

# Native Grasses Seedling Development

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The Vision



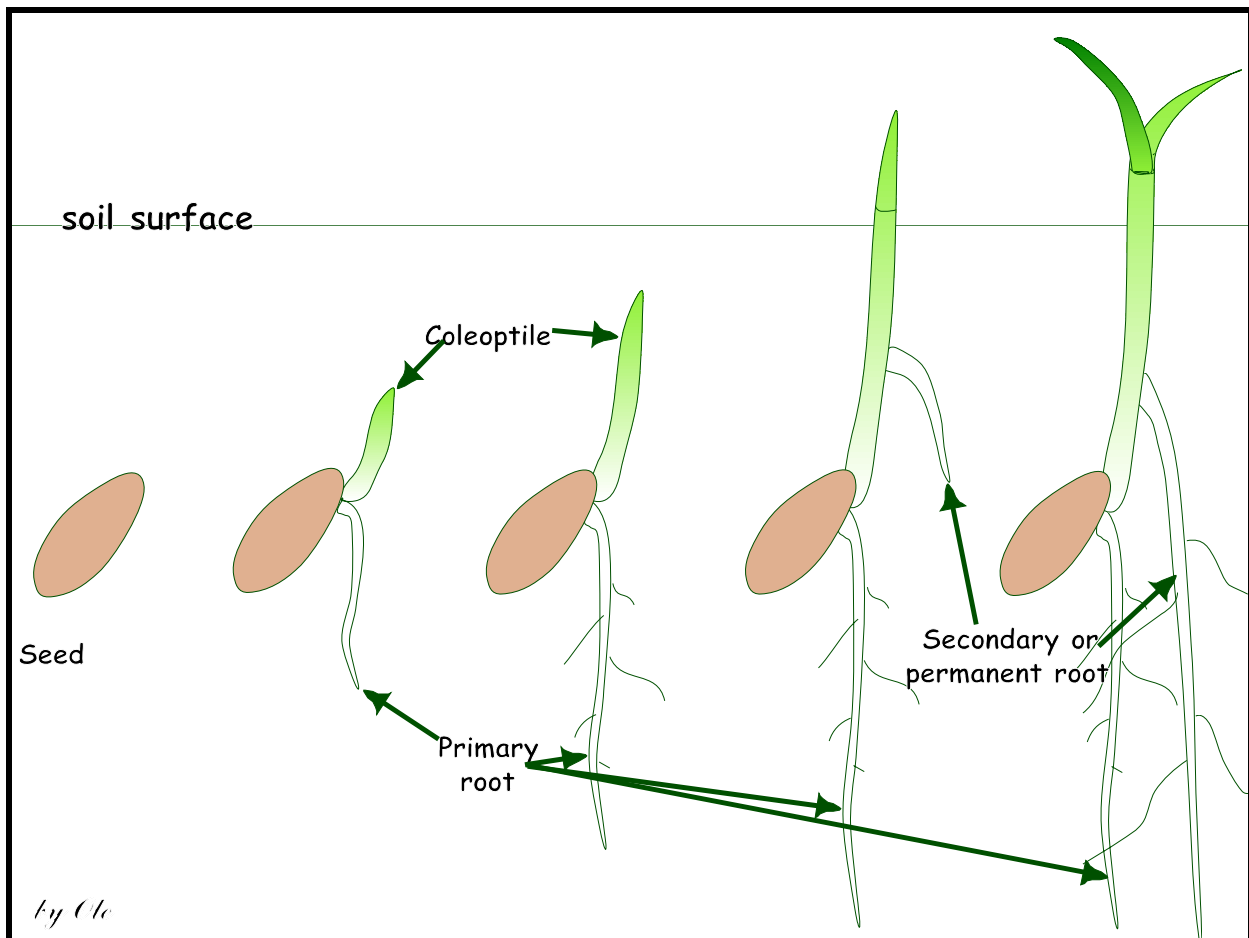
Native grasses, by nature, exhibit slow development after the conditions for germination and emergence are present. The seedlings are small and follow a definite development pattern. Depth and time of planting, combined with precipitation and temperature, determine when and how rapidly the seedlings become established. The seedling is considered established when the secondary or permanent root system has developed and the second leaf has emerged. If the seed is on or at the soil surface, moisture is often the limiting factor for establishment. If the seedling lacks moisture, it may die. The establishment process may take up to 8 weeks after germination and the plant becomes readily visible.

Figure 1 illustrates the process seedlings follow to establish. After the seed has been planted at the proper depth, it imbibes moisture from the soil (Figure 1, left). Normally, the seed reaches the point where enough moisture has been imbibed in 6-12 hours. If temperature and other requirements are met, germination occurs (seed coat splits).

