

# Passion for grass

## *Grass solutions for airport grass fields*

World Bird Strike  
Conference  
Dec 5-9 2016  
Amsterdam (NL)



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# Topics

- Introduction to Barenbrug
- Growth of grass in general
- What is the contribution of grass to the reduction of bird strikes?
  - Long grass policy
  - Role of endophytes

# INTERNATIONAL

## Think global, act local

- Family company since 1904
- 18 operating companies
- 29 branches
- 6 continents
- R&D activities in 21 countries
- Seed production worldwide
- Upcoming markets
- Brand awareness



# Barenbrug Research in Europe

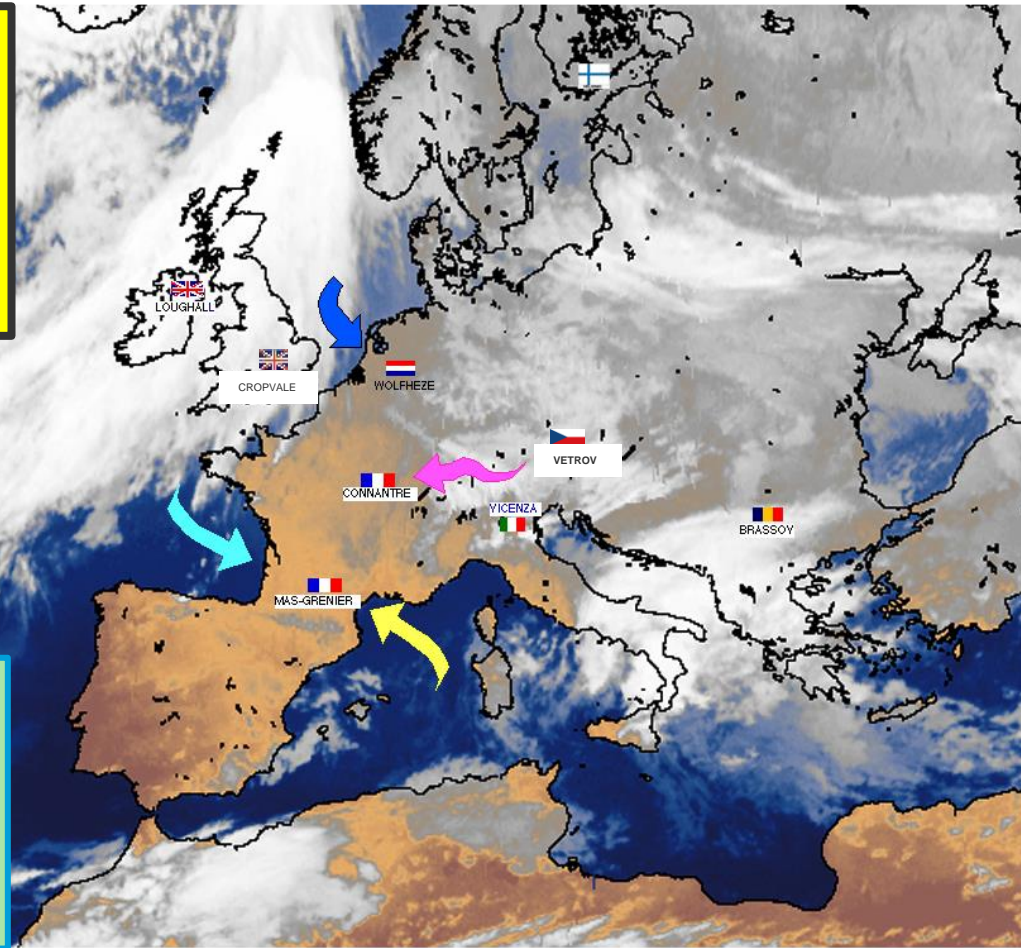
- Breeding sites network covering most local climatic conditions

Breeding and testing stations  
Barenbrug:

