“RED FESCUE VS. FESCUE/ BENTGRASS: EFFECT ON TURF QUALITY AND ANNUAL BLUEGRASS COMPETITION ON GOLF GREEN”

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Low input turf grass management of golf courses

Copenhague , 6 October 2015

BACKGROUND : RED FESCUE + COLONIAL BENTGRASS

- Traditional seed mixture used on Scandinavian golf courses (60 % of golf courses in Norway).

Smørum GC, Denmark, Sep. 2011
Photo: Trygve S. Aamlid

ADVANTAGES :

- High competition against *Poa annua*
- Good density
- Good visual turf quality
- Faster establishment than pure fescue

DISADVANTAGES :

- Greens often dominated by colonial (maybe because greenkeepers add too much water and fertilizers…)
- Slow greens (because colonial grows too much). Compensation: try to mow lower, which increase the risk for *Poa annua* to come in.
- More pesticides needed than for pure fescue (colonial is not very resistant to diseases)
- Patchy (fescue and bentgrass appearing in patches, photo)

WHAT ARE THE ALTERNATIVES? :

I) PURE RED FESCUE (*Festuca rubra*)

- ADVANTAGES :
  - Minimizing inputs (N, water…)
  - High resistance to diseases
- DISADVANTAGES :
  - Low density, potential susceptibility to invasion by annual bluegrass (*Poa annua*)?
  - Susceptibility to ice damage
  - Too firm greens for many golf players

Smørum GC, Denmark, Sep. 2011
Photo: Trygve S. Aamlid

II) PURE RED FESCUE (*Festuca rubra*) + VELVET BENTGRASS

- ADVANTAGES :
  - High green speed
  - Denser greens, perhaps more uniform than colonial + fescue
- DISADVANTAGES :
  - Thatch accumulation (typical for velvet)

Furesöe Golf Club, Denmark, Oct. 2012
Photo: Agnar Kvalbein

OBJECTIVES

1. To compare visual quality, playing quality and competition against annual bluegrass on golf greens with pure red fescue, red fescue + colonial bentgrass and red fescue + velvet bentgrass.

2. What are the optimal mowing height and fertilizer rate for these combinations?

3. Is mowing height or fertilizer rate the most important factor for the competition between species ?

MATERIALS AND METHODS: TRIAL DESIGN

- Field trial on USGA-green (90 vol% sand and 10 vol% peat), in Landvik, Norway, during 2011-2012.
- Split-split-block design with three blocks and 4 factors:
  - **Factor 1.** Grass species/mixtures:
    - **Pure red fescue**: [F. r. spp. litoralis(40 % cv. 'Cezanne') and F. r. spp. commutata (20 % cv.'Calliope', 20% cv. 'Bargreen', 20 % cv. 'Musica')
    - **90 % red fescue + 10 % colonial bentgrass** (5 % cv. 'Jorvik' and 5 % cv. 'Barking')
    - **90 % red fescue + 10 % velvet bentgrass** (10 % cv. 'Villa').
  - **Factor 2.** Mowing heights: **4.0** or **5.5** mm
  - **Factor 3.** N-rates : **0.5**, **1.0** or **1.5** kg 100 m^{-2} yr^{-1}
  - **Factor 4.** P-rates/mycorrhiza:
    - **0** kg P/M
    - **0.18** kg P 100 m-2 yr-1
    - **0** kg P + **SYMBIVIT®**


USGA green
Landvik - south coast of Norway
Growing seasons 2011 and 2012
90% sand
10 %peat
Red fescue + colonial bent
5.5 mm
4.0 mm
Red fescue + velvet bent
5.5 mm
4.0 mm
Pure red fescue
5.5 mm
4.0 mm
Per 100 m²
per year:
1.5 kg N
1.0 kg N
0.5 kg N
1st of August 2012

MATERIALS AND METHODS: MAINTENANCE

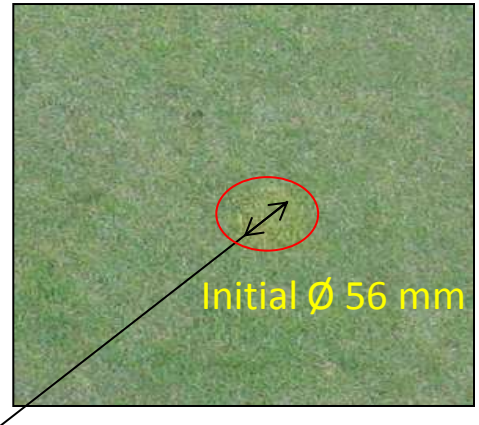
- Seeding rate: 2.5 kg 100 m^{-2} seeds. Seeded 12 August, 2010.
- *Poa annua* plugs installation: 18 August, 2011.
- Mowing: 3 times per week
- Fertilizer: liquid fertilizer every 2nd week, N as ammonimumnitrate. Except for N and P, all nutrients were the same in all treatments.
- Annual topdressing: 9.5 mm of sand per season. Brushing.
- Wear treatment: Pedestrian type wear machine, with golf spikes.

