



# Controlled Release Nutrition





# Multicote®

## Controlled Release Fertilizers

**Continuous  
plant nutrition  
over months**

**Enhanced  
nutrient use  
efficiency**

**Labor  
saving**



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- Summary



# Multicote® overview

- ✦ A range of controlled release fertilizers
- ✦ Designed to feed plants continuously over months
- ✦ Based on polymer coated technology
- ✦ A variety of formals is available, to suit the needs of different plants
- ✦ Products for ornamentals, agriculture and turf



# The benefits of Controlled Release Nutrition

# The benefits of controlled release nutrition



- Optimal Plant Development - Nutrients are precisely supplied in accordance with specific plant needs



**Multicote<sup>®</sup>**: optimal nutrition throughout the growth season

**Granular soluble fertilizer:** hazardous excess at the beginning followed by deficiency towards the end of the growth season

# The benefits of controlled release nutrition



## Single Application per Season

- ✓ Labor saving
- ✓ Reduced application costs
- ✓ Fewer tractor operations = less soil compaction



# The benefits of controlled release nutrition



## ✦ **Minimized Losses**

Through leaching, volatilization or fixation in the soil

- ✦ Availability of nutrients throughout the growth cycle is ensured
- ✦ Optimized use of fertilizers without wastage
- ✦ No surplus fertilization is required – reduced application rates
- ✦ Ecologically superior (no soil, ground-water or air pollution)



# The benefits of controlled release nutrition



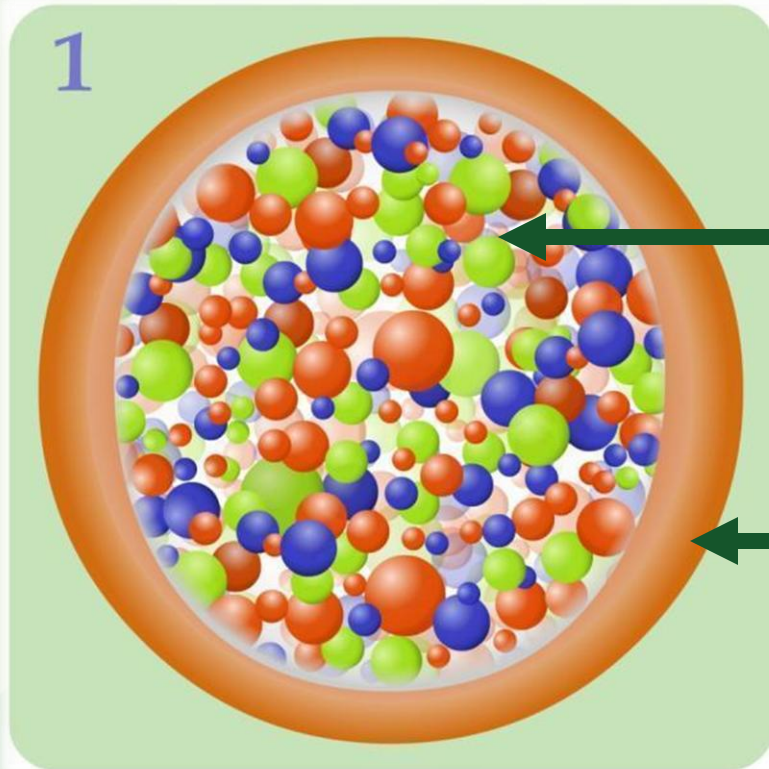
- ❖ **Fertilization totally independent of irrigation**
  - ❖ No need for sophisticated dosing and injection systems
  - ❖ In rainy season – no need for technical irrigations
  - ❖ No fertilizer losses where irrigation is applied in excess to prevent salinity build-up