- Wolfheze NL
- Mas Grenier Fr
- Connantre Fr
- Brasov Ro
- Cropvale UK

Cooperations:

- Oseva Uni CZ
- Boreal FIN
- AFBI NI
- Landlab Italy



# Research strategy

- Turf and forage specialist
- Top performing varieties
- Quality product:
  - germination
  - purity
- Strong breeding stations and trial network
- Strong link with development team and seed production team



# Research strategy

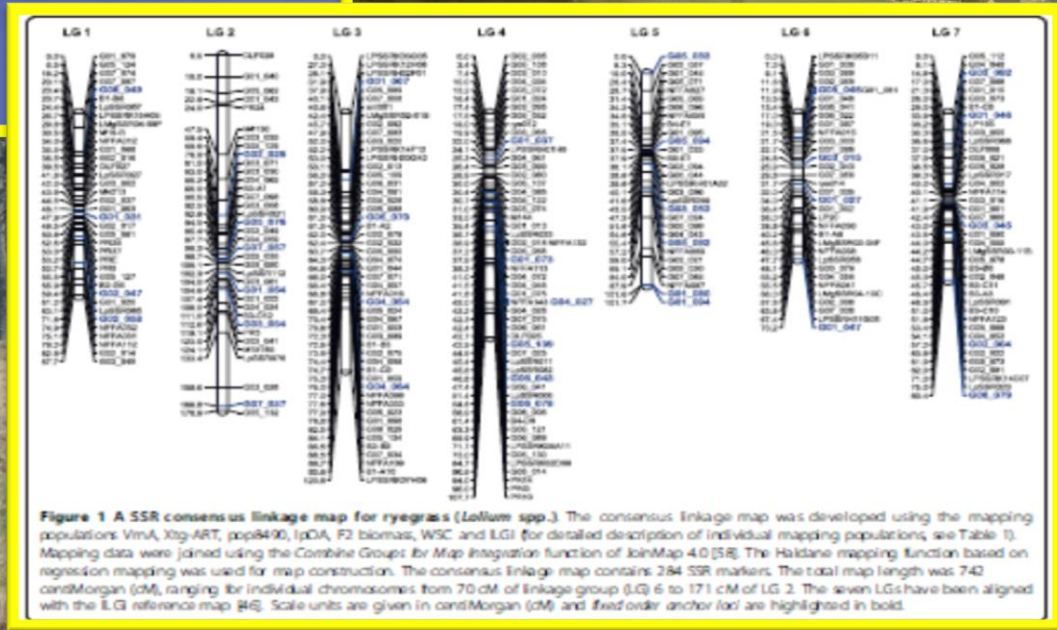
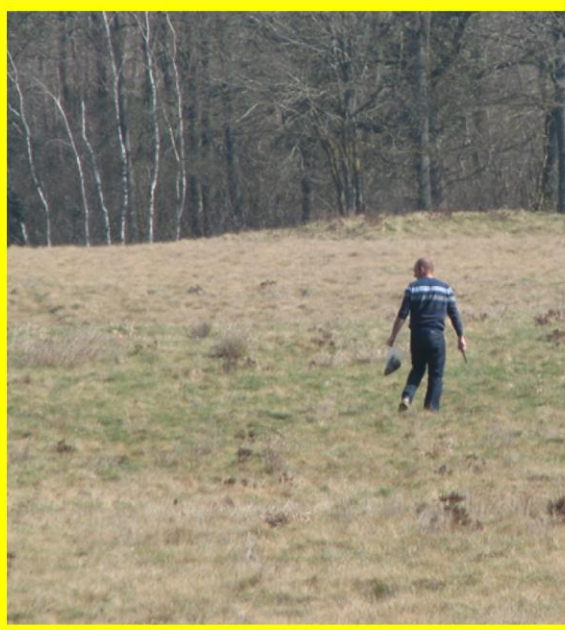
Response to environmental changes and society concerns

- Climate change: Drought heat
- Environmental: Less fertilisers & water and chemical input
- Reduce clippings



# Breeding cycle

- We search the perfect grass but .... How????
- Collection
- Technology







# THE STORY OF GRASS...

THE BREEDING AND COMMERCIALISATION OF A NEW GRASS CULTIVAR IS A LONG AND CHALLENGING BUSINESS.

