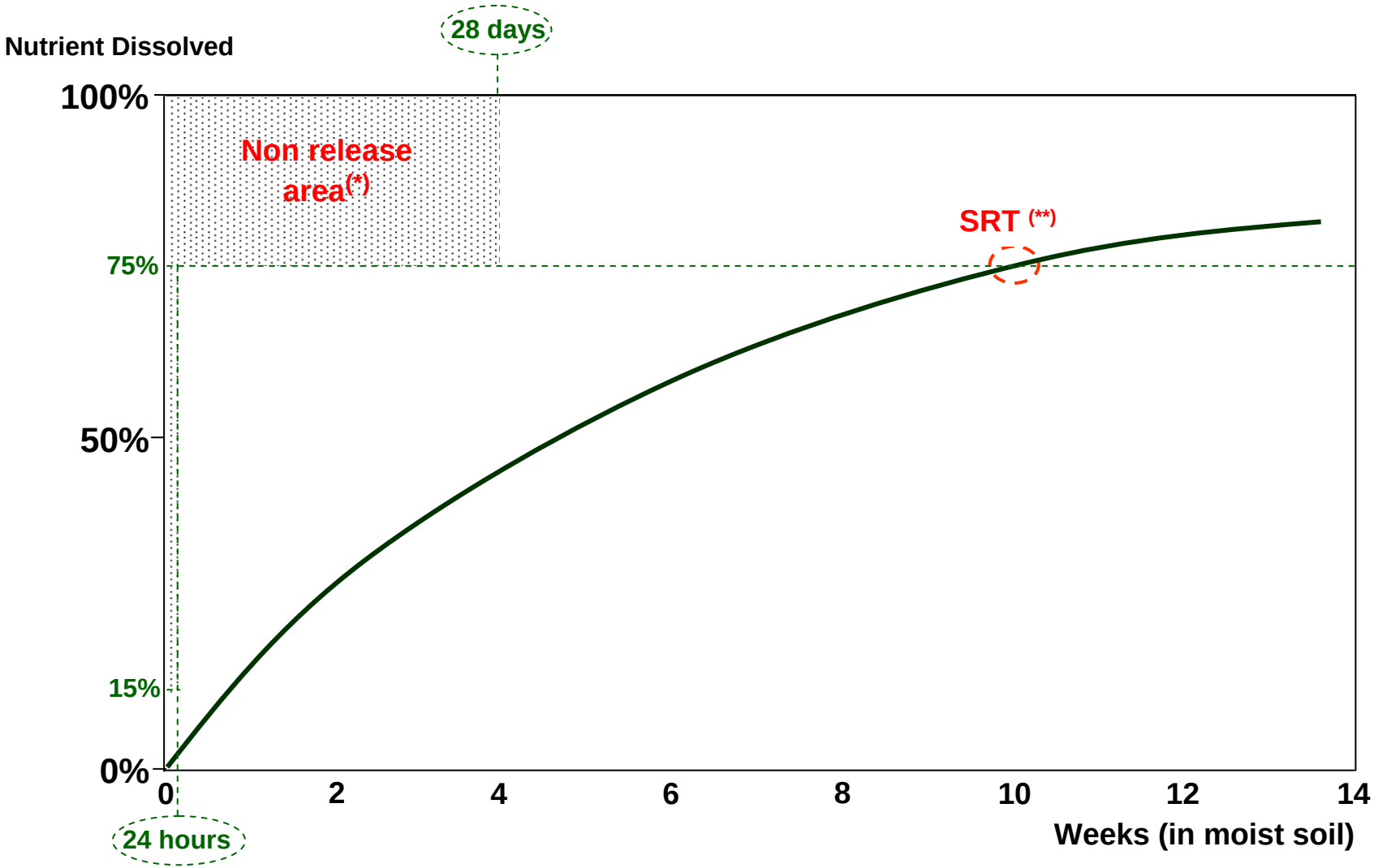
CRF release pattern in moist soil

(Comité Européen de Normalisation, CEN)(*)

- No more than 15% in 24 hours
- No more than 75% in 28 days
- At least 75% at ***SRT*** (**S**tated **R**elease **T**ime claimed by manufacturer)

(*) EN 13266:2001. Method for coated fertilizers. Determination of the release of the nutrients.

