



Canadian Food  
Inspection Agency

Agence canadienne  
d'inspection des aliments

## Canadian Food Inspection Agency



### **Our vision:**

To excel as a science-based regulator, trusted and respected by Canadians and the international community.

### **Our mission:**

Dedicated to safeguarding food, animals and plants, which enhances the health and well-being of Canada's people, environment and economy.

## ***Comparison of Four Foxtail Species***

***Yellow Foxtail, Setaria pumila***

***Green Foxtail, Setaria italica subsp. viridis***

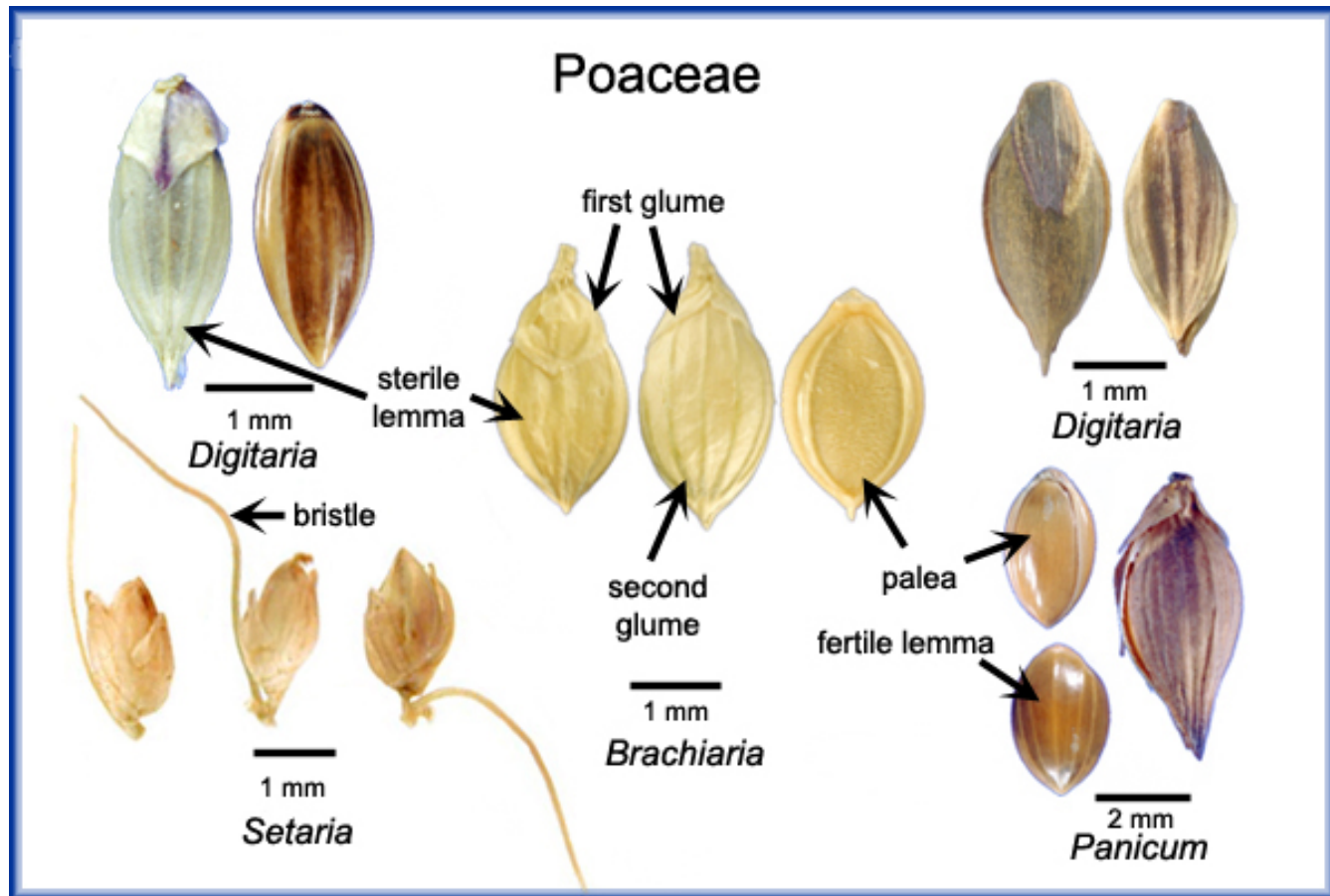
***Giant Foxtail, Setaria faberi***

***Knotroot Bristle Grass, Setaria parviflora***

***By Jennifer Neudorf***

**Canada**

# SPIKELET, WITH 1 PERFECT FLORET & A STERILE LEMMA



From John H. Wiersema-USDA, ISTA purity workshop, 2006

# Yellow Foxtail (*Setaria pumila*)

## 2nd Glume



- Glume covers up to  $\frac{1}{2}$  the length of the lemma.
- Lemma has an oval shape.
- Lemmas have a wide-angled tip with a three-pronged awn where the nerves converge.