## YEARS 1-3 THE BEGINNING

The first stage is to decide what we want the cultivar to achieve, then work begins in the greenhouse/polytunnel with initial cross.



## YEARS 4-6 SELECTION

Field assessments and selections based on desired characteristics and selection of parental plants



## YEAR 7 ISOLATION

Crossing of parental plants to produce seed of potential new cultivar



## YEAR 11 FIRST MULTIPLICATION

It's time to decide on the very best varieties and multiply to create pre-basic seed



## YEAR 16 OFFICIAL REGISTRATION

Once registered the seed is sown for harvest and its commercial use



## YEAR 17 FINISHED!

After 17 years of research and development the first grass seed goes on sale



## YEARS 8-10 PRIVATE TRIALS

We carry out multiple performance tests. These can take place on farms, in fields, at sports arenas, anywhere that is appropriate!

## YEARS 12-15 OFFICIAL TRIALS

We send the chosen varieties to various official independent trials which determine if the variety's performance is sufficient to get it registered.

# Breeding cycle

Selection of best quality



Crossing



Yield



Again

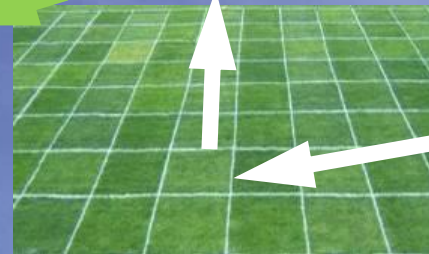
Pre-basic seeds  
Production for  
official tests



No

Go

Market  
potential?



3 years of testing

New plant!

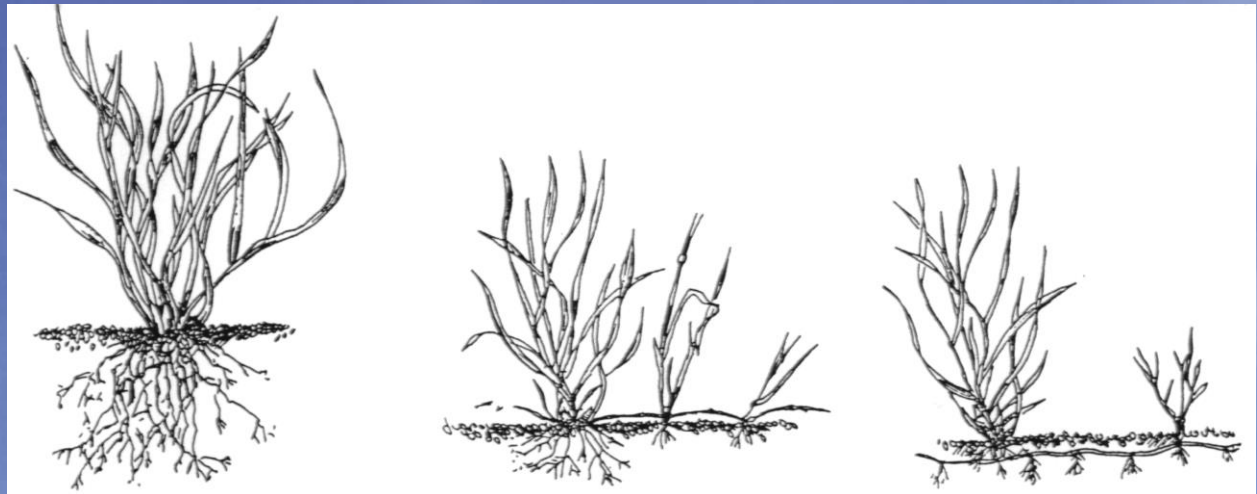
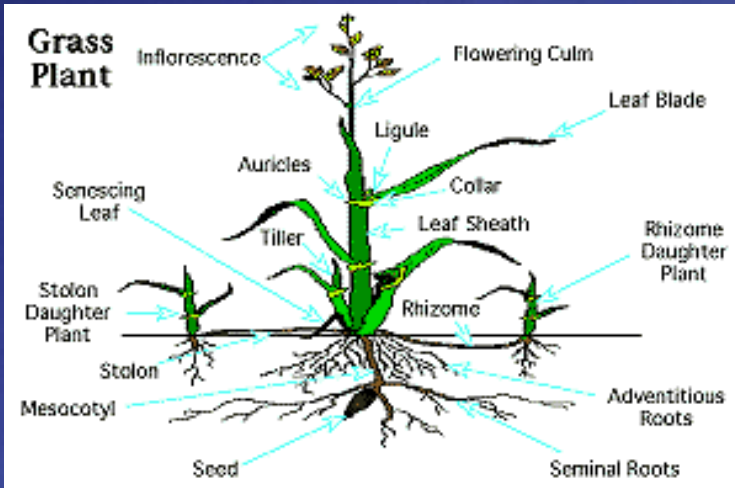