# Multicote<sup>®</sup> Technology



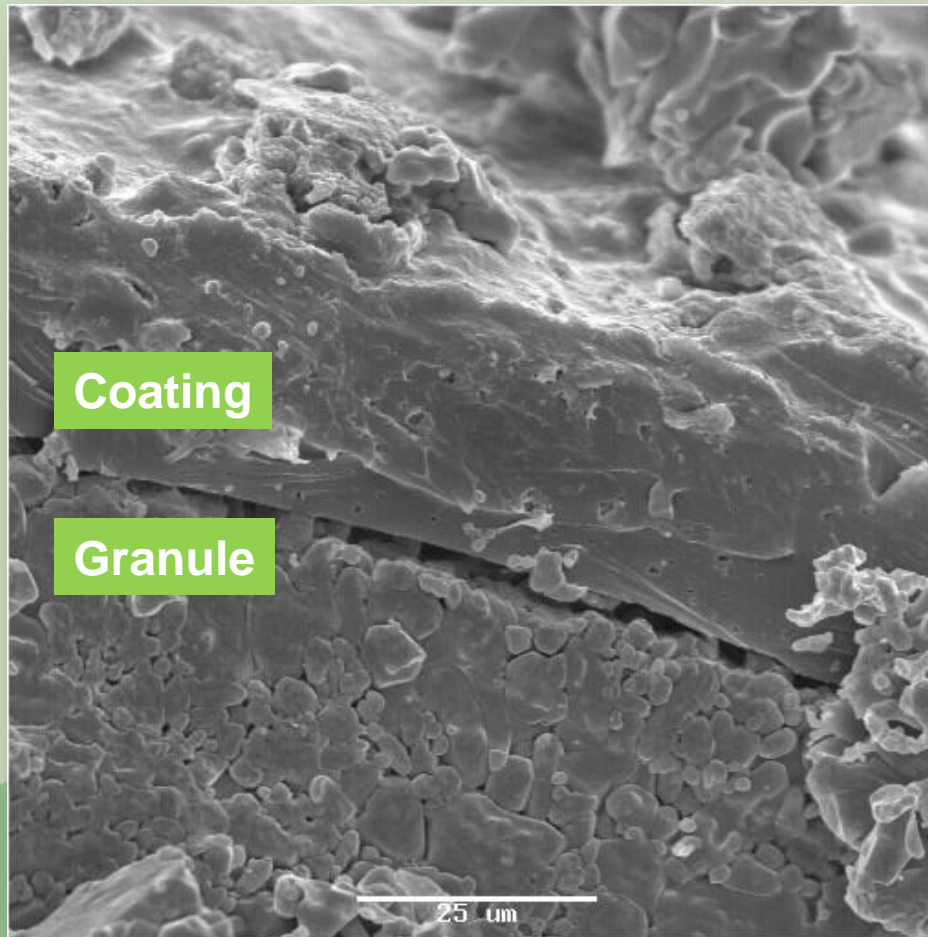
# Multicote<sup>®</sup> technology



Core:  
Soluble nutrients

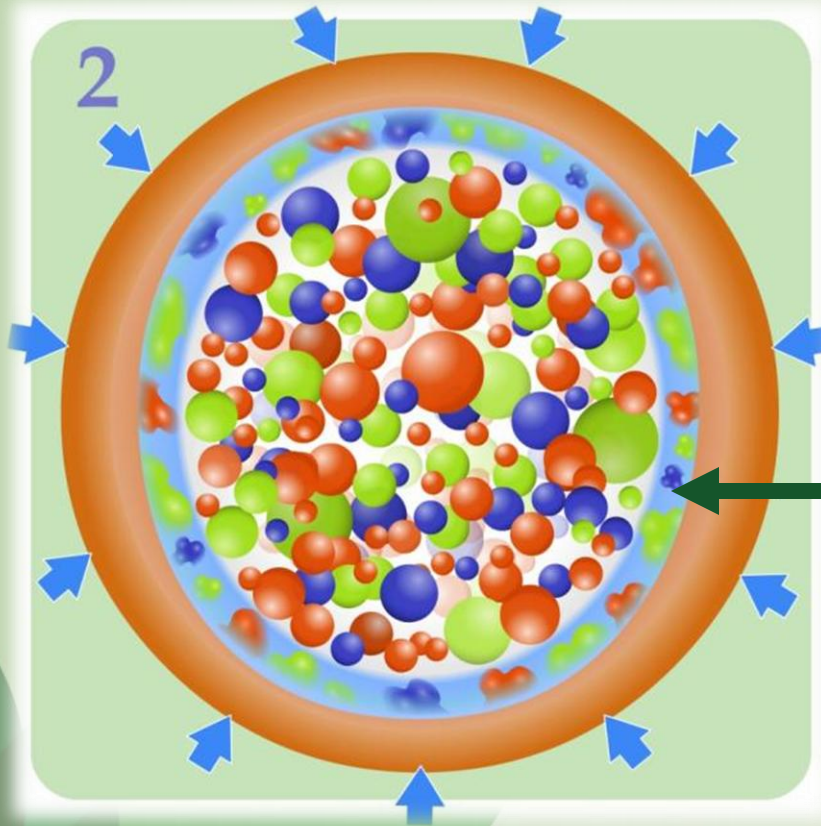
Shell:  
Polymer coating