MATERIALS AND METHODS: ASSESSMENTS

- **Visual Turf quality and density (scale 1-9)**
  Monthly from June to October in 2011 and 2012
- **Playing quality**
  Monthly from June to October in 2011 and 2012
  - **Ball roll distance** (Stimpmeter with ball release 38 cm)
  - **Firmness** (Clegg Soil Impact Tester 2.25 kg)
- **Diameter of annual bluegrass plugs**
- **Thatch/mat thickness and ignition loss**

Ball roll distance

Measured 24 h after mowing



Diameter of annual bluegrass plugs

Firmness = Hardness (harder)

RESULTS & DISCUSSION

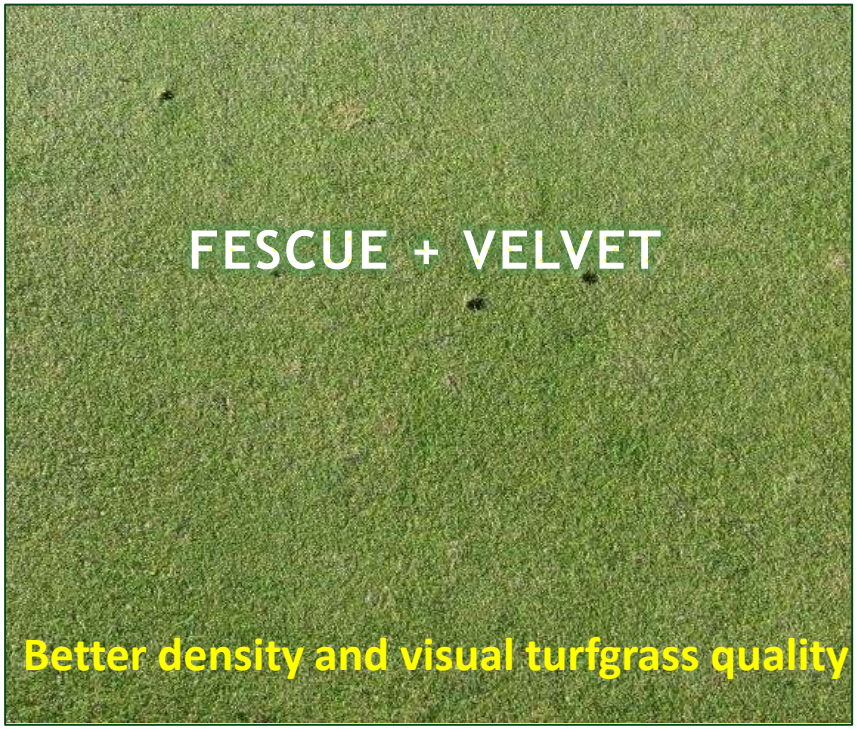
FACTOR	LEVEL	Visual Turfgrass quality 2012, (1-9)	Density 2012, scale (1-9)	Reduction or increase in diameter of annual bluegrass plug, %
Species	Red fescue (RF)	4.6 b	3.8 c	+6.3 a
	RF + Colonial bent	5.4 ab	5.7 b	- 2.8 b
	RF + Velvet bent	5.6 a	6.3 a	- 3.8 b
Nitrogen, kg 100 m^{-2} yr^{-1}	0.5	3.0 c	3.5 c	- 4.0
	1.0	5.7 b	5.5 b	+1.2
	1.5	6.9 a	6.7 a	+2.5
Mowing height, mm	4.0	4.9 b	4.8 b	+2.0
	5.5	5.5 a	5.7 a	- 2.2

+ Poa annua is expanding into surrounding turf
- Surrounding turf is expanding into Poa annua plug

