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# Seed Identification of *Festuca* species

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# Learning objectives

1. Become familiar with the structures and features of the Poaceae family used in identification of fescue species.
2. Apply knowledge of fescue floret features to distinguish between fescue species, ryegrass species and their hybrids.

# Grass Family Florets: Poöideae subfamily



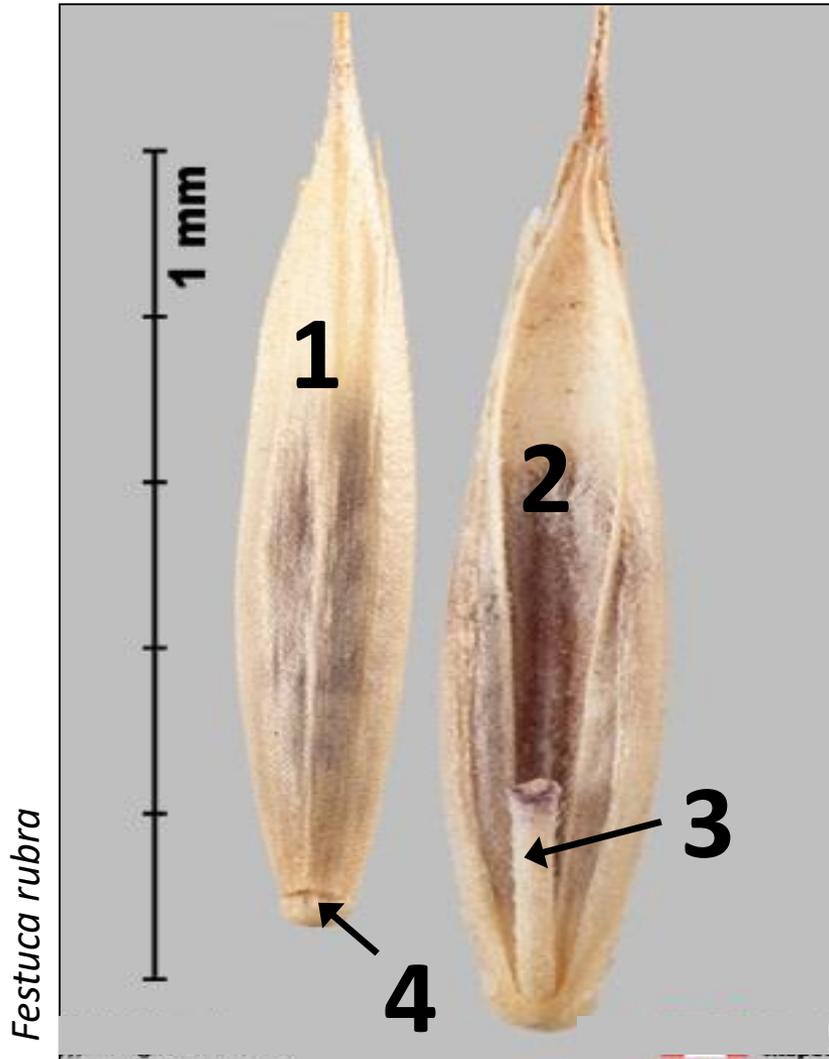
# Question #1

**What is the order of floret parts A-D?**

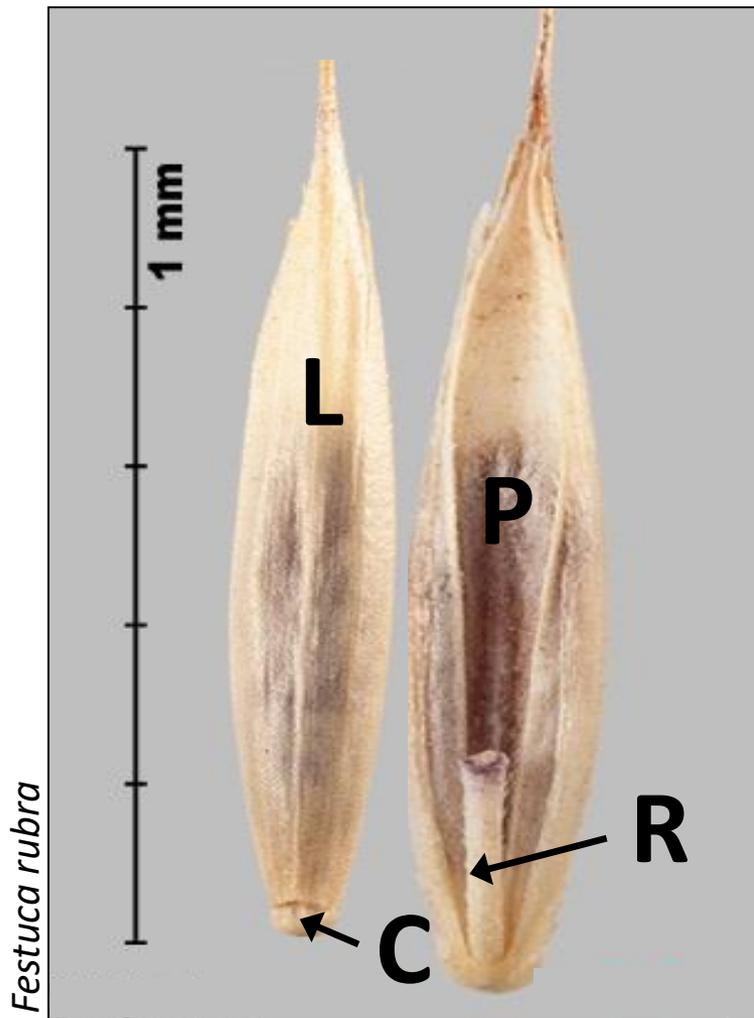
**A.** 1. Lemma, 2. Callus, 3. Palea, 4. Rachilla

