KNOW THE PLANT GROWTH CYCLE

This Insight describes the stages of development for **wheat-type cereal crops** and is critical for leaf tissue sampling to support the management decisions facing growers.

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Knowing the stages of development of wheat-type cereal crops is critical for leaf tissue sampling to support many management decisions.

Herbicide applications, for example, are usually completed during the tillering stage. Similarly, a good timing for nitrogen application on wheat is at 6-weeks, or before stem extension.

The accurate crop growth stage identification is also important for disease control measures. Crop sensitivity to heat or cold also depends on growth stages. For example, during flowering, the crop is very sensitive to low temperature.

The accurate identification and reporting of the growth stage is also important in interpretation of nutrient status when leaves are analysed.

The 'Zadoks Scale' proposed by the Dutch Phytopathologist Jan C Zadoks is widely used in cereal research to describe the growth stage of crop. The Scale runs from 00 – 99m with the first digit representing the the 0 – 10 developmental phases, and the second being the 0 – 10 growth stages within the phase *(see the accompanying diagram)*. Wheat-type cereals show early tiller formation when their seed is primed and are sown with adequate phosphate and nitrogen.

Thus, the first tiller in a good crop often appears with plants having 2 – 3 leaves.

Combining Zadoks codes, *(as shown in the following chart)*, gives an indication of not only crop growing stage, but also the seed and seedling vigour and paddock fertility.

For example, a seedling having 3 leaves only (Z13) is a weaker seedling compared to another having 3 leaves with 1 tiller (Z13/21) – or a seedling with 3 leaves and 2 tillers (Z