RESULTS & DISCUSSION

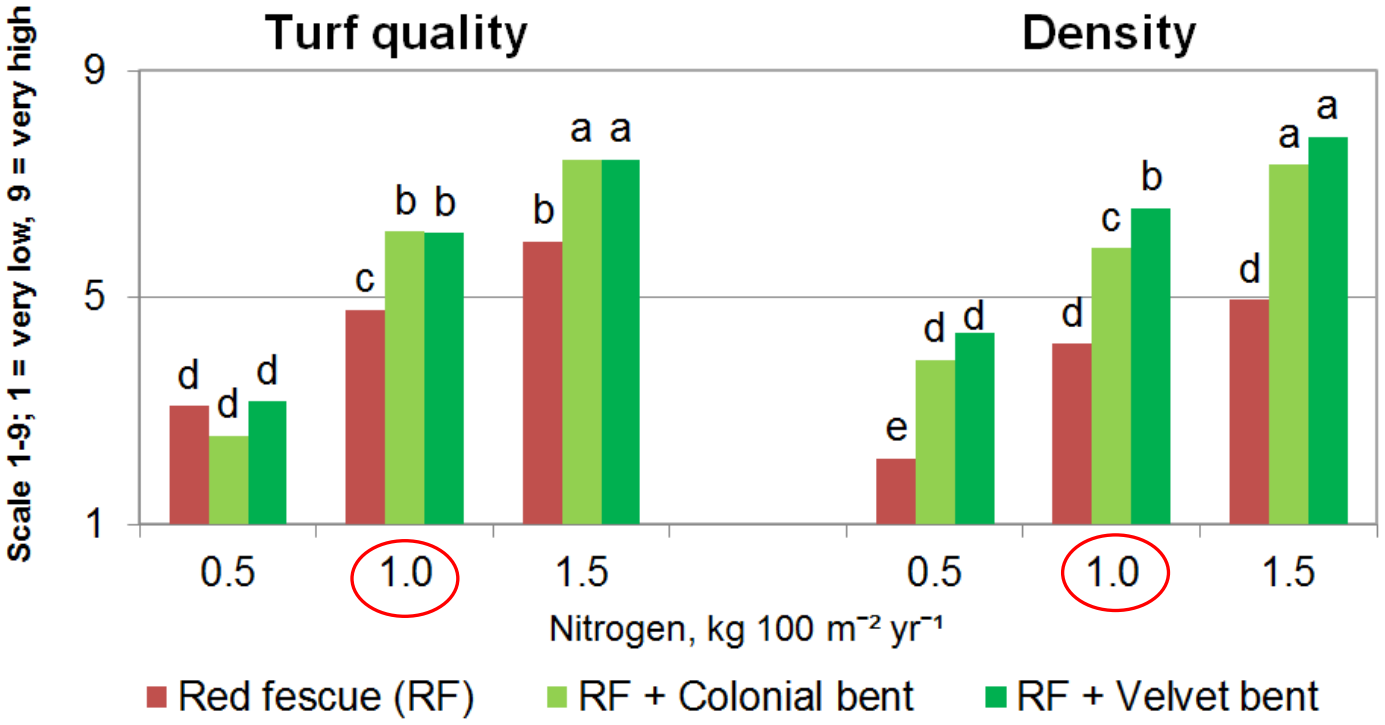
OCTOBER 2011

DENSITY EFFECTS



RESULTS & DISCUSSION

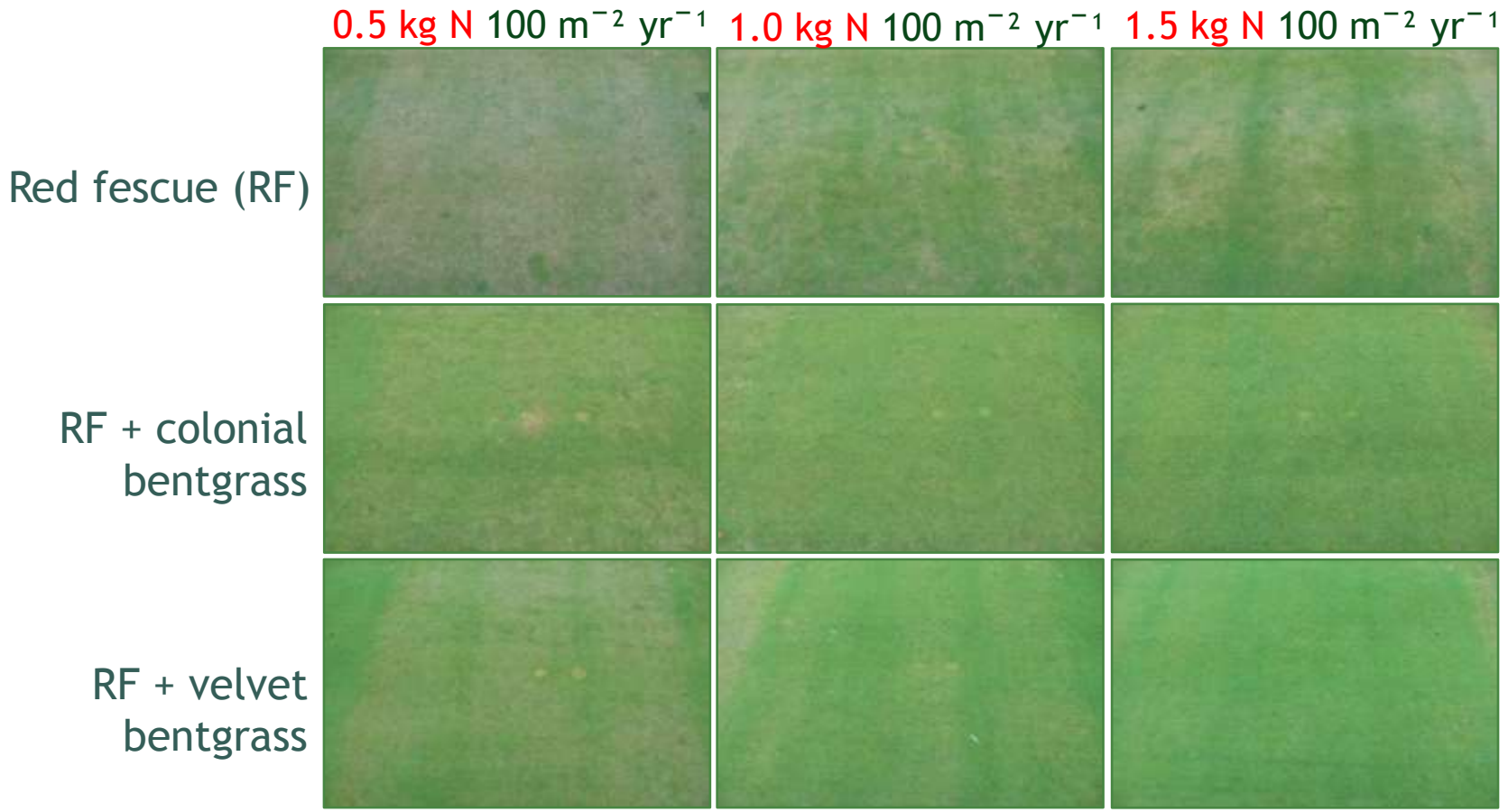
Interaction N x Species (average for 2012)



- Better results at higher N levels and in mixtures with bentgrasses.
- At low N input, pure red fescue performance was at the same level as combinations regarding visual turf quality.
- Minimum N rate for obtaining acceptable turf quality and density was 1.0 Kg N 100 m^{-2} yr^{-1}.