CRF release pattern example in moist soil



(*) as recommended by Comité Européen de Normalisation (CEN); (**) Stated Release Time (SRT)

Controlled Release fertilizer (CRF)

- **CRF have been in the world market for more than 40 years**
- **There are many types and brand names of CRF**
- **CRF is an area of high R&D and commercial activity (*)**

Some CRF brand names in the market

- Multicote
- Smartcote
- Nutricote
- Evercoat
- Nutri-Pak
- Basacote
- Plantacote
- Osmocote
- Polyon
- **NP-CaS** **(Tripoliven C.A.)**

(*) Activity field known as "*Enhanced Efficiency Fertilizers*" or *EEF*

NP-CaS

Controlled Release Fertilizer

www.tripoliven.com

NP-CaS

Tripoliven has developed a granular Controlled Release Fertilizer (CRF) based on urea (U), wet process phosphoric acid (WPA), monoammonium phosphate (MAP) and calcium sulfate

This granular material has high solubility and fast release NP nutrients, coming from U-WPA-MAP components and slow release soluble CaS nutrients coming from calcium sulfate.

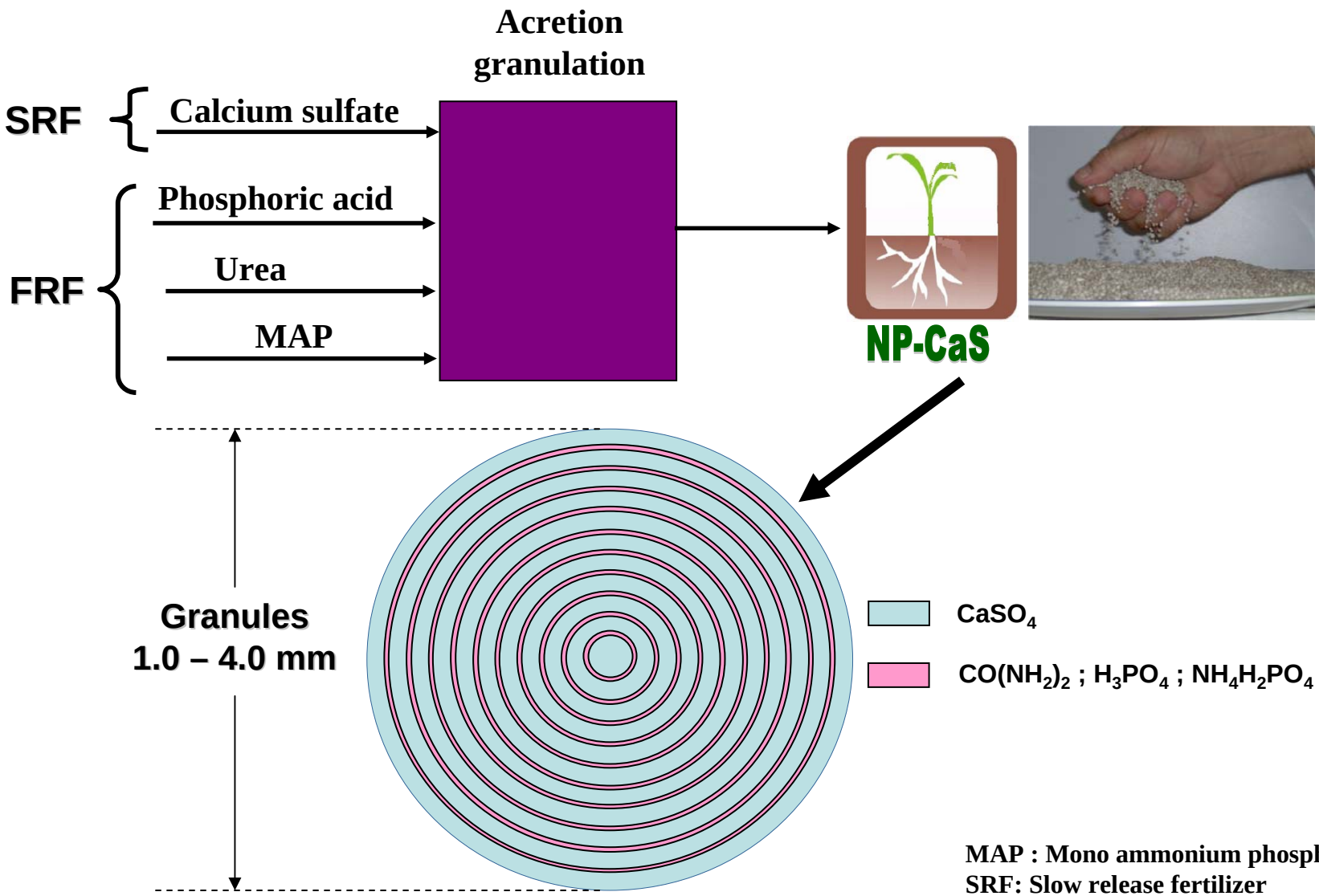
The NP release is controlled by CaS release, generating an efficient CRF effect. All nutrients (NPCaS) are present in a high efficient bioavailable chemical form, and can be used on all types of crops and soils, either alone or in bulk blends