# Yellow Foxtail (*Setaria pumila*) Lemma



- Decorated with thick transverse ridges that remain large towards the tip.
- Widest point at the middle of the lemma
- Base of the lemma is wide-angled like the tip.



# Yellow Foxtail (*Setaria pumila*) Palea



- Palea forms a rim where it meets the lemma.
- No glossy edges
- Slight to no dip at the tip of palea.

# Yellow Foxtail (*Setaria pumila*) Profile

- Highest profile at mid-point of lemma.
- Profile steeply slopes to lemma tip and base.



# Green Foxtail (*Setaria italica* subsp. *viridis*)

## 2nd Glume

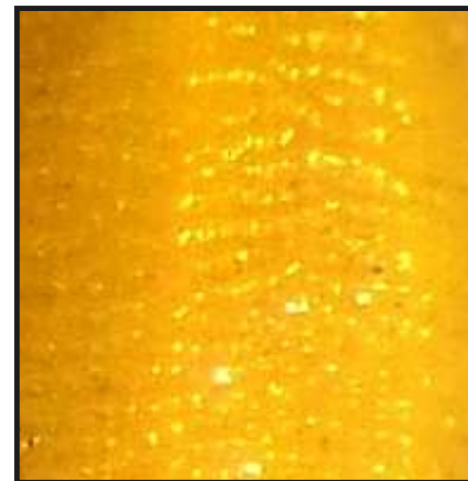


- Glume covers the lemma completely, or with the tip of the lemma exposed.
- Lemma has elongated, elliptical shape.
- Lemma has rounded tip with small single awn.

# Green Foxtail (*Setaria italica* subsp. *viridis*) Lemma



- Decorated with slight transverse and longitudinal ridges, forming a grid-like or pebbled pattern.
- The surface is smoother than other *Setaria* species





# Green Foxtail (*Setaria italica* subsp. *viridis*) Profile

- Gradual curve from base to apex, with widest point at middle.
- No areas of high profile, or “hump”; lemma tends to be flattened.



# Giant Foxtail (*Setaria faberi*)

## 2nd Glume



- Glume covers  $\frac{1}{2}$  -  $\frac{3}{4}$  the length of the lemma.
- Lemma has oval shape.
- Lemma has narrow tip with a one-pronged awn.

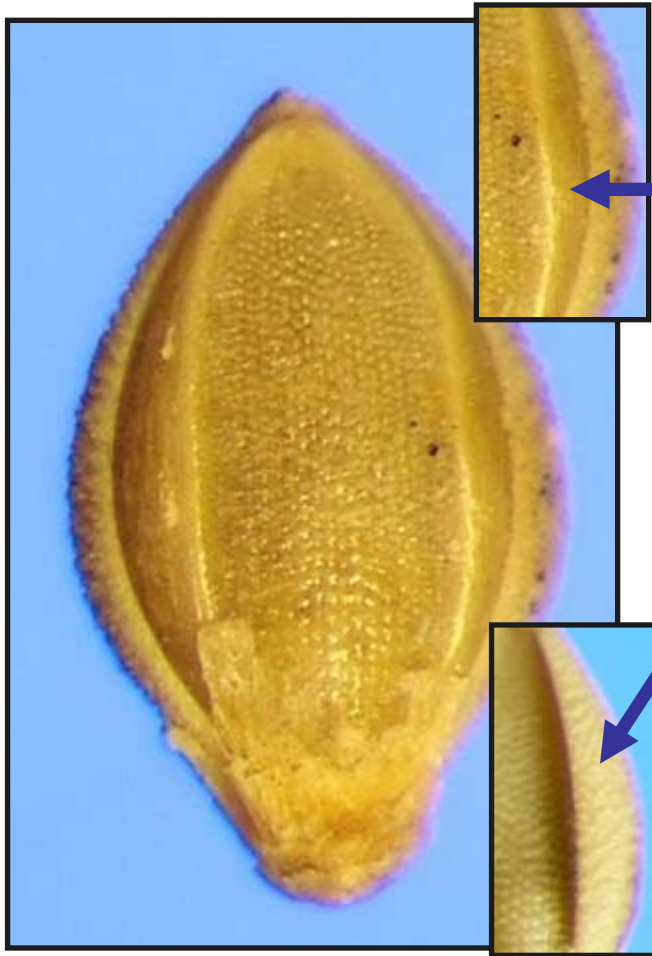
# Giant Foxtail (*Setaria faberi*) Lemma



- Decorated with thick, transverse ridges that get smoother towards the tip.
- Widest point of lemma tends to be just below the middle.
- Lemma narrows at base.