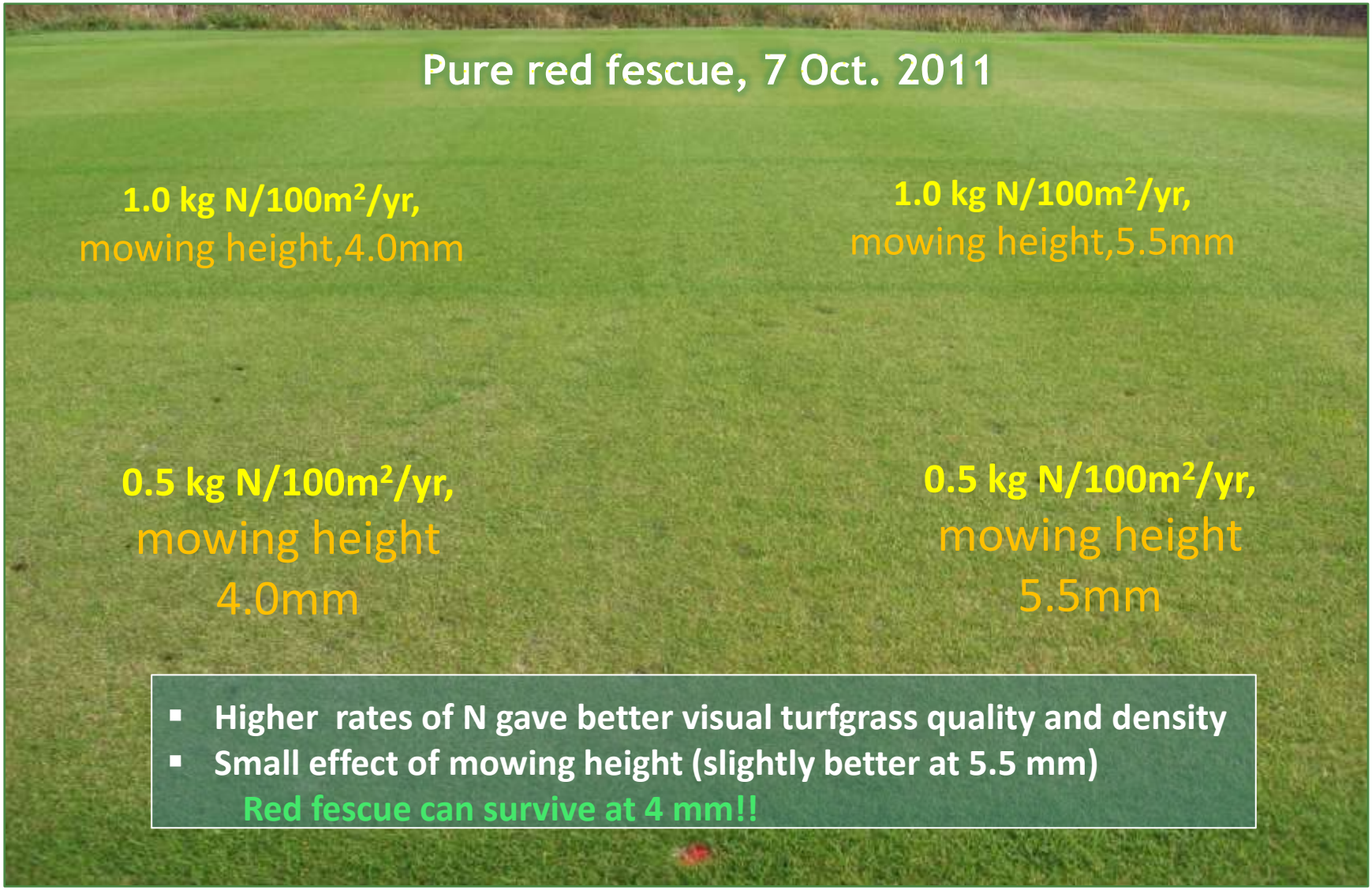
RESULTS & DISCUSSION

1st of Agust 2012
Mowing height 5.5 mm



- **Mixed greens are better visual quality and density at all N levels.**
- **1 kg N is enough in all cases.**

RESULTS & DISCUSSION



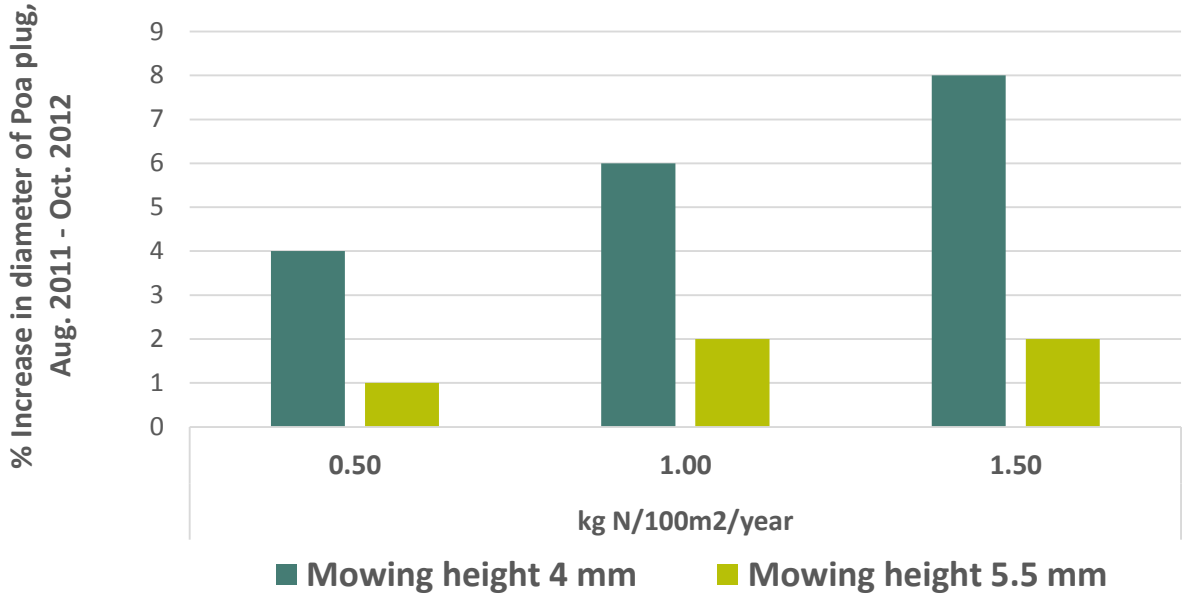
- Higher rates of N gave better visual turfgrass quality and density
- Small effect of mowing height (slightly better at 5.5 mm)

Red fescue can survive at 4 mm!!