Besides its nutritional value, the calcium sulfate has a benefical effect in soils, enhancing its physical and chemical quality, specially on alcalin, salin, sodic, aluminic, compacted soils

We will refer to this product along the presentation as NP-CaS

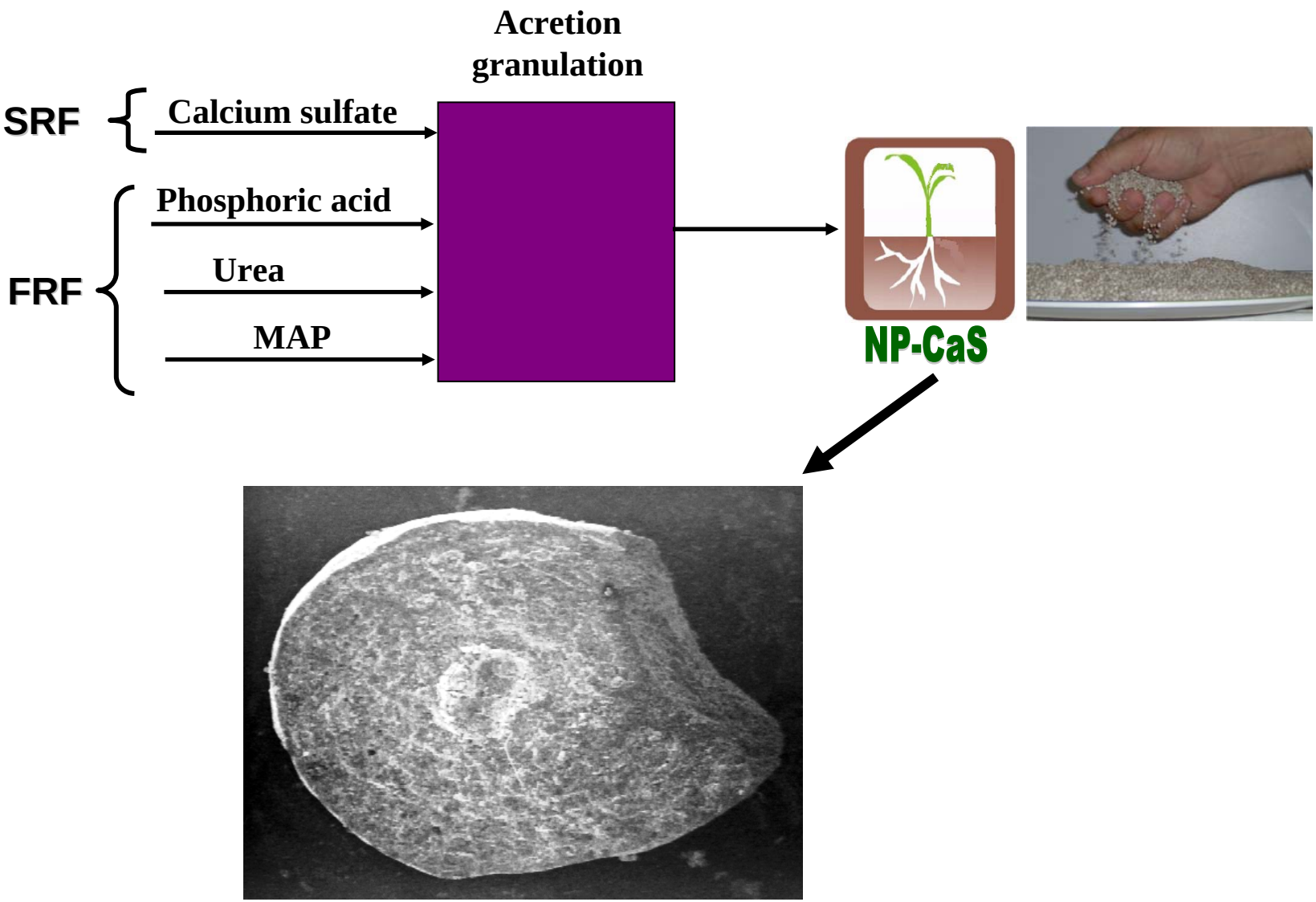
www.tripoliven.com

NP-CaS



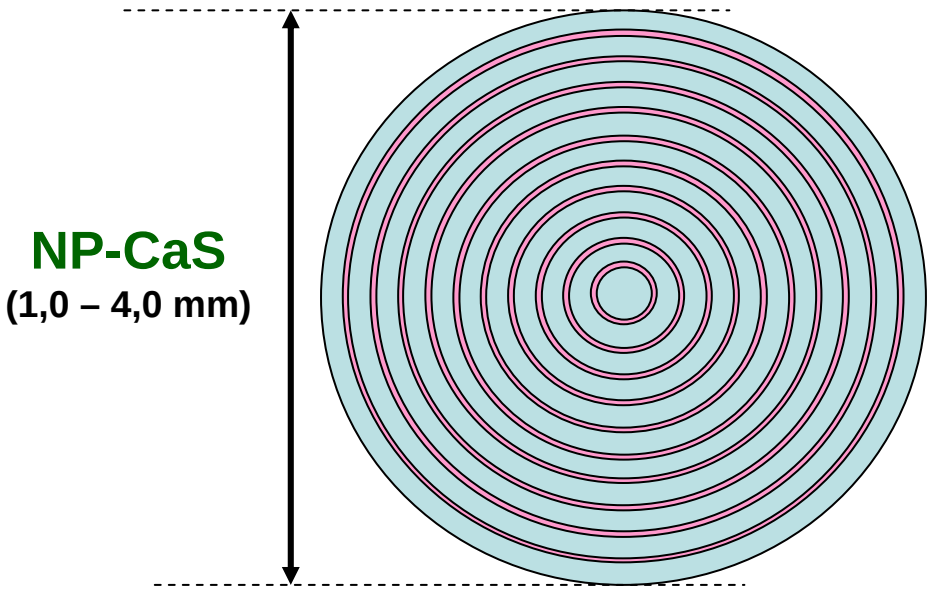
MAP : Mono ammonium phosphate
SRF: Slow release fertilizer
FRF: Fast release fertilizer

NP-CaS


Acretion
granulation
SRF
Calcium sulfate
FRF
Phosphoric acid
Urea
MAP
NP-CaS

NP- CaS Controlled Release Fertilizer

Granular Fertilizer



Action Mechanism

When granule **NP-CaS** layers are exposed to soil moisture:

- Calcium sulfate layers are slowly dissolved, releasing Ca and S
- NP layers are inmediatly dissolved, releasing N and P
- This constant-continuous “slow-fast” layers dissolution controls the efficient release of NPCaS nutrients for plant absorption
- Ca^{2+} and SO_4^{2-} released by calcium sulfate also enhance the physical and chemical soil quality

CaS (calcium sulfate: $CaSO_4$)
Medium Solubility (1-3 g/l)
Slow rate dissolution (30 – 60 microns/day)

NP (Urea ; H_3PO_4 ; MAP)
High solubility (>300 g/l)
Inmediat dissolution

MAP : Mono ammonium phosphate ($NH_4H_2PO_4$)