# Multicote<sup>®</sup> technology



Scanning Electron Microscope image of coated NPK granule

# Multicote® technology



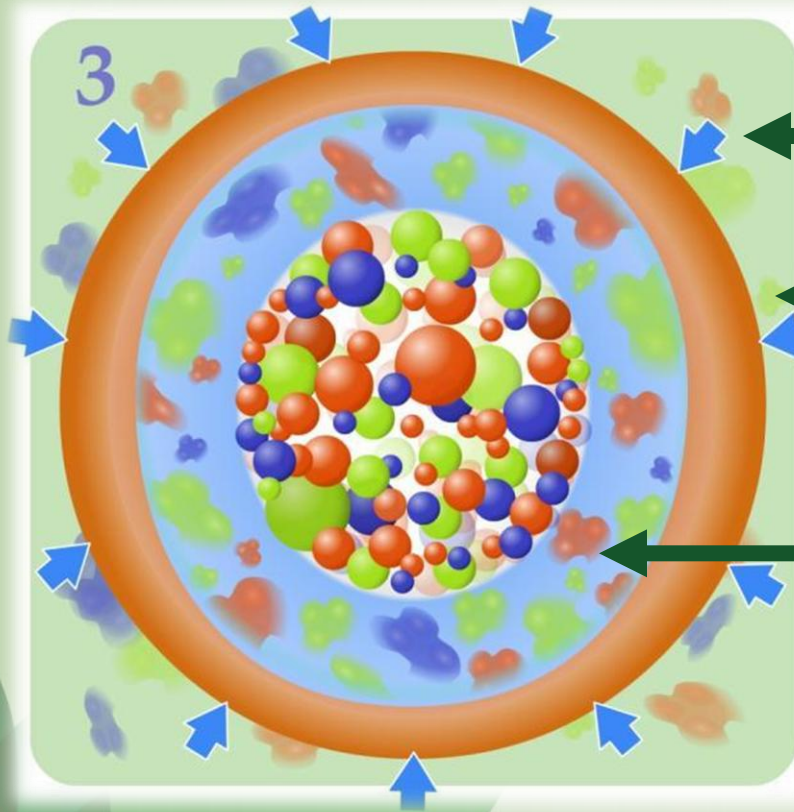
After application in the soil:

Water penetration

Gradual dissolution of the nutrients

This stage takes 7-10 days, depending on the longevity

# Multicote<sup>®</sup> technology

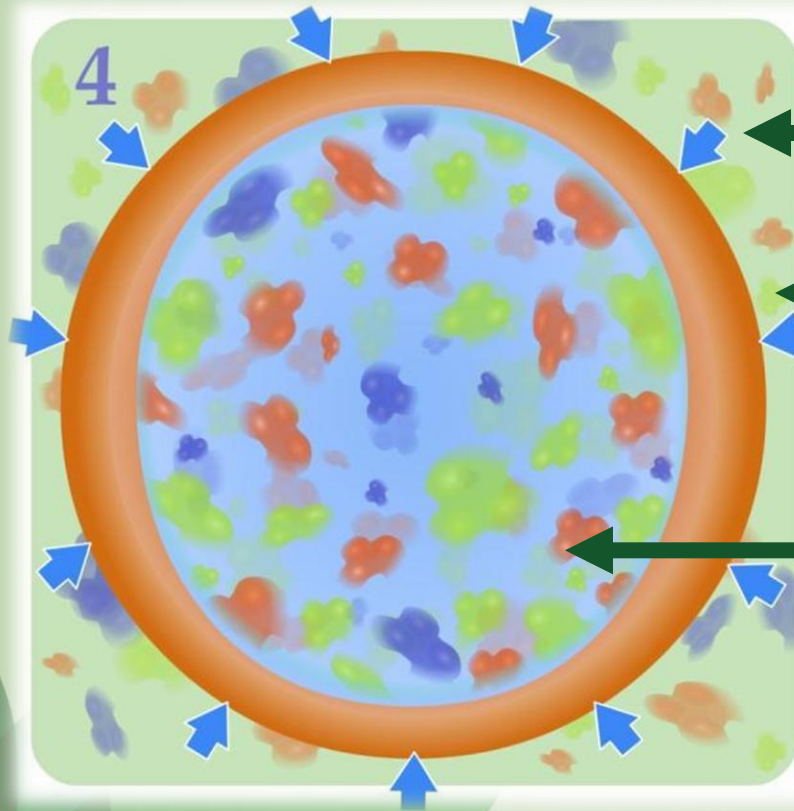


Water penetration

Diffusion of nutrients through the coating to the soil

Further dissolution of nutrients

# Multicote<sup>®</sup> technology



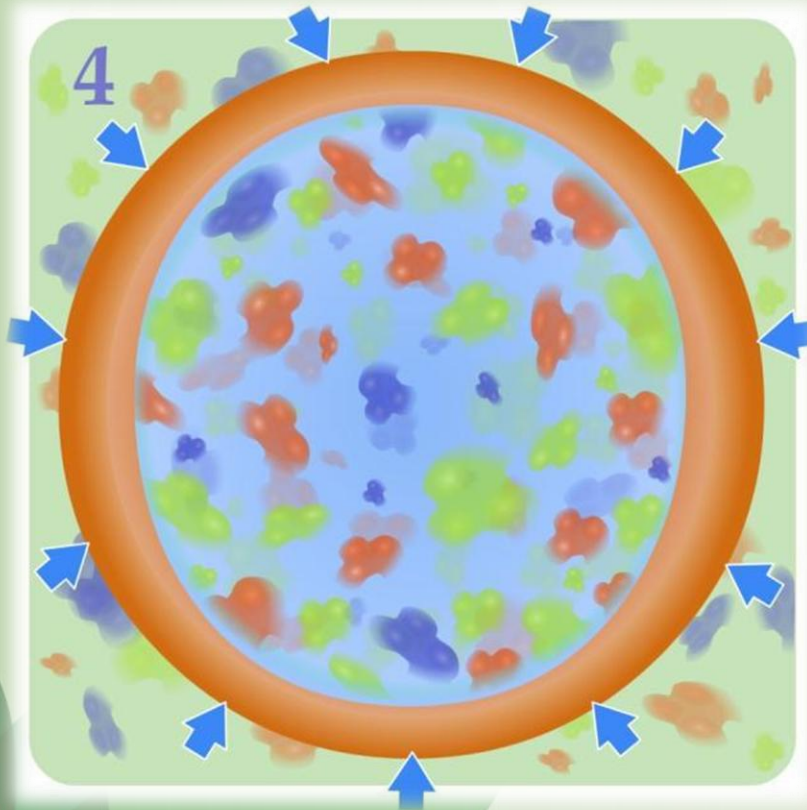
Water penetration

Diffusion of nutrients through the coating to the soil

Complete dissolution of nutrients

At this stage the release rate decays, according to Fick's 2<sup>nd</sup> law of diffusion.

# Multicote® technology



Fick's 2<sup>nd</sup> law of diffusion:

$$\frac{dC}{dt} = D \frac{d^2 C}{dX^2}$$

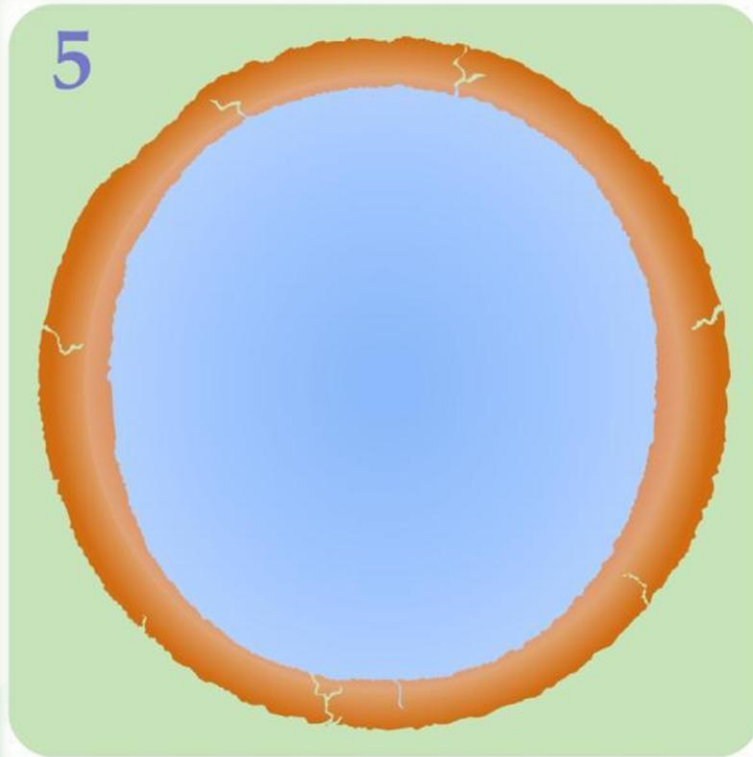
C = concentration

t = time

D = diffusion coefficient



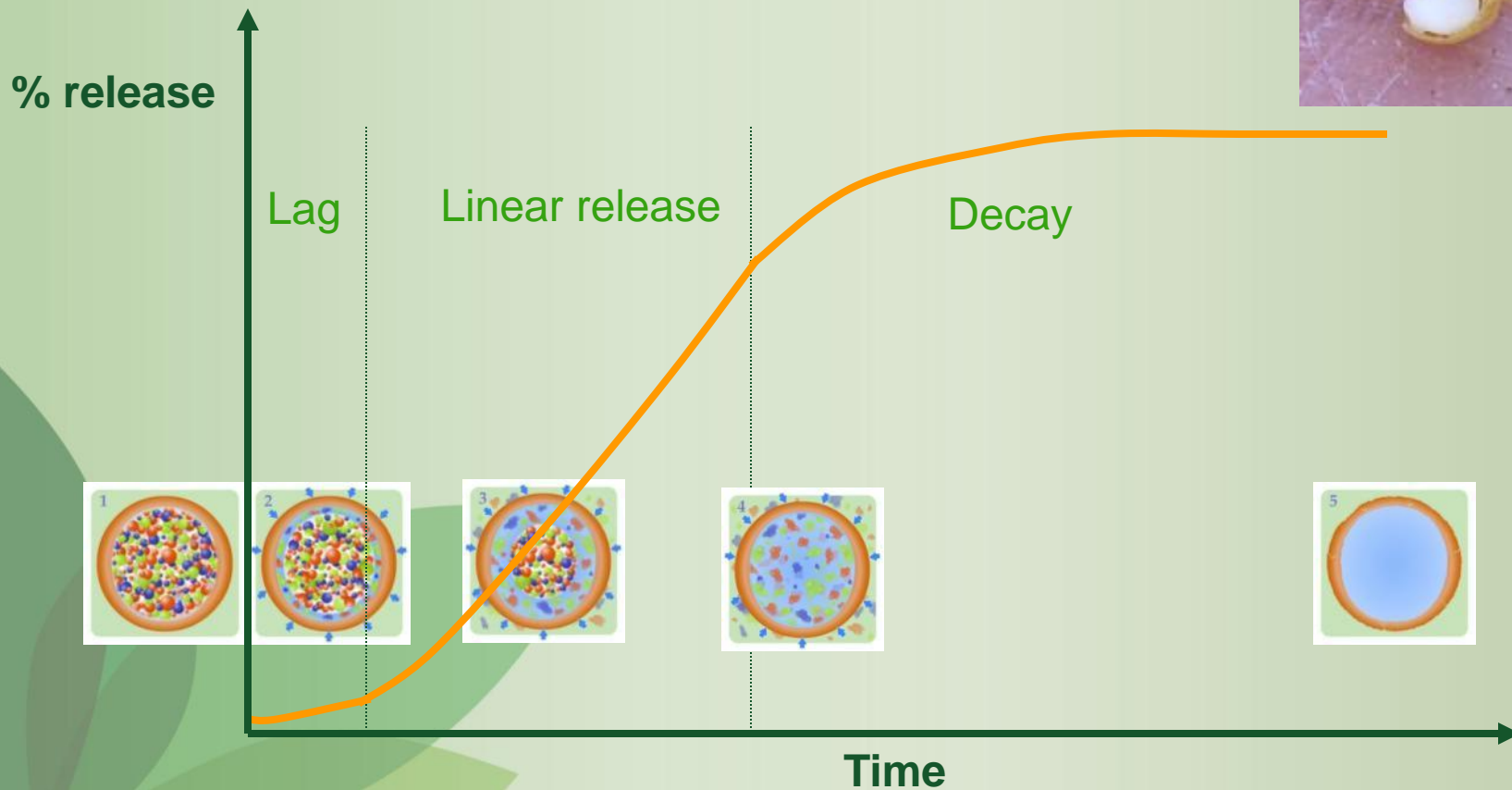
# Multicote® technology



After the release is complete, the coating will degrade gradually, leaving no residues in the soil.