# The crucial role of grass for airport fields

- Genetic variation :
  - Inter-specific -> species
  - Intra-specific -> varieties!!
- Variety decisive for success
  - Grass morphology
  - Role of endophytes?



# Growth habit of grass



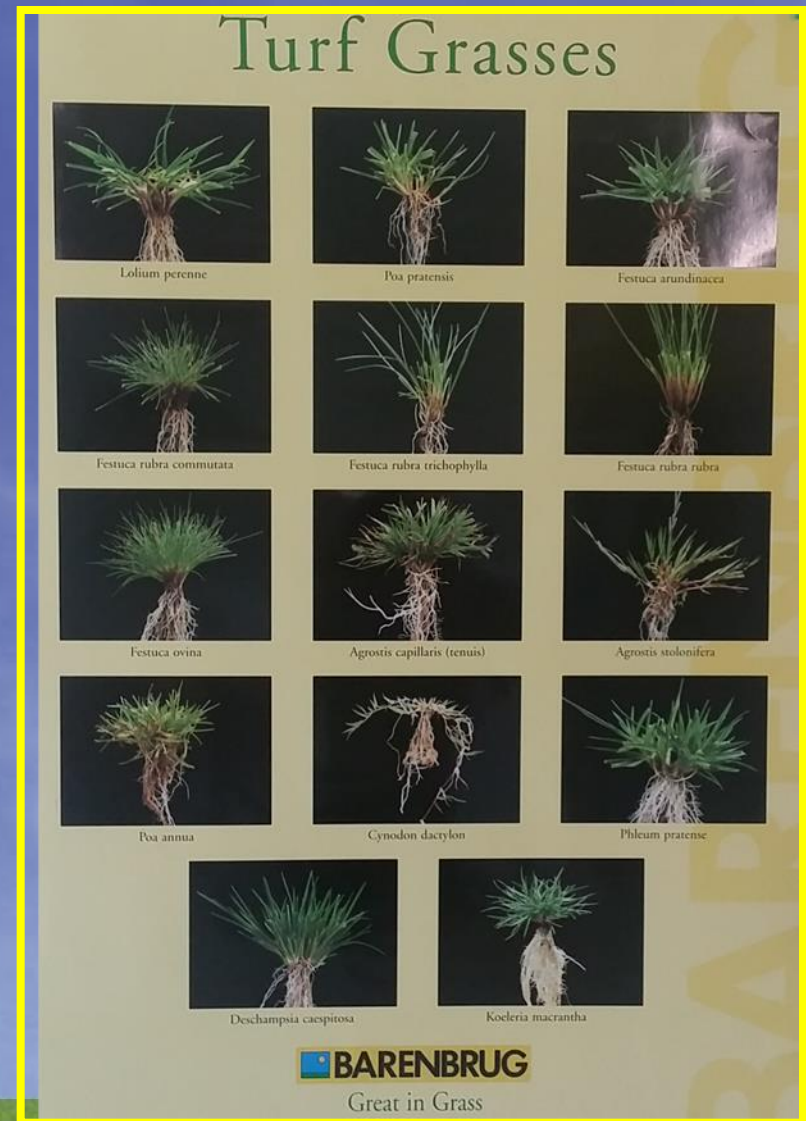
Stand alone ('bunch')