**B.** 1. Lemma, 2. Palea, 3. Rachilla, 4. Callus

**C.** 1. Palea, 2. Lemma, 3. Rachilla, 4. Callus



# Floret Features of Fescue Species



**General:** Shorter than other crop florets (~5.0 mm long), pale colour, visible, dark coloured grain, narrow ends

**Lemma:** Granular, dense to scattered or smooth textured, hairs near pointed end, often awned from tip

**Palea:** Generally smooth, hairs at pointed end, in-rolled, with small, fine teeth

**Rachilla:** Cylindrical, narrow, generally short-hairy

**Callus:** Thick, base flat or rounded, like a lip



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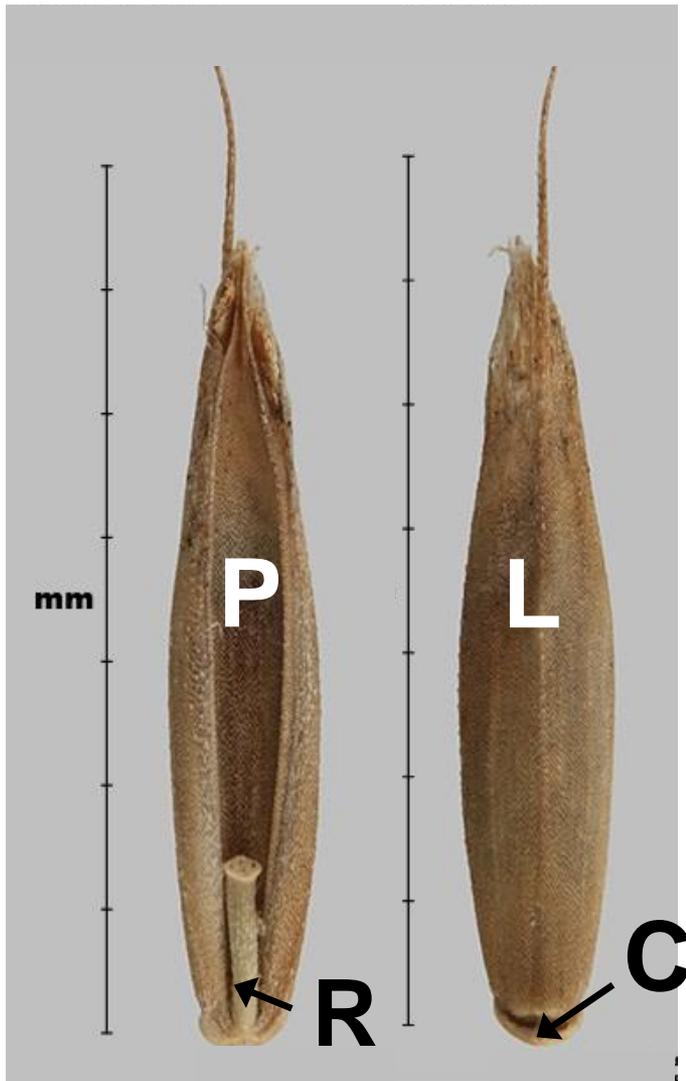
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# Features of Broad-leaved Fescues: Tall and Meadow Fescue (subgenus *Schedonorus*)



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# *Festuca arundinacea* (tall fescue)



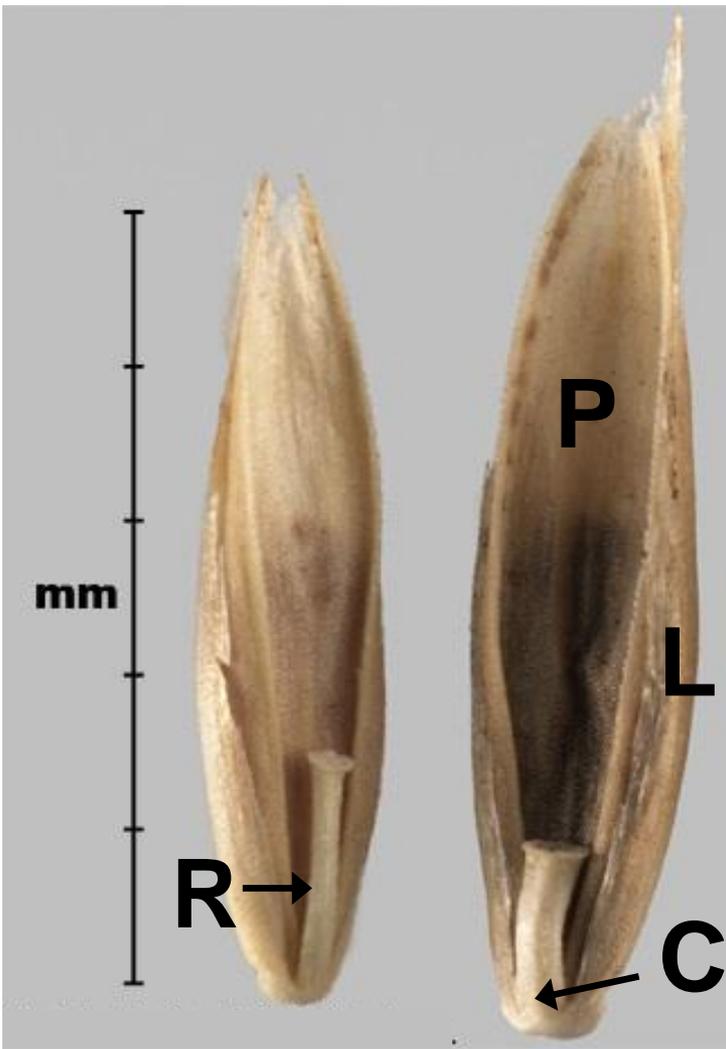
**Lemma:** Brown, short awned, granular texture, folded over palea almost to top

**Palea:** Granular texture, small teeth that can extend to base

**Rachilla:** Cylindrical, with bristles

**Callus:** Flared at sides rounded at base, space above

# *Festuca pratensis* (meadow fescue)



**Lemma:** Light brown, smooth to slightly granular, shining, may have small awn

**Palea:** Smooth to slightly granular, shining, wrinkled, teeth not obvious

**Rachilla:** Compressed, smooth, curves to one side

**Callus:** Flared at sides, flat base small space above

# Comparison of Tall and Meadow Fescue

	<i>Festuca arundinacea</i> (Tall fescue)	<i>Festuca pratensis</i> (Meadow fescue)
<b>Lemma</b>	<ul style="list-style-type: none"> <li>- Darker colour than meadow fescue</li> <li>- Generally awned</li> <li>- Granular texture, dull</li> <li>- Can have bristles on surface, concentrated on the nerves</li> <li>- Base wider than meadow fescue</li> </ul>	<ul style="list-style-type: none"> <li>- Paler colour than tall fescue</li> <li>- Short or no awn</li> <li>- Fine granular texture</li> <li>- Shining near apex</li> <li>- Base more narrow than tall fescue</li> </ul>
<b>Palea</b>	<ul style="list-style-type: none"> <li>- Granular texture, dull</li> <li>- Teeth can extend to the base, small and fine</li> <li>- Palea curve inwards almost to the top</li> <li>- Top of palea sharp pointed</li> </ul>	<ul style="list-style-type: none"> <li>- Finely granular, smoother towards top</li> <li>- Teeth concentrated near top of palea</li> <li>- Palea keels curve inwards in the lower half</li> <li>- Palea opens wider in the upper half than tall fescue</li> </ul>
<b>Rachilla</b>	<ul style="list-style-type: none"> <li>- Cylindrical, short hairy</li> </ul>	<ul style="list-style-type: none"> <li>- Compressed, oval in cross-section, smooth</li> <li>- Often leans to one side</li> </ul>
<b>Callus</b>	<ul style="list-style-type: none"> <li>- Thick rim</li> <li>- Curved base</li> <li>- Flares out at the sides</li> </ul>	<ul style="list-style-type: none"> <li>- Thick rim</li> <li>- Wider than bottom of the lemma</li> <li>- Fairly flat base</li> </ul>