RESULTS & DISCUSSION

Pure red fescue plots

Combined effect of N and mowing height on competition from *Poa annua*

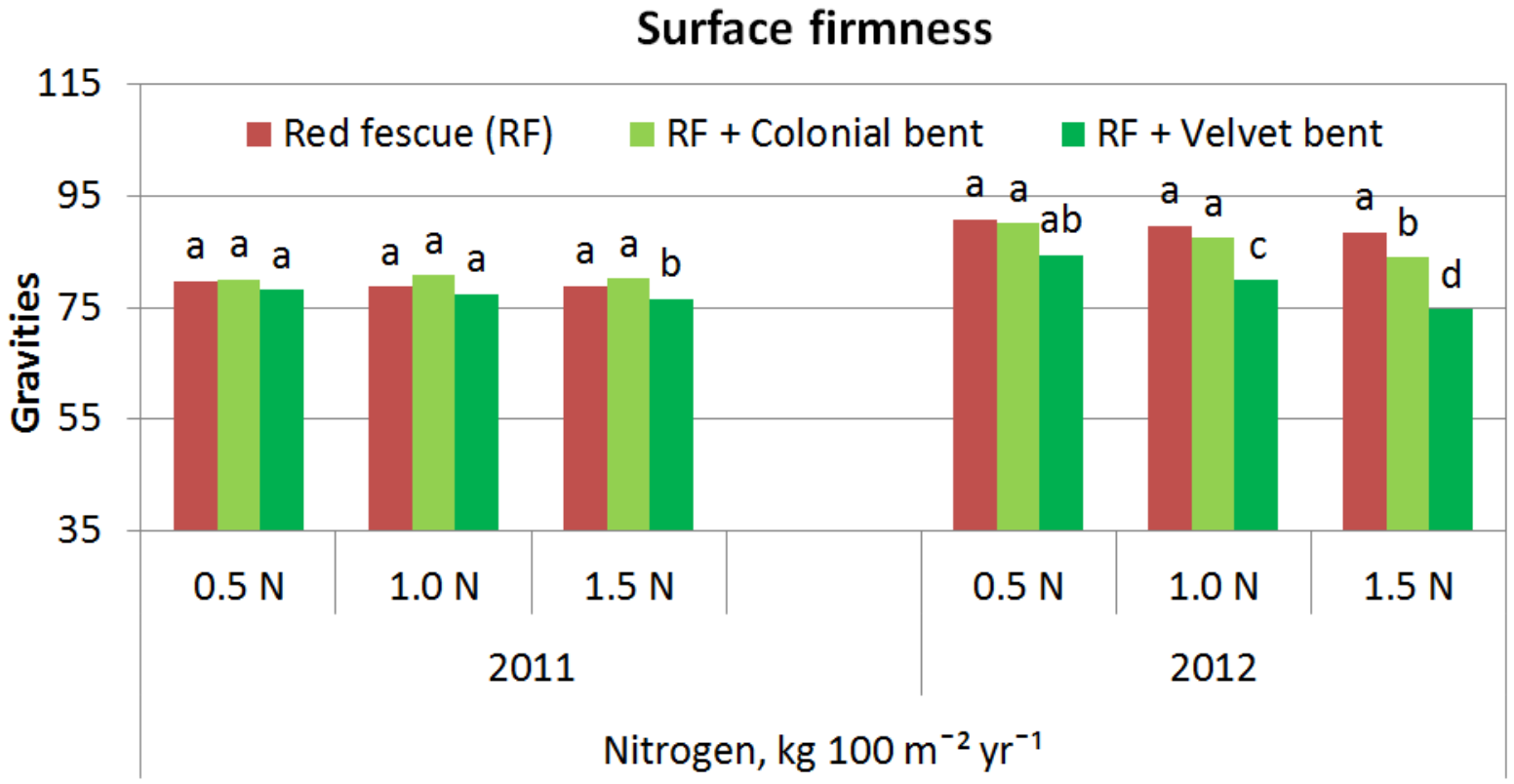


- At 4mm mowing height, Poa annua expansion increased when N level increased
- At 5.5mm mowing height, there was a much smaller impact of N on Poa annua competition

RESULTS & DISCUSSION

FACTOR	LEVEL	Playability		Thatch 2012, %OM	Thatch/Mat thickness 2012, mm
		Surface hardness, 2012	Ball roll distance,cm 2012		
Species	Red fescue (RF)	90 a	118 a	4.0 b	20.7 a
	RF + Colonial bent	87 b	104 b	4.1 b	20.6 a
	RF + Velvet bent	80 c	117 a	5.2 a	22.6 a
Nitrogen, kg 100 m^{-2} yr^{-1}	0.5	88 a	122 a	3.7 c	20.4 b
	1.0	86 b	113 b	4.5 b	21.3 ab
	1.5	83 c	104 c	5.2 a	22.1 a
Mowing height, mm	4	86 a	118 a	4.3 a	20.6 a
	5.5	85 b	107 b	4.7 b	22.0 a

RESULTS & DISCUSSION



RESULTS

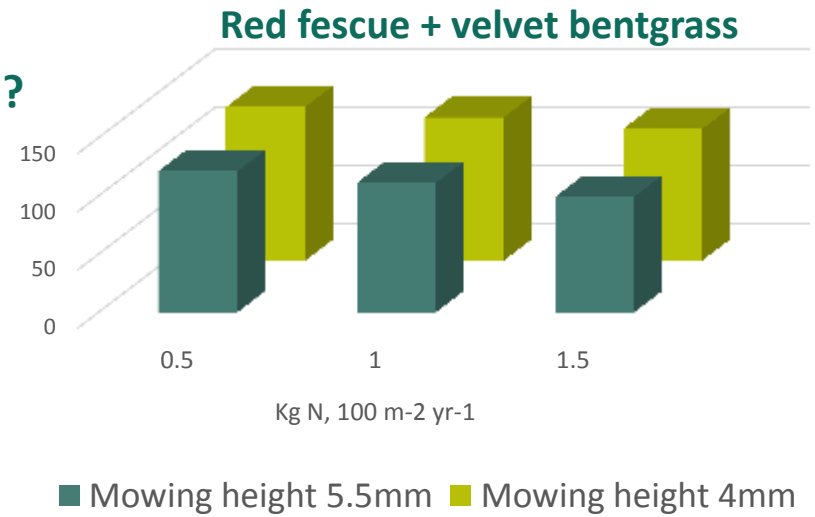
- **In the first year there were no effects. In the second year, the mixed greens became softer with increasing N-rate (specially for velvet).**
- **Hardness surface on pure fescue is not affected by N rate.**