Stolons

Rhizomes

# Which species ?

- Perennial ryegrass
- Tall Fescue
- Kentucky Bluegrass
- Fine Fescue
  - Creeping red fescue
  - Slender fescue
  - Chewing fescue
- Other species:
  - Koeleria, Hard and Sheep fescues, Bermuda grass, Turf Cocksfoot, Deschampsia, Agrostis



# Traditional grass specie: perennial rye

*Lolium perenne*

## Characteristics:

- bunch type
- germination: 1-2 weeks
- establishment: 1,5 month
- fast grower
- sowing depth: 1,5 cm
- high need for water, fertilizer
- High productivity (dry matter)
- relatively low winterhardiness



# Why long grass policy?

- Prey birds, wintering gulls and lapwings give safety risks to ascending and descending aircrafts
- Also habitat choice based on food supply and length of vegetation
- Long grass is less attractive for bird swarms and since introduction of tall growing grass policy (at least 20 cm) decreased number of gulls
- Lot of *Lolium perenne* is/was usually used along runways

# Long grass policy at Schiphol Airport

- Trial study at Polderbaan
- Finding the best grass mixture out of alternative grass mixtures compared to perennial rye grass mix
- Conducted by Plant Research International – Wageningen UR assigned by Schiphol Airport
- Published 2004



# Grass seed mixtures in trial

1. *Festuca arundinacea* – *Poa pratensis*
2. *Festuca arundinacea* – *Poa pratensis* – *Descampsia cespitosa*
3. *Festuca arundinacea* – *Koeleria macrantha*–  
*Descampsia cespitosa*
4. *Elymus repens* – *Poa pratensis*
5. *Festuca arundinacea* – *Festuca rubra rubra*–*Lolium perenne* (old Schiphol airport mix until 2006)
6. 100% *Lolium perenne* (traditional forage mix)

# Trial set up

1. Barbizon-Barzan (80 Fa-20 Pp)
2. Barbizon-Barcampsia-Barzan (50 Fa-40 Dc-10 Pp)
3. Barbizon-Barcampsia-Barkoel (50 Fa-30 Pp-20 Km)
4. Szarvasi (Ely)-Barzan (80-20 Pp)
5. Olga-Echo-Kelvin (50 Fa-30 Frr – 20 Lp) standard Schiphol Fa mix
6. 100% Lp (traditional airport mix)



Fa - Pp

Fa - Dc - Pp

Lp

Fa - Dc - Km

Ely - Pp

Fa - Fr - Lp

# Autumn (after seeding)



*Fa-Dc-Pp* (mengsel 2)



*Fa-Dc-Km* (mengsel 3)



*Fa-Pp* (mengsel 1)



*Ely-Pp* (mengsel 4)



*Lp* (mengsel 6)



*Fa-Fr-Lp* (mengsel 5)

# 1st winter



*Fa-Dc-Pp* (mengsel 2)



*Fa-Dc-Km* (mengsel 3)



*Fa-Pp* (mengsel 1)



*Ely-Pp* (mengsel 4)



*Lp* (Schipholmengsel 6)



*Fa-Fr-Lp* (Schipholmengsel 5)

# Spring



*Fa-Dc-Pp* (mengsel 2)



*Fa-Dc-Km* (mengsel 3)



*Fa-Pp* (mengsel 1)



*Ely-Pp* (mengsel 4)



*Lp* (Schipholmengsel 6)