# Features of Ryegrasses and Comparison to Meadow Fescue



# *Lolium spp.* (ryegrass)

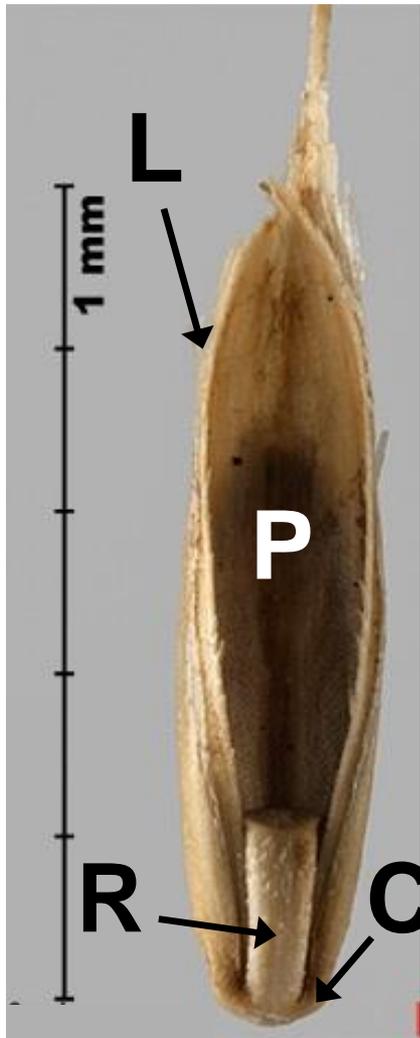


*Lolium multiflorum*



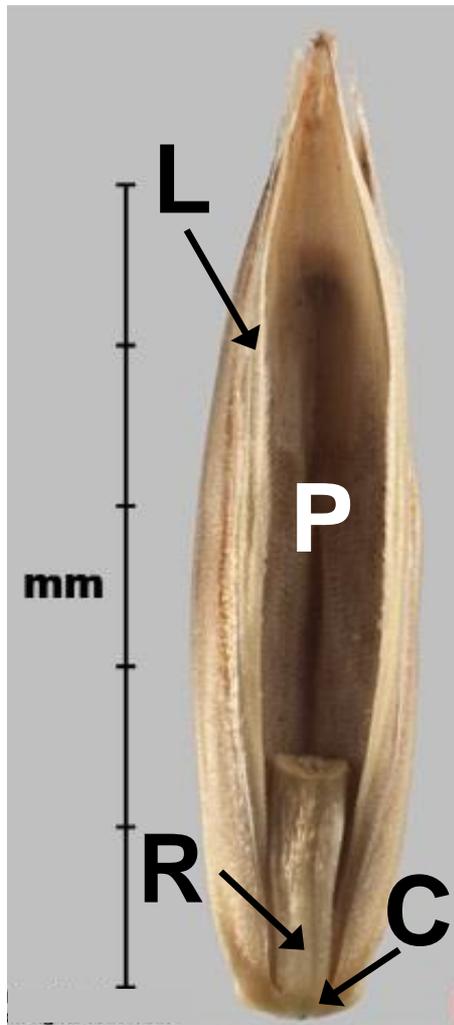
*Lolium perenne*

# *Lolium multiflorum* (annual ryegrass)



- A. Lemma:** generally awned and curved backwards
- B. Palea:** shining above, granular close to rachilla, generally flared and open away from rachilla
- C. Rachilla:** flattened, straight-sided, can be curved outwards
- D. Callus:** flat base, not flared at sides, space above callus

# *Lolium perenne* (perennial ryegrass)



**Lemma:** awn usually not present; stout appearance

**Palea:** shining above, can be gradually granular in bottom half

**Rachilla:** flattened; tapered at base; lies flat against palea

**Callus:** flat base; not flared; little to no space above

# Comparison of Ryegrasses and Meadow Fescue

	<i>Lolium perenne</i> (perennial ryegrass)	<i>Lolium multiflorum</i> (annual ryegrass)	<i>Festuca pratensis</i> (meadow fescue )
<b>Lemma</b>	<ul style="list-style-type: none"> <li>- Stout, neat appearance</li> <li>- Not awned, but sharp-pointed</li> <li>- Granular texture, dull</li> </ul>	<ul style="list-style-type: none"> <li>- Thin, rough appearance, can be arched</li> <li>- Often awned</li> <li>- Granular texture, dull</li> </ul>	<ul style="list-style-type: none"> <li>- Not awned, but sharp-pointed</li> <li>- Granular texture, shiny near tip</li> <li>- Rounded on back, narrow at base</li> </ul>
<b>Palea</b>	<ul style="list-style-type: none"> <li>- Granular texture, gradually shiny past rachilla</li> <li>- Teeth obvious</li> <li>- Pointed at top</li> </ul>	<ul style="list-style-type: none"> <li>- Granular texture, abruptly shiny past rachilla</li> <li>- Teeth obvious</li> <li>- Flared at top</li> </ul>	<ul style="list-style-type: none"> <li>- Finely granular, shining near top</li> <li>- Teeth not obvious</li> <li>- Inward-curving keels more developed past rachilla</li> </ul>
<b>Rachilla</b>	<ul style="list-style-type: none"> <li>- Flattened</li> <li>- Short-hairy</li> <li>- Pressed against palea</li> </ul>	<ul style="list-style-type: none"> <li>- Flattened</li> <li>- Short-hairy</li> <li>- Curves away from palea</li> </ul>	<ul style="list-style-type: none"> <li>- Compressed</li> <li>- Smooth</li> <li>- Often leans to one side</li> </ul>
<b>Callus</b>	<ul style="list-style-type: none"> <li>- Thin rim</li> <li>- Flat base</li> <li>- No space above</li> </ul>	<ul style="list-style-type: none"> <li>- Thin rim</li> <li>- Flat base</li> <li>- No space above</li> </ul>	<ul style="list-style-type: none"> <li>- Thick rim</li> <li>- Flat base</li> <li>- Space above</li> </ul>