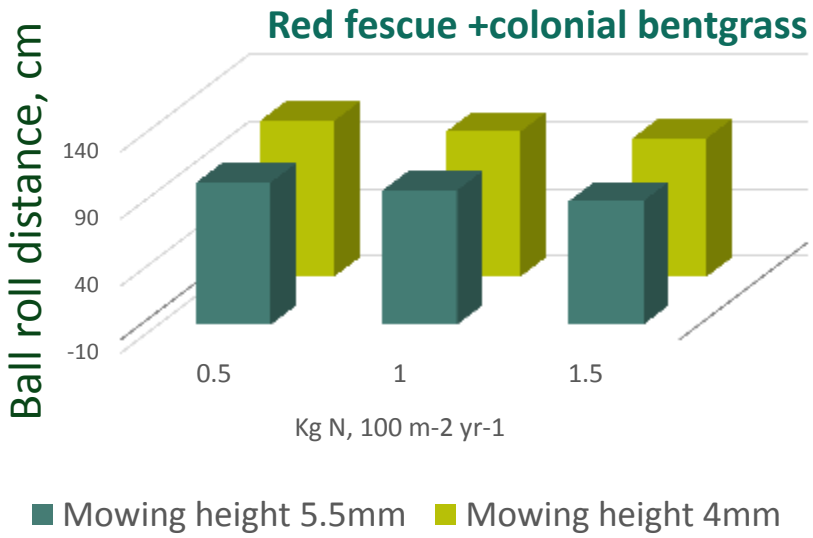
RESULTS & DISCUSSION: BALL ROLL DISTANCE

Mowing height

or

N level?



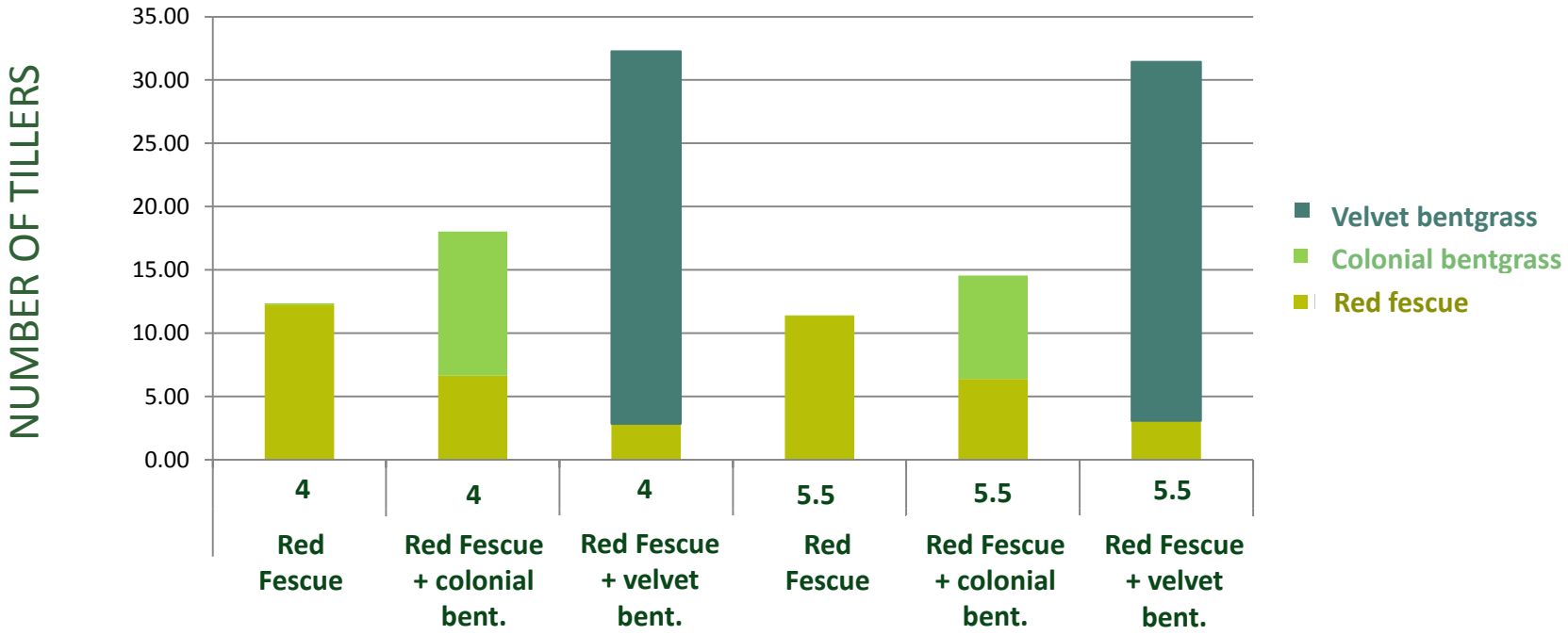


In all species combinations:

- BRD **is higher** at lower N rates and lower mowing heights.
- BRD **decrease** is more affected by N rates than by mowing heights.