*Fa-Fr-Lp* (Schipholmengsel 5)

# 2nd winter



*Fa-Dc-Pp* (mengsel 2)



*Fa-Dc-Km* (mengsel 3)



*Fa-Pp* (mengsel 1)



*Ely-Pp* (mengsel 4)



*Lp* (mengsel 6)



*Fa-Fr-Lp* (mengsel 5)







Slide 25

# Impression Polderbaan, Spring 2010

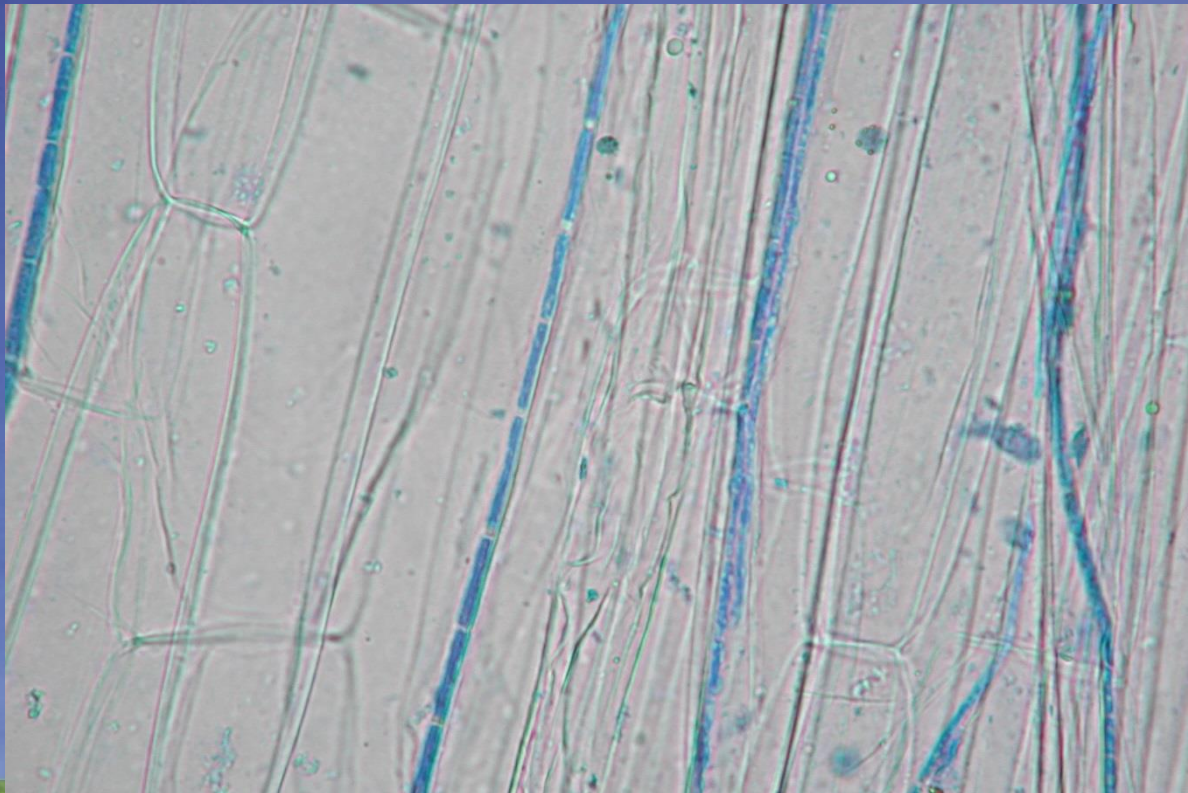


# Conclusions of study

- Mixes with *Festuca arundinacea* and *Descampsia cespitosa* meet requirements of 'long grass policy'
  - Dc -> not too dense stiffy sward preventing it from being invaded by weeds
  - Fa -> sufficiently erected crop, well prepared for winter survival
- 'Barbizon/Barnoble' tall fescue types have more stems and rougher leaf than Olga; unattractive for foraging and hiding
- One time mowing a year saves costs
- Good experiences at Schiphol Airport