## Question #2: Name the species





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# Fine-leaved Fescues: Species Groups Introduction (subgenus *Festuca*)



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## Broad-leaved fescues

(Subgenus *Schedonorus*)

- Florets longer and wider
- Lemma and palea appears thicker, roughly granular
- Rachilla more compressed (in *F. pratensis*)
- Callus flared at sides



## Fine-leaved fescues

(Subgenus *Festuca*)

- Florets shorter and more narrow
- Lemma and palea appears thinner, smooth or finely granular
- Rachilla cylindrical
- Callus more narrow

## Sheep fescue group

(Section *Festuca*)



- ***Festuca ovina***  
(sheep fescue)
- ***Festuca filiformis***  
(fine-leaved fescue)
- ***Festuca brevipila***  
(hard fescue)

## Red fescue group

(Section *Aulaxyper*)



- ***Festuca rubra* subsp. *rubra*** (red & creeping red fescue)
- ***Festuca rubra* subsp. *fallax*** (Chewing's fescue)
- ***Festuca heterophylla***  
(various-leaved fescue)

# Features of Fine-leaved Fescue Species Groups

	<i>Festuca ovina</i> (sheep fescue) group	<i>Festuca rubra</i> (red fescue) group
<b>Lemma</b>	<ul style="list-style-type: none"> <li>- Colour straw yellow to golden brown, duller</li> <li>- More opaque, appears thicker</li> <li>- Lemma back more rounded</li> <li>- Sides more curved</li> <li>- Shorter, thicker awns</li> </ul>	<ul style="list-style-type: none"> <li>- Colour pale to straw yellow colour (can darken in storage), shinier</li> <li>- More translucent, appears thinner</li> <li>- Lemma backs flatter</li> <li>- Straighter sides</li> <li>- Longer, thin awns</li> </ul>
<b>Palea</b>	<ul style="list-style-type: none"> <li>- Keels curved inwards, generally past lemma edges</li> <li>- Caryopsis colour reddish</li> </ul>	<ul style="list-style-type: none"> <li>- Keels curved inwards, generally covered by lemma</li> <li>- Dark caryopsis colour</li> </ul>
<b>Rachilla</b>	<ul style="list-style-type: none"> <li>- Cylindrical rachilla</li> <li>- Flared or capped end</li> </ul>	<ul style="list-style-type: none"> <li>- Cylindrical rachilla,</li> <li>- Rachilla end not as pronounced</li> </ul>
<b>Callus</b>	<ul style="list-style-type: none"> <li>- Callus wider, can be flared out</li> </ul>	<ul style="list-style-type: none"> <li>- Callus more narrow</li> </ul>

## Question #3

**For chat:** What are 3 features that distinguish the fine-leaved from the broad-leaved fescue group?

- 1.
- 2.
- 3.

## **Question #3**

What are 3 features that distinguish the fine-leaved from the broad-leaved fescue group?

- 1. Fine-leaved group florets are smaller**
- 2. Lemma and palea appear thinner and more smooth**
- 3. Rachilla is cylindrical in all species**



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# Features of Fine-leaved Fescues: Sheep Fescue Group (section *Festuca*)



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# *Festuca ovina* (sheep fescue)



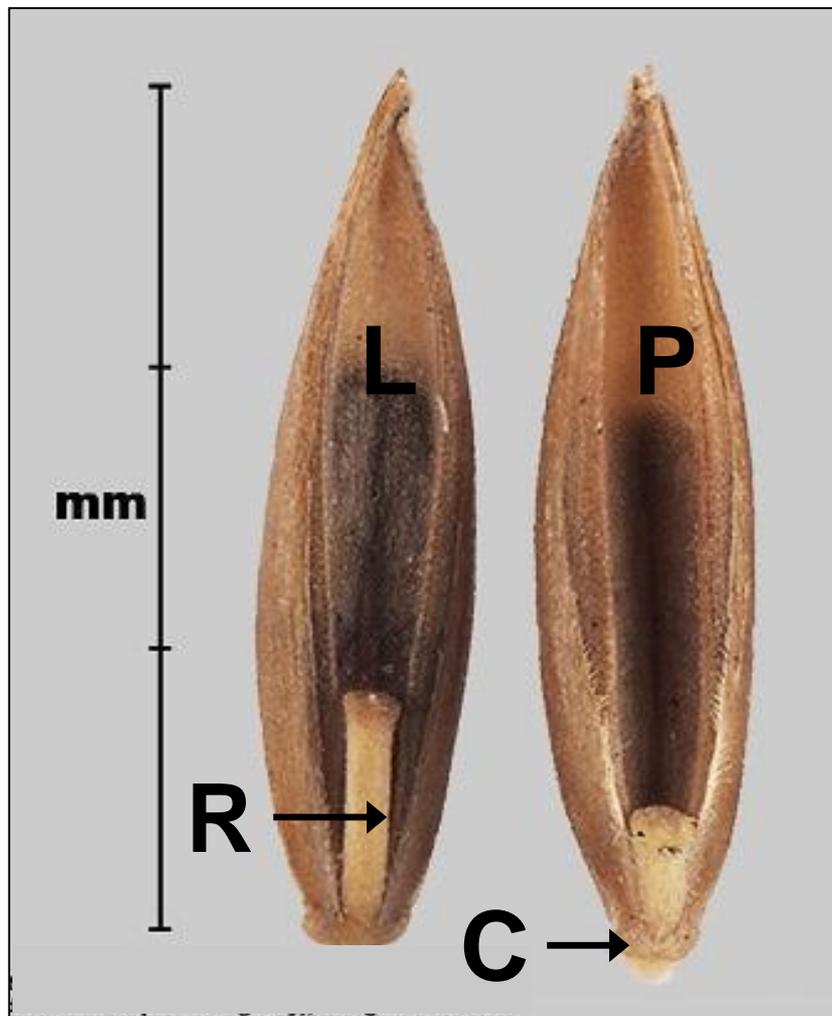
**Lemma:** firm, golden brown, granular texture, sharp pointed or short awn