# Multicote<sup>®</sup> technology

Typical release curve:





# Multicote<sup>®</sup> technology

## Release rate, longevity & temperature

- ✦ The rate of nutrient release from Multicote increases with temperature:

$$\frac{dC}{dt} = D \frac{d^2 C}{dX^2}$$

C = concentration, t = time  
D = diffusion coefficient

$$D = D_0 e^{-\frac{Q}{RT}}$$

Q = activation energy, R = gas constant  
T = temperature

- ✦ Note: plant uptake rates also increase with temperature
- ✦ The longevity decreases as release rate increases

# Multicote® technology

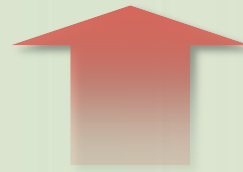


The rate of nutrient release from Multicote® increases with temperature, and the longevity is decreased accordingly.

**temperature**

**Release rate**

**longevity**





# The Multicote® Range





# The Multicote® range

The Multicote range provides solutions for different market segments:

- **Multicote®** for nurseries and ornamentals
- **Multicote® Agri / Multigro®** for agriculture
- **CoteN™** for arable crops
- **Multicote® Turf / Multigreen®** for professional turf & domestic lawns



# Multicote®

for nurseries and ornamentals



*certified for*  
**Horticulture**



# Multicote® products



Product	Recommended applications
Multicote 2	Compost production, gardening
Multicote 4	Pot-plants and hanging baskets, bedding plants, garden applications
Multicote 6	Pot-plants, hanging baskets
Multicote 8	Trees, shrubs, pot-plants and container grown nursery stock
Multicote 12	Trees, shrubs, pot-plants and container grown nursery stock
Multicote 16	Container grown nursery stock in tropical and sub-tropical regions



# Release longevities



	15°C (60°F)	21°C (70°F)	30°C (86°F)
<b>Multicote 2</b>	3 months	2 months	-
<b>Multicote 4</b>	6 months	4 months	2 months
<b>Multicote 6</b>	7-8 months	6 months	3-4 months
<b>Multicote 8</b>	9-10 months	8 months	5-6 months
<b>Multicote 12</b>	15-16 months	12 months	7-8 months
<b>Multicote 16</b>	20-22 months	16-18 months	9-10 months