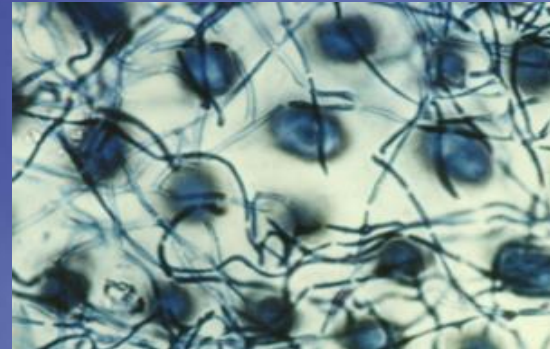
# What are endophytes?

A fungus (*Neotyphodium spp.*) growing within a plant without external signs of infections. Endofytes occur naturally in several species of grasses

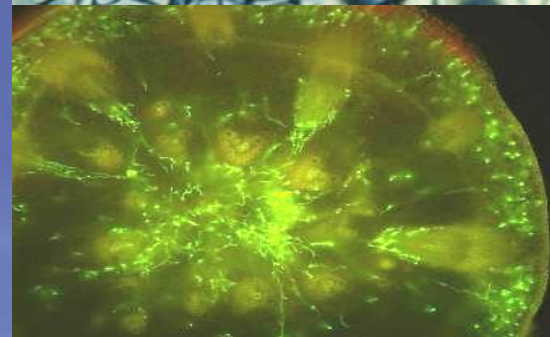


# Endophyte in grass

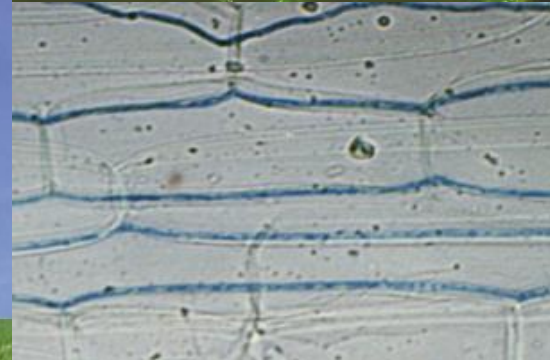
## Where is it found in the plant?



- Seed head for transmission



- Stem



- Mainly plant base

# Endophyte in grass

## Why is it beneficial in grasses?

- Endophyte produces compounds called: Alkaloids
- Alkaloids are active against herbivores and insects
- It reduces damages by insects
- Better establishment and less (a)biotic stress
- Greater grass persistence
- Highest levels found at *Festuca arundinacea* and *Lolium perenne*

# Endophyte in grass

Strong effect on insects feeding in the crown of the plant

- Argentine stem weevil, Billbugs
- Black beetle adults
- Mealybugs
- Chinch bugs



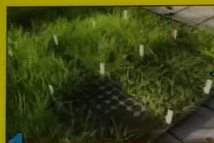
# Future of endo

- “Endosafe”: Endo alkaloids for its p harmful for the c

- More specific res on airport grass:

## Endophytes in grass

### Projects



1

collected plants

← 1 Collecting endosafe endophytes.



2

seed treatment for killing the endophytes

← 2 Removal endophytes out of seeds.



3

inoculation of the endophytes in Barenbrug varieties

← 3 Inoculation of endosafe endophytes in Barenbrug varieties.