**Palea:** granular & waxy texture, fine teeth near top, in-rolled & covered by lemma

**Rachilla:** protrudes, short hairy, often curved

**Callus:** thick rim, flat end

# *Festuca filiformis* (fine-leaved fescue)



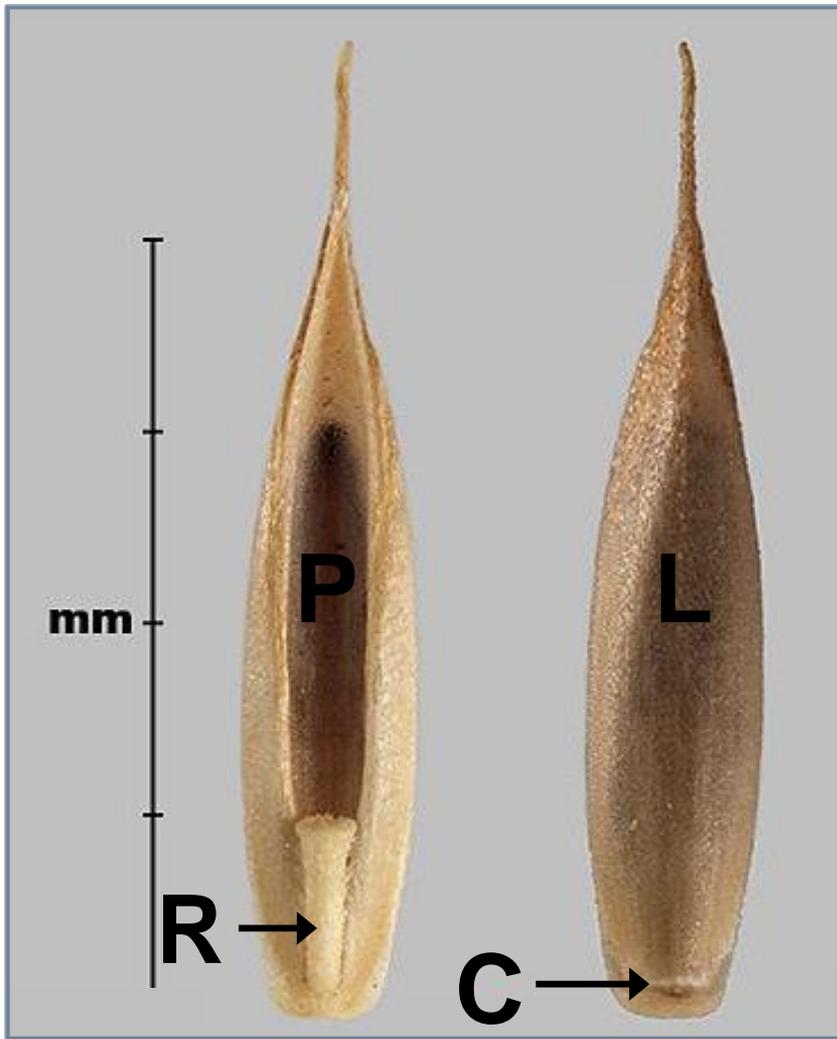
**Lemma:** firm, shiny, yellowish brown, no awn, smaller than other 2 species

**Palea:** smooth texture, shiny, teeth hard to see, in-rolled & exposed keels, more opaque than other 2 species

**Rachilla:** protruding, hairy or smooth

**Callus:** thin rim, slightly curved

# *Festuca brevipila* (hard fescue)



**Lemma:** firm, light or golden brown, granular texture, shiny, hairy near top, generally has a short awn

**Palea:** more shallow than other 2 species, granular texture, in-rolled & generally exposed

**Rachilla:** short hairy, straight, protrudes

**Callus:** thick rim, flat end

# Question #4

1.



2.



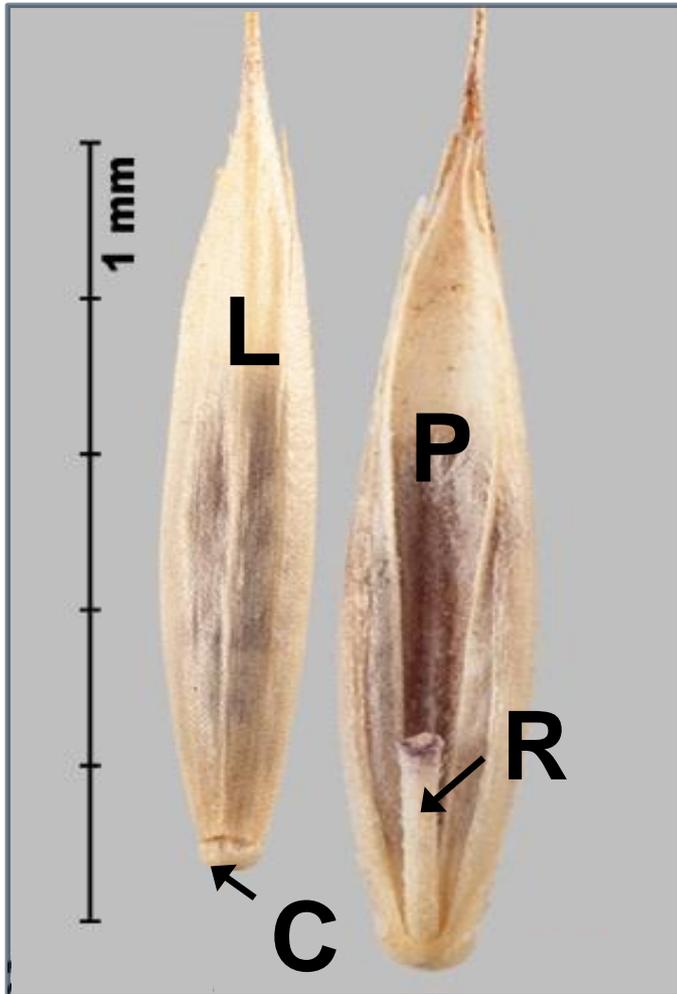
3.