# Multicote<sup>®</sup> Agri / Multigro<sup>®</sup> for agriculture CoteN<sup>™</sup> for arable crops





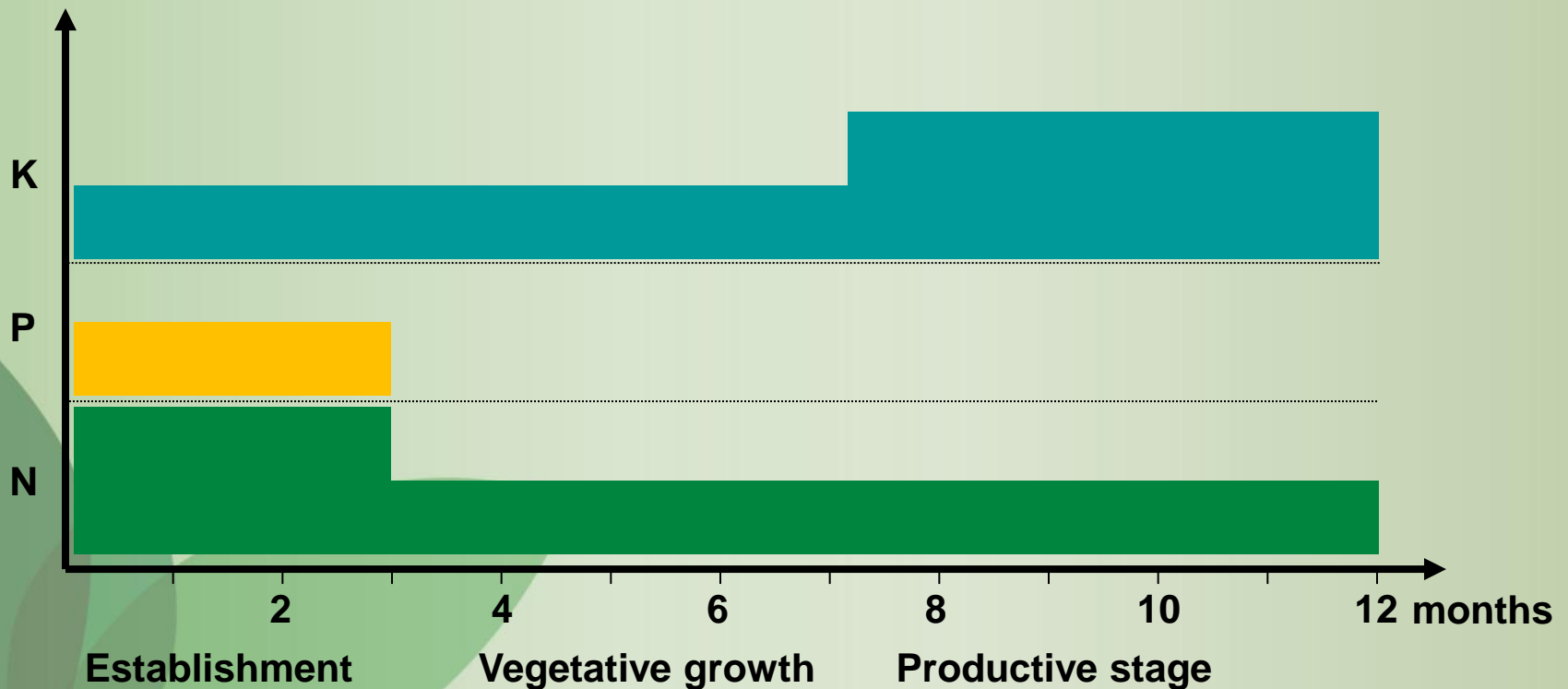
# Multicote® Agri products

- ❖ Combine coated N, P, K and Mg & non-coated nutrients
- ❖ Wide variety of nutritional compositions
- ❖ Release longevities of 2,3,4,6,8 and 12 months
- ❖ CoteN™: controlled-release nitrogen



# Multicote<sup>®</sup> Agri “Stages”

- ✦ NPK ratio changes during the growth season, according to growth requirements.



**Multicote<sup>®</sup> Agri & CoteN<sup>™</sup>**  
**are recommended**



**On light soils**  
where nutrients are easily leached

# Multicote<sup>®</sup> Agri & CoteN<sup>™</sup> are recommended



As base fertilizers for rainy season crops.  
Rainfall accelerates nutrient leaching....

# Multicote<sup>®</sup> Agri & CoteN<sup>™</sup> are recommended



.... when the mud makes side-dressing application troublesome.

Multicote<sup>®</sup> Agri & CoteN<sup>™</sup>  
are recommended



Where nitrogen application rates are limited by local regulations, so high efficiency of nutrient use is desired



**Multicote<sup>®</sup> Agri & CoteN<sup>™</sup>**  
**are recommended**



For crops with a shallow root system

# Multicote® Turf / Multigreen

for professional turf & domestic lawns





# Multicote® Turf / Multigreen

for professional turf & domestic lawns

- ✔ Year-round nutritional programs for turf of all types and all uses
- ✔ Formulas with different N:K ratios
- ✔ Takes care of the changing nutritional needs of the turf plant
- ✔ Products contain potassium nitrate
- ✔ Supports seasonal growth processes



# Multicote<sup>®</sup> Turf products

Product	N:K ratio*	Action
Booster	2:1	Dormancy breaker Initiates intensive leaf growth
Feeder	1:1	For balanced root and shoot growth. Helps maintaining turf quality and durability during seasons of intensive use.
Keeper	1:2 or 1:3	High-potassium fertilizer supports autumn growth and builds carbohydrate storage. Promotes drought & frost resistance
Multi-K <sup>®</sup> Turf / Multiverdo	1:3	Quickly available potassium fertilizer; “Quick action for tough periods”.

# Summary



- ✔ Controlled-release products for ornamentals, agriculture and turf
- ✔ Based on polymer-coating technology
- ✔ Provide efficient nutrition
  - ✔ For optimal growth
  - ✔ For minimized losses
- ✔ Require single application per season
- ✔ Products address specific requirements of the crop



# Multicote®

## Controlled Release Fertilizers

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over months**

**Enhanced  
nutrient use  
efficiency**

**Labor  
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# Thank You

Join-up our knowledge community  
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