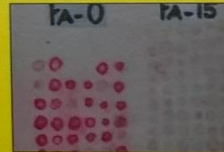
4 Screening of seeds and plants.



seed 400x



plant 400x



through immunoblot

 BARENBRUG

ich are

ophytes

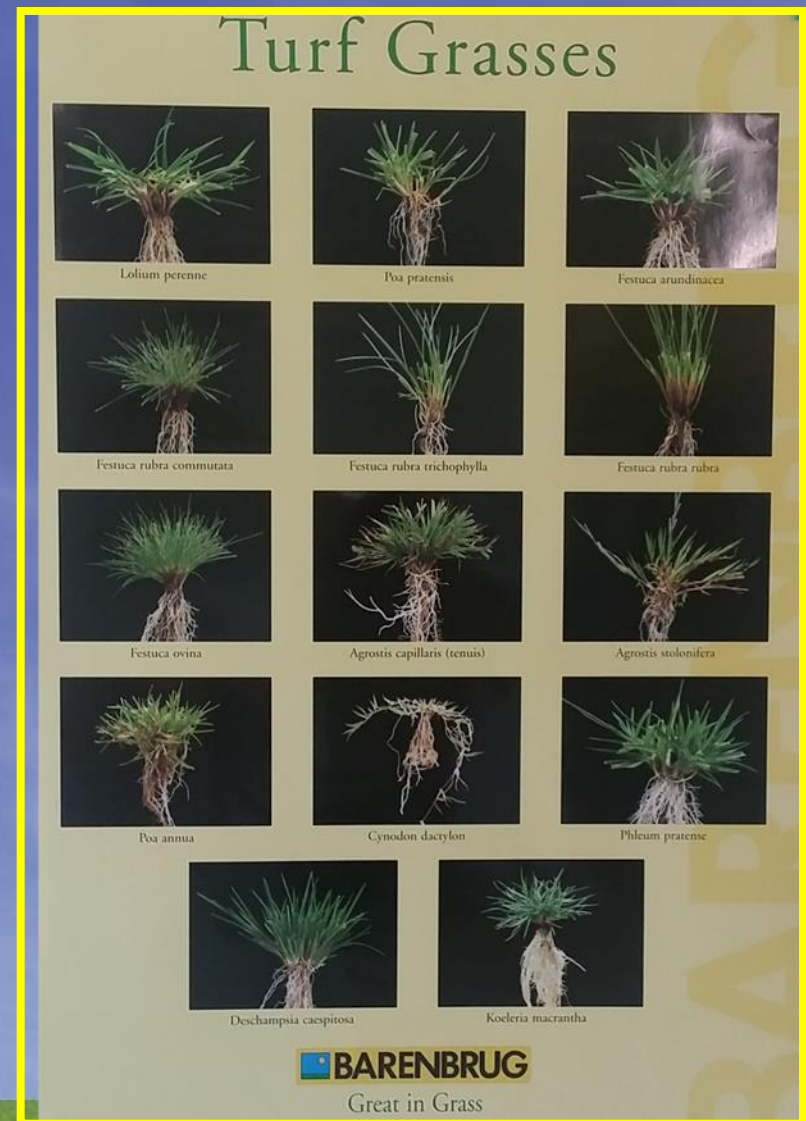
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 BARENBRUG



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# Tall fescue

*Festuca arundinacea*

- Bunchy type with vertical growth habit
- Very drought tolerant
- Enormous rootsystem (till 1 meter)
- Can withstand close mowing
- Low need of water & fertilization
- High levels of endophytes!
- Barnoble successor of Barbizon in airport grass seed mixture



# Tufted hairgrass

*Descampsia cespitosa*

- germination: 1-2 weeks
- establishment: 3 months
- long growing season
- Low/medium need for water
- Low need for fertilizers
- Moderate level of endophytes
- Cold tolerant
- High lignin & hemicellulose (cell walls)
- Low maintenance possible



# Overview progress bird strike 'reduction'



Source: Annual Report Schiphol Group, 2015

# Current product for airports

## BAR Airport

- 40% *Descampsia cespitosa* (Barcampsia)
- 60% *Festuca arundinacea* (Barbizon/Barnoble type)

Unattractive habitat for mammals and birds due to

- A particular morphology and growth habit (stiff, erected)
- High contents of cell walls
- Possibly beneficial endophytes



***Thank you for your attention!***

**Questions?**