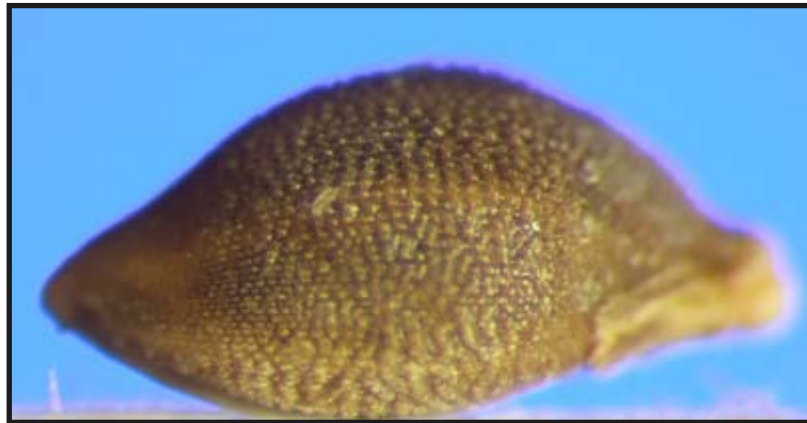
# Giant Foxtail (*Setaria faberi*) Palea



- Palea edges exposed, with glossy crescents at the margins.
- Immature specimens have covered palea edges.
- Strong depression at palea tip.
- Overall convex shape to palea.

# Giant Foxtail (*Setaria faberi*) Profile

- Highest profile tends to be below center of lemma.
- Sharp curve towards lemma tip, looks like an “S” shape.



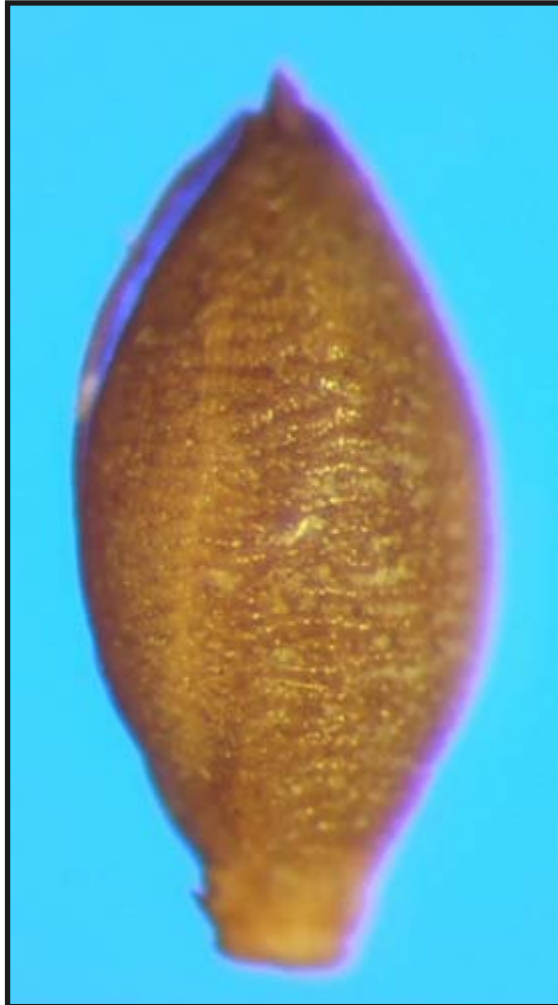
# Knotroot Bristle Grass (*Setaria parviflora*)

## 2nd Glume

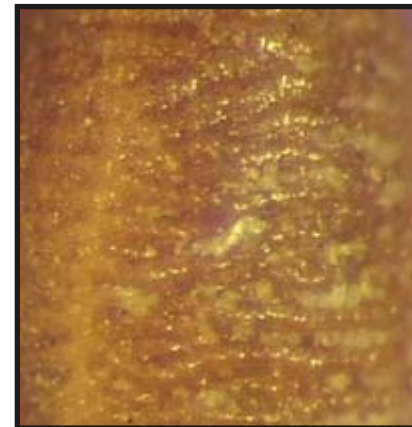


- Glume covers about  $\frac{3}{4}$  the length of the lemma.
- The floret (“seed”) of Bristle Grass is narrower and more elongated than Giant Foxtail.
- Lemma has narrow tip with a one-pronged awn.