# Comparison of Sheep Fescue Group Species

	<i>Festuca ovina</i> (sheep fescue)	<i>Festuca filiformis</i> (fine-leaved fescue)	<i>Festuca brevipila</i> (hard fescue)
<b>Lemma</b>	<ul style="list-style-type: none"> <li>- Pubescent near apex</li> <li>- Pointed, may have short awns</li> <li>- Floret length: 4.0-5.0 mm</li> </ul>	<ul style="list-style-type: none"> <li>- Pubescent near apex</li> <li>- Generally has short awns</li> <li>- Floret length: 3.0-3.5 mm</li> </ul>	<ul style="list-style-type: none"> <li>- Smooth, lustrous</li> <li>- Can be bristly near apex</li> <li>- Lemma pointed without awn</li> <li>- Yellowish wash</li> <li>- Floret size similar to sheep fescue</li> </ul>
<b>Palea</b>	<ul style="list-style-type: none"> <li>- Palea keels covered by lemma more frequently than other 2 species</li> <li>- Granular and waxy</li> <li>- Fine teeth near apex</li> </ul>	<ul style="list-style-type: none"> <li>- More shallow than other 2 species, keels usually exposed</li> <li>- Surface smooth</li> <li>- Fine teeth near apex</li> </ul>	<ul style="list-style-type: none"> <li>- Palea keels exposed</li> <li>- Smooth and lustrous</li> <li>- More opaque than other 2 species</li> <li>- Teeth difficult to see</li> </ul>
<b>Rachilla</b>	<ul style="list-style-type: none"> <li>- Strongly protruding, often curved, hairy</li> </ul>	<ul style="list-style-type: none"> <li>- Strongly protruding, straight, hairy</li> </ul>	<ul style="list-style-type: none"> <li>- Protruding, straight</li> <li>- Smooth or hairy</li> </ul>
<b>Callus</b>	<ul style="list-style-type: none"> <li>- Thick rim, flat</li> </ul>	<ul style="list-style-type: none"> <li>- Thick rim, flat</li> </ul>	<ul style="list-style-type: none"> <li>- Rim more narrow, slightly curved</li> </ul>

# *Festuca rubra* subsp. *rubra* (red & creeping red fescue)



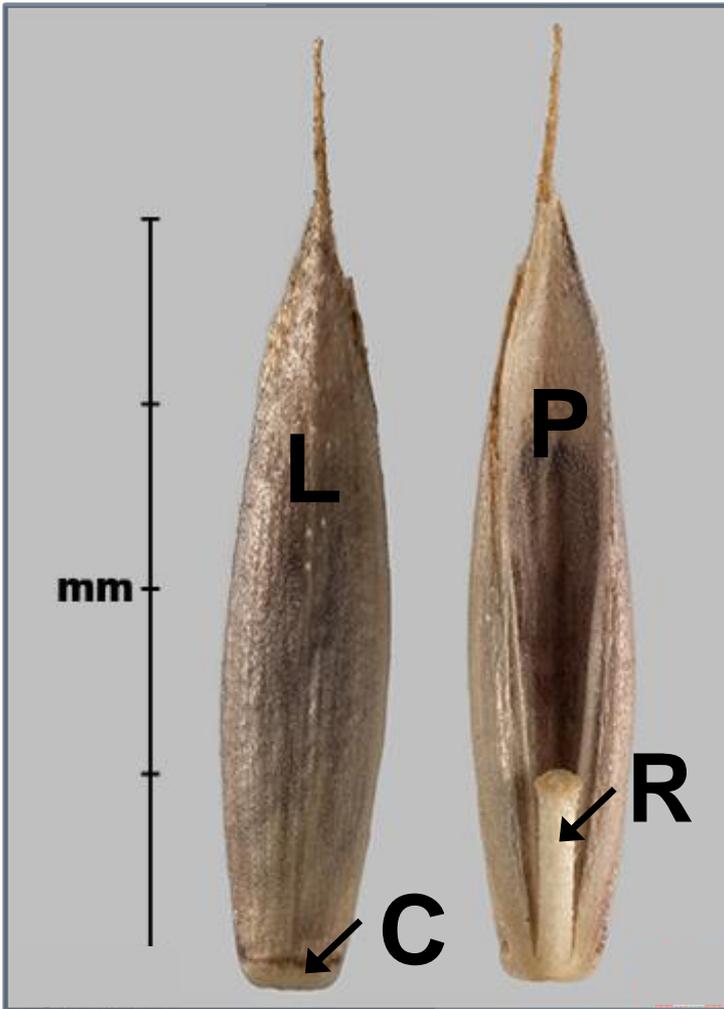
**Lemma:** pale colour, textured, shiny, awned, generally longest florets of the group

**Palea:** translucent, purple grain visible & appears shorter than Chewing's, grain widest at middle

**Rachilla:** thin, short-hairy, protrudes

**Callus:** thick lip, generally more narrow than Chewing's fescue

# *Festuca rubra* subsp. *fallax* (Chewing's fescue)



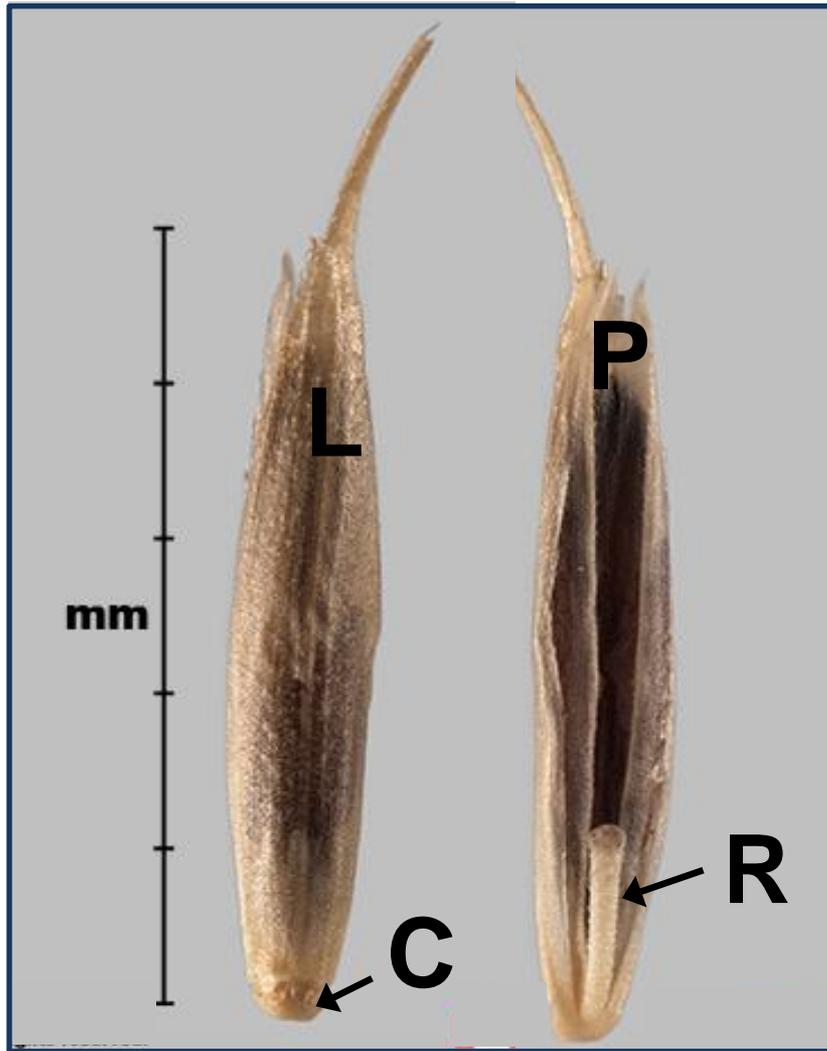
**Lemma:** pale colour, often darker than red fescue, shiny, awned

**Palea:** more opaque than other 2 species, grain appears longer than red fescue and widest at base, teeth more visible than other 2 species

**Rachilla:** straight, less protruding than other 2 species

**Callus:** thick lip, generally wider than red fescue

# *Festuca heterophylla* (various-leaved fescue)



**Lemma:** pale colour with a greyish wash, long awned, grain visible through the lemma

**Palea:** caryopsis appears darker than the other 2 species, almost as long as palea, edges thin

**Rachilla:** protruding, narrow

**Callus:** smaller and more narrow than the other 2 species

# Question #5



## Question #6

What are 3 features that distinguish the red fescue from the sheep fescue group?

- 1.
- 2.
- 3.

## Question #6

What are 3 features that distinguish the red fescue from the sheep fescue group?

- 1. Red fescue group florets generally paler in colour**
- 2. Florets appear thinner, caryopsis more visible and dark coloured**
- 3. Florets tend to be more shiny and smoother**

# Comparison of Red Fescue Group Species

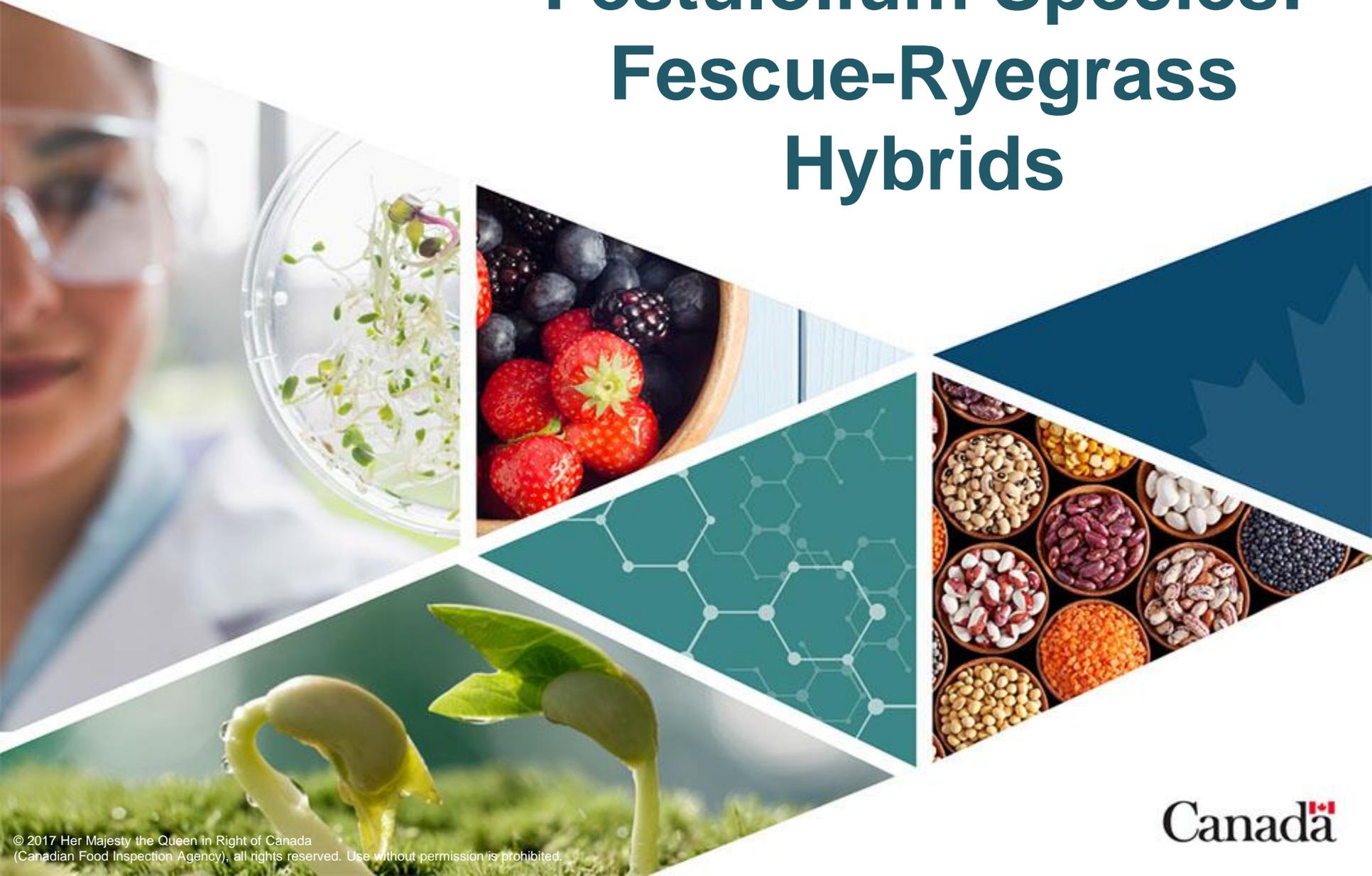
	<i>Festuca rubra</i> subsp. <i>rubra</i> (red & creeping red fescue)	<i>Festuca rubra</i> subsp. <i>fallax</i> (Chewing's fescue)	<i>Festuca heterophylla</i> (various-leaved fescue)
<b>Lemma</b>	<ul style="list-style-type: none"> <li>- Length: 5.0 – 5.5 mm</li> <li>- Arched backwards</li> <li>- Scattered granular texture</li> <li>- Generally paler than Chewing's fescue</li> </ul>	<ul style="list-style-type: none"> <li>- Length: 4.5 – 5.0 mm</li> <li>- Not generally arched</li> <li>- Can have scattered hairs</li> <li>- Generally darker than red fescue</li> </ul>	<ul style="list-style-type: none"> <li>- Slender, fine appearance</li> <li>- Arched backwards</li> <li>- Long, prominent awn</li> <li>- Greyish wash</li> <li>- Caryopsis visible</li> <li>- Granular or hairy at awned end</li> </ul>
<b>Palea</b>	<ul style="list-style-type: none"> <li>- Transparent, purple grain visible,</li> <li>- Caryopsis fairly short, around ½- ¾ length of the palea</li> </ul>	<ul style="list-style-type: none"> <li>- Palea less transparent than other 2 species</li> <li>- Caryopsis fairly long, around ¾ length of the palea</li> <li>- Teeth more noticeable than other 2 species</li> </ul>	<ul style="list-style-type: none"> <li>- Transparent</li> <li>- Caryopsis fairly long, around ¾ length of the palea</li> <li>- Caryopsis appears darker than other 2 species</li> </ul>
<b>Rachilla</b>	<ul style="list-style-type: none"> <li>- Protruding, often arched outward</li> </ul>	<ul style="list-style-type: none"> <li>- Less protruding, straight</li> </ul>	<ul style="list-style-type: none"> <li>- Protruding, slender and straight</li> </ul>
<b>Callus</b>	<ul style="list-style-type: none"> <li>- Thick lip</li> </ul>	<ul style="list-style-type: none"> <li>- Thick lip, generally wider than red fescue</li> </ul>	<ul style="list-style-type: none"> <li>- Smaller and more narrow than other 2 species</li> </ul>



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# Festulolium Species: Fescue-Ryegrass Hybrids



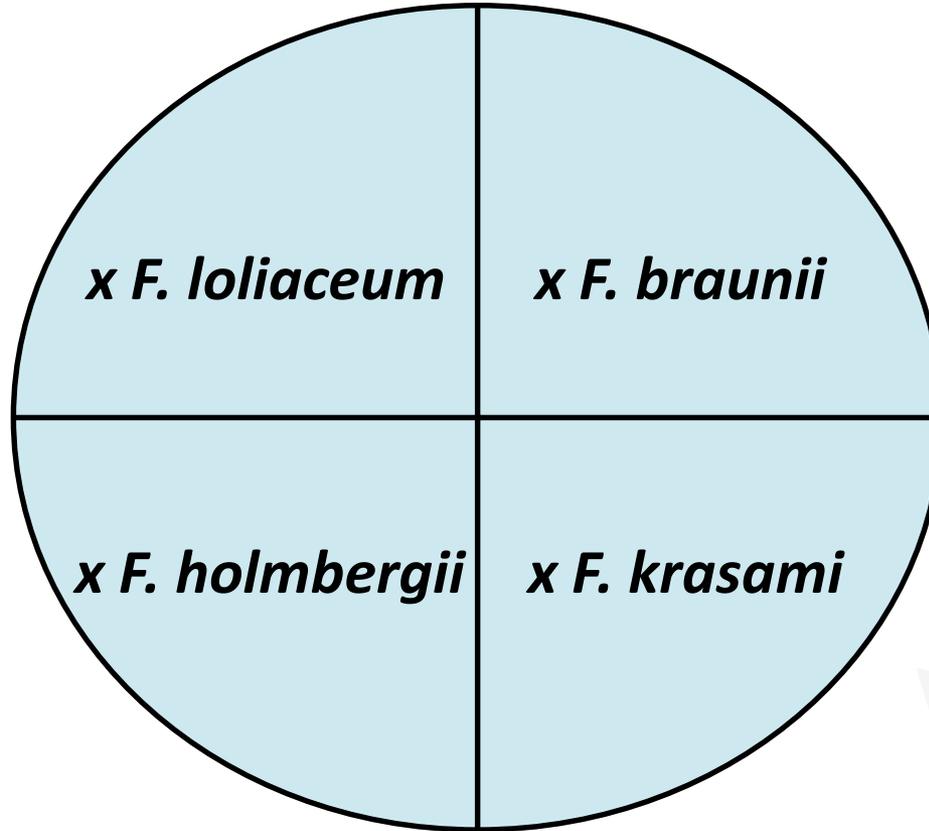
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# For the chat:

Has your lab analysed Festulolium?

If so, what are some of the features you noticed?

***F. pratensis***  
(meadow fescue)



***F. arundinacea***  
(tall fescue)

***L. perenne***

(perennial ryegrass)

***L. multiflorum***

(annual ryegrass)

# *X Festulolium spp. (festulolium)*



# *X Festulolium spp. (festulolium)*



**Lemma:** light brown colour, granular textured, often hairy, shiny near top, generally flat, awned, appears wider than tall fescue

**Palea:** granular to about halfway, flat, opens up above rachilla

**Rachilla:** generally compressed, small cap on end

**Callus:** thick rim, small or no space above, generally narrow, some are flared on sides

## Question #7 - Review

1. Which fescue species looks most like ryegrass florets?
2. What are the 2 species groups of fine-leaved fescues?
3. What are the 2 closest related fescue species to *F. brevipila* (hard fescue)?

## Question #7 - Review

1. Which fescue species looks like ryegrass florets? ***Festuca pratensis* (meadow fescue)**
2. What are the 2 species groups of fine-leaved fescues? **Sheep and red fescue groups**
3. What are the 2 closest related fescue species to *F. brevipila* (hard fescue)? ***Festuca ovina* (sheep fescue) and *F. filiformis* (fine-leaved fescue)**

# Thank you!

## **Acknowledgements:**

Seed images from National Seed Herbarium

**Questions/comments** send to:

[cfia.ssts-ssts.acia@canada.ca](mailto:cfia.ssts-ssts.acia@canada.ca)

## **More references:**

International Seed Morphology Association (ISMA):  
*Seed Identification Guide*: [www.idseed.org](http://www.idseed.org)

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# Fescue Species: Seed Analysis Questions



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# ROA Reporting (M&P)

How should we report a dehulled fescue sp?

**Unidentifiable caryopsis:** 1.3.2 b. the number present must be reported as "Poaceae sp." under Other Weed Seeds

**Pure Seed:**

3.2.2 c(i). Broken florets or free caryopses, provided they are larger than one-half the original size.

**Inert matter:**

3.2.5 b iii) Florets of *Lolium* and *Festuca* spp. with a caryopsis less than one-third the length of the palea, measured from the base of the rachilla

3.2.6 a(i). Florets or free caryopses, with more than one-half the radicle-plumule axis missing

# radicle-plumule axis