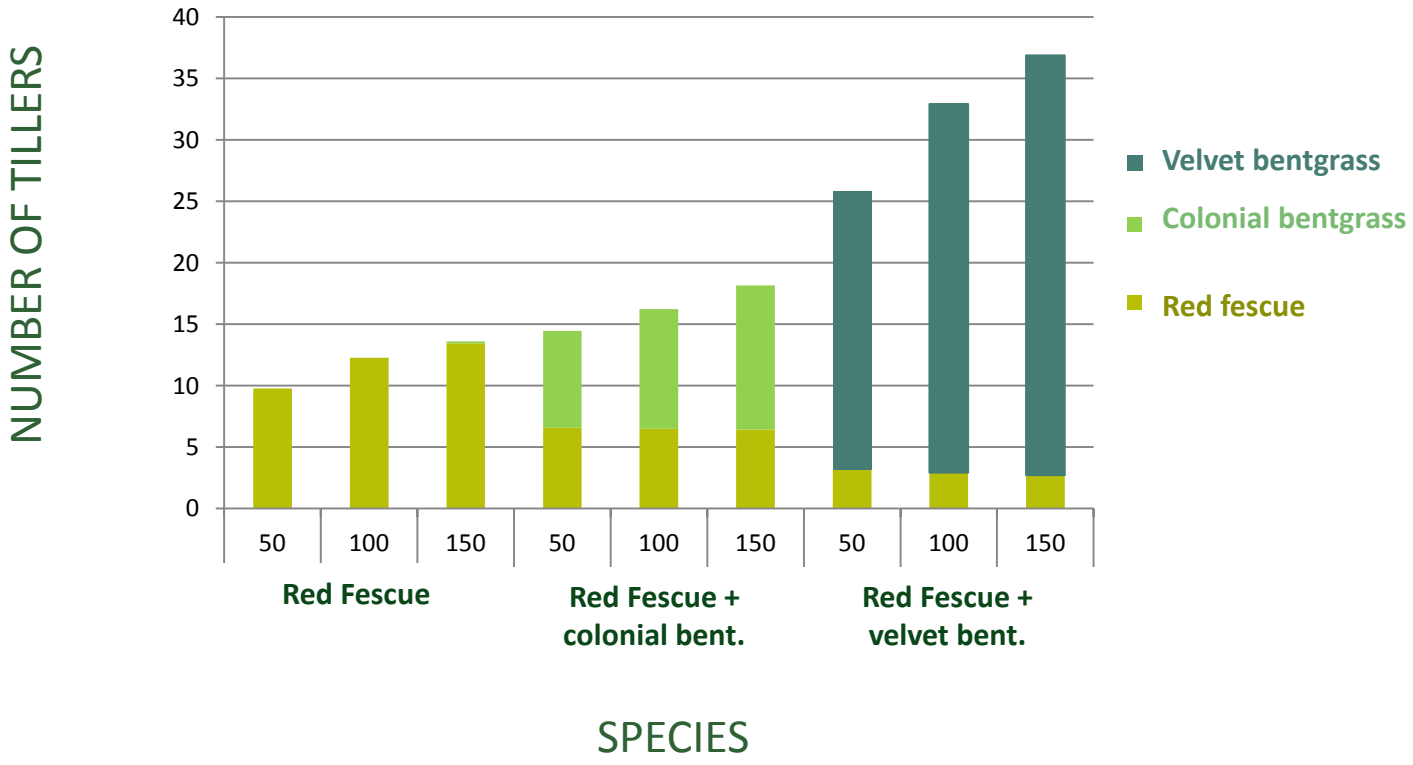
RESULTS & DISCUSSION

EFFECT OF MOWING HEIGHT ON BOTANICAL COMPOSITION



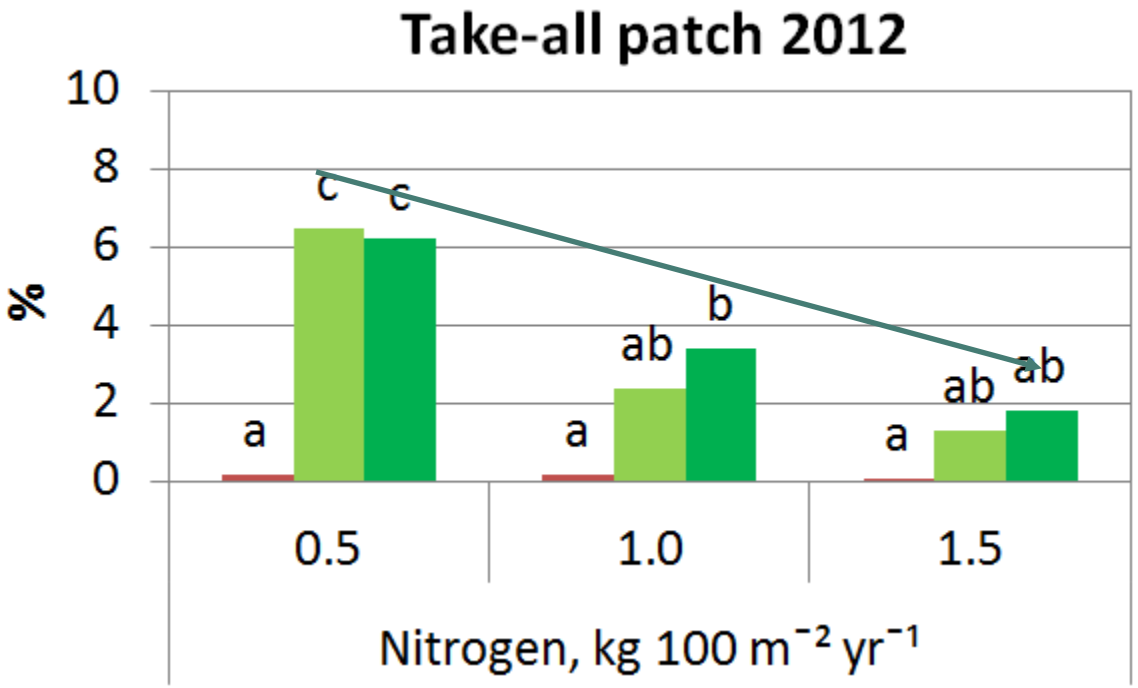
RESULTS & DISCUSSION

EFFECT OF N ON BOTANICAL COMPOSITION



RESULTS & DISCUSSION

Interaction N x Species (average for 2012)