Figure 2 represents the development stage when the coleoptile and primary root have been initiated. The primary root takes up water for the plant and nutrients for growth are from the endosperm in the seed. During this stage, if moisture is limited, death of the plant is possible.

The coleoptile and primary root continue to develop and the primary root system develops root hairs to increase the uptake of moisture (Figure 3). During this period, large amounts of water are needed to maintain development.

As the coleoptile reaches the soil surface and sunlight, the first leaf breaks out of the coleoptile (Figure 4). The primary root continues to supply water and the nutrients for



**Figure 1.** Native grass seedlings develop in stages until the permanent root system is developed and the second leaf emerges and the plant is established.

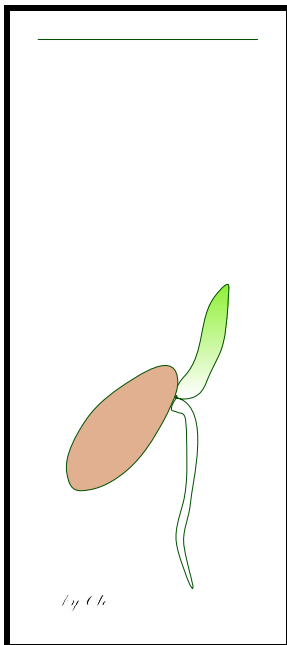
development are from the endosperm. This begins the most critical stage as the secondary or permanent root will begin development. Permanent root development is initiated between the seed and the soil surface. The location of the root development varies by species. This fact is the primary reason proper placement of the seed is important. If sufficient moisture is not present, the permanent root will not develop and the plant will die.

The seedling becomes an established plant when the permanent root has developed sufficiently to supply water and nutrients without nutrients from the endosperm in the seed being required (Figure 5). On the surface, the second leaf will appear. The second leaf will not appear until the permanent root has developed. If moisture is not available and the plant is established, it will become dormant until moisture is available. If the dry period is long, the plant may die.

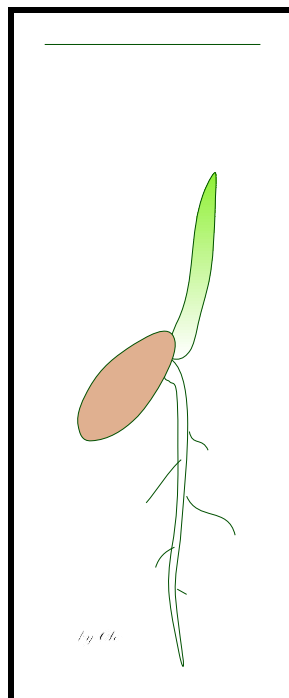
### Summary

Proper seeding depth, timing, and good moisture are needed to establish native grasses. The seedling plant is difficult to find until it has the second leaf out. The process takes up to 8 weeks depending on temperature and moisture.

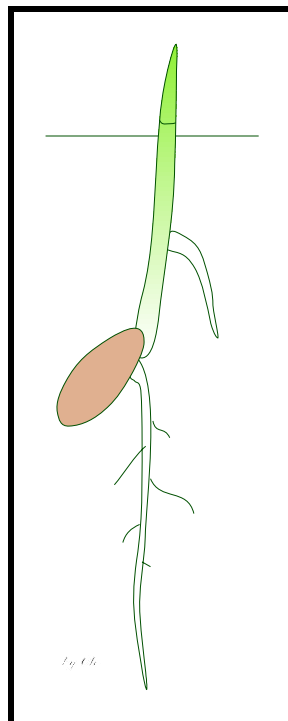
Prepared by  
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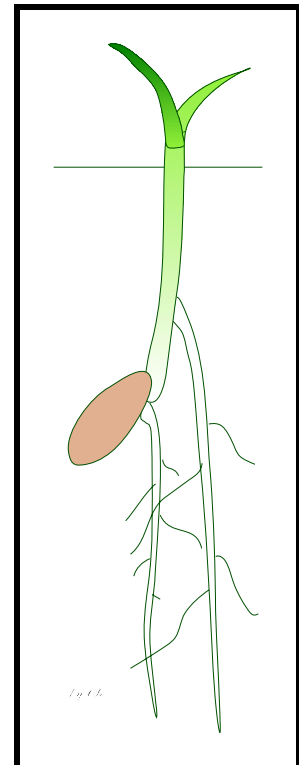
**Figure 2.** The grass seedling as the coleoptile and primary root begin development.



**Figure 3.** Rapid development of the coleoptile and primary root occur during this stage.



**Figure 4.** The permanent root will develop between the seed and the surface if water is available.



**Figure 5.** The seedling is considered established when the plant is able to develop the second leaf.