Calcium Sulfate as fertilizer release controller

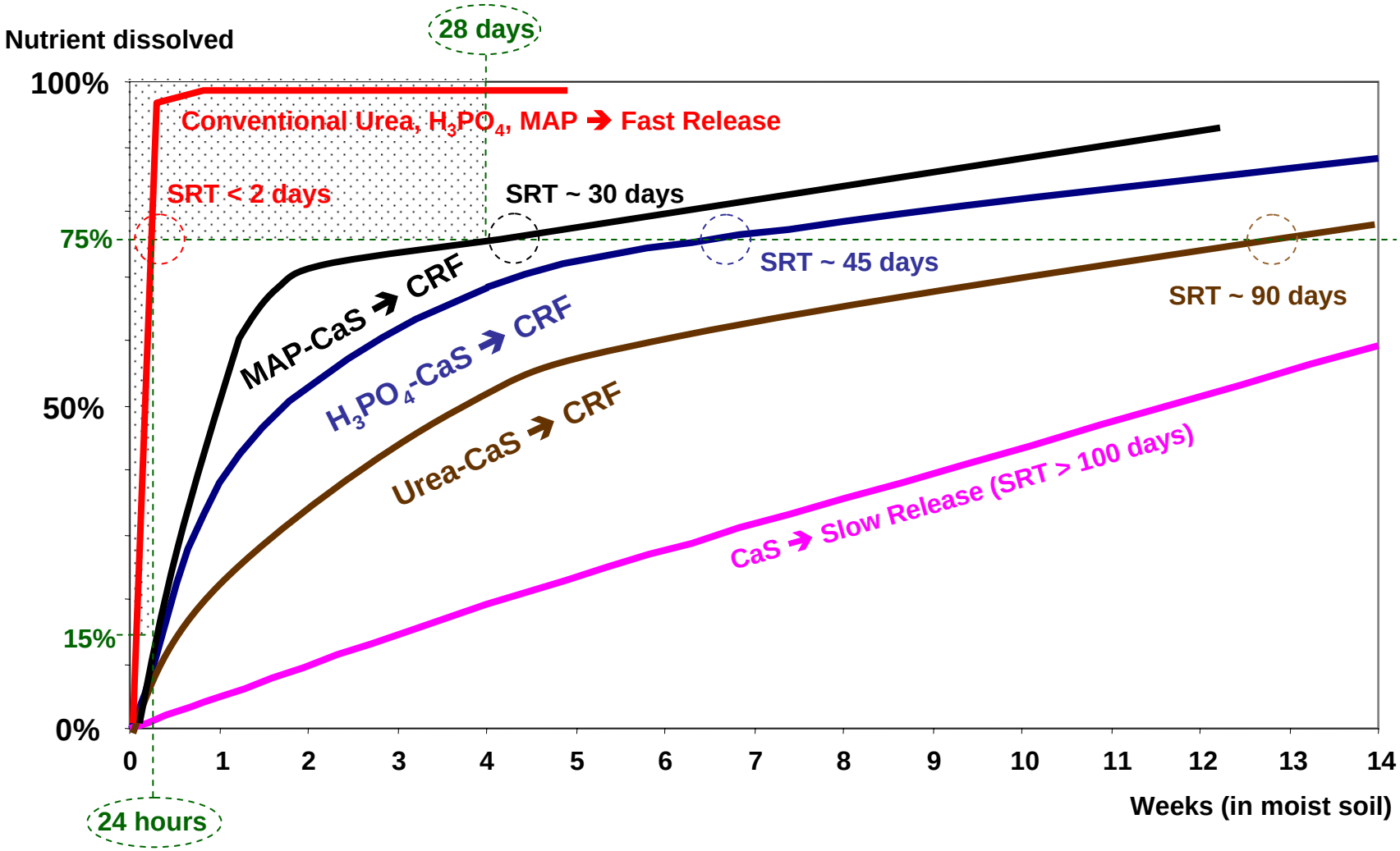
Technical literature and Tripoliven experience:

- Crystalin structure of calcium sulfate allows its continuous and constant dissolution rate in water or in the soil moisture
- Under properly operation parameters, calcium sulfate, urea, phosphoric acid and ammonium phosphate, can be efficiently granulated together
- Dissolution properties of calcium sulfate is maintained in the granules obtained, acting as a dissolution controler of these granules
- Granules obtained can be used as controlled release fertilizer on any crop and on any soil type

NP- CaS

Release Pattern

NP- CaS: Release Pattern



(*) MAP: Mono ammonium phosphate; CaS: Calcium Sulfate; SRT: Stated Release Time

NP- CaS

Available combinations

Type	N	P_2O_5	$CaSO_4$
High in Calcium Sulfate	2%	10%	80%
High in Calcium Sulfate	5%	13%	75%
High in Nitrogen	18%	2%	50%
High in Phosphate	5%	25%	50%

NP- CaS

Perfect Sinergy

NP

- N and P controlled release for optimum nutrition efficiency
- P of maximum bioavailability (monophosphate type: $H_2PO_4^-$)
- N sligtly acidic, minimum hidrolisis and minimum volatilization

CaS

- Does not modiffy chemical properties of NP components
- Does effective control releasing of NP nutrients
- Does provide bioavailable Ca and S nutrients
- Does enhance physical-chemical soil properties

For maximizing profits

NP-CaS

Your best CRF selection

Thank you

www.tripoliven.com