Red fescue (RF)

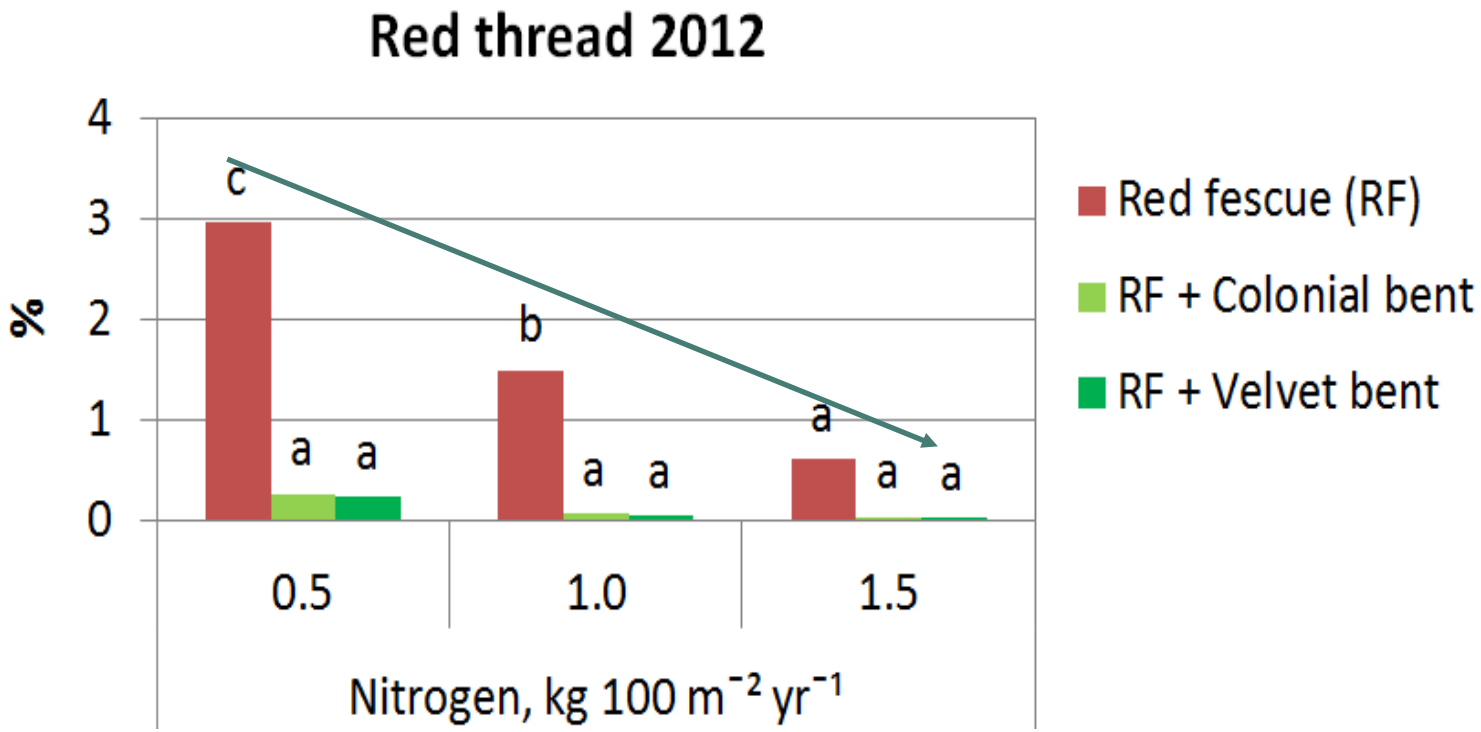
RF + Colonial bent

RF + Velvet bent

- Better resistance on Red fescue greens> colonial+fescue and velvet +fescue.
- Higher N rates on mixed greens, reduced take-all percent.
- No effect of mowing height on Take-all patch

Red fescue+velvet bentgrass
Photo: Tanja Espevig

RESULTS & DISCUSSION



RESULTS

- More disease on Red fescue. Almost no disease on mixed greens.
- Red thread decreased on Red fescue when N rate increased.

CONCLUSIONS

Variables	Red Fescue + Colonial bentgrass	Pure Red fescue	Red fescue + Velvet bentgrass
Visual Turf Quality	0	⬇	(⬆)
Density	0	⬇	⬆
Competition against Poa annua	0	⬇	⬆
Surface hardness/ thatch	0	⬆	⬇
Green speed	0	⬆	⬆
Resistance to Take all	0	⬆	0
Resistance to Red Thread	0	⬇	0

1. The characteristics of the green (fescue/bent ratio, ball roll, surface hardness, thatch and organic matter contents) were more influenced by N level than by mowing height.
2. Neither N or mowing height had any effect on *Poa annua* competition in fescue/bentgrass combinations.
3. On pure red fescue greens:
    a. **at 4 mm mowing height, competition from Poa increased with increasing N level.**
    b. **at 5.5 mm mowing height, competition from Poa annua not influenced by N level.**

THANK YOU SO MUCH FOR YOUR ATTENTION

MUCHAS GRACIAS