# Knotroot Bristle Grass (*Setaria parviflora*) Lemma



- Decorated with transverse ridges that do not get smaller at the tip.
- Widest point of the lemma is below the middle.
- Lemma narrows at the base.
- The tip is usually darker-coloured than the rest of the lemma.



# Knotroot Bristle Grass (*Setaria parviflora*) Palea



- Palea forms a rim where it meets the lemma; glossy edges are never exposed.
- Slight depression at palea tip.
- Overall concave shape to palea.



# Knotroot Bristle Grass (*Setaria parviflora*) Profile

- Highest part of profile below center of lemma.
- Evident curve towards lemma tip, looks like a slight “S” shape.
- Curve flattens at base.



# Visual Comparison of *Setaria* Species



Top: 2nd Glume,  
Bottom: Lemma



L to R: Bristle Grass,  
Yellow Foxtail, Giant  
Foxtail and Green  
Foxtail

Note: The seeds shown on this slide are typical for their species and are mature. Seeds may vary in shape/size slightly.

# Visual Comparison of *Setaria* Species



Top: Palea  
Bottom: Profile

Note: The seeds shown on this slide are typical for their species and are mature. Seeds may vary in shape/size slightly.



L to R: Bristle Grass, Yellow Foxtail, Giant Foxtail and Green Foxtail

# Comparison of *Setaria* Species

Species	Yellow Foxtail	Green Foxtail	Giant Foxtail	Knotroot Bristle Grass
2 <sup>nd</sup> Glume	<ul style="list-style-type: none"> <li>• ½ the length of the floret.</li> </ul>	<ul style="list-style-type: none"> <li>• Covers the floret entirely.</li> </ul>	<ul style="list-style-type: none"> <li>• ¾ the length of the floret.</li> </ul>	<ul style="list-style-type: none"> <li>• ¾ the length of the floret.</li> </ul>
Lemma	<ul style="list-style-type: none"> <li>• transverse ridges remain strong at apex</li> <li>• 3-pronged awn at tip</li> <li>• wide-angled lemma tip.</li> <li>• large, even hump</li> </ul>	<ul style="list-style-type: none"> <li>• pebbled surface more apparent than ridges.</li> <li>• narrow-angled lemma tip.</li> <li>• flattened surface</li> </ul>	<ul style="list-style-type: none"> <li>• transverse ridges get smaller at apex</li> <li>• narrow-angled lemma tip, may have short awn.</li> <li>• S-shaped hump</li> </ul>	<ul style="list-style-type: none"> <li>• transverse ridges remain large at apex</li> <li>• narrow-angled lemma tip, may have short awn.</li> <li>• slight S-shape hump</li> </ul>
Palea	<ul style="list-style-type: none"> <li>• glossy edges covered</li> <li>• slight to no dip at apex</li> </ul>	<ul style="list-style-type: none"> <li>• glossy edges exposed</li> <li>• no dip at apex</li> </ul>	<ul style="list-style-type: none"> <li>• glossy edges exposed or covered in young “seeds”</li> <li>• strong dip at apex</li> <li>• convex shape</li> </ul>	<ul style="list-style-type: none"> <li>• glossy edges covered</li> <li>• slight dip at apex</li> <li>• concave shape</li> </ul>
Notes	<ul style="list-style-type: none"> <li>• largest of the 4 species</li> <li>• wide oval shape</li> <li>• 3.0 X 2.0 mm</li> </ul>	<ul style="list-style-type: none"> <li>• elliptic shape</li> <li>• 1.75 X 1.0mm</li> </ul>	<ul style="list-style-type: none"> <li>• strong nerves on lemma</li> <li>• wide oval shape</li> <li>• 2.5 mm x 1.5 mm</li> </ul>	<ul style="list-style-type: none"> <li>• apex dark coloured</li> <li>• narrow oval shape</li> <li>• 2.0 X 1.0 mm</li> </ul>



# Glossary

**Awn:** Bristle-like projection from the tip of the lemma.

**Base:** Bottom of the lemma; the point of attachment to the grass plant.

**Bract:** Undifferentiated leaf-like organ associated with the grass floret, named according to its position on the plant.

**Elliptical:** Shape with widest point at middle, tapers to slightly pointed ends.

**Floret:** A collective term referring to the grain, palea and lemma.

**2nd Glume:** Second of the two bracts that enclose the floret of the grass plant.

**Lemma:** Larger of the two bracts surrounding the grain.

**Nerves:** Longitudinal, thin ridges that run from base to tip of the lemma.

**Oval:** Shape with widest point at the middle, tapers gradually to rounded ends.

**Palea:** Smaller of the two bracts surrounding the grain, often surrounded by the lemma.

**Profile:** View along side of floret.

**Tip:** Top of the lemma; furthest point opposite of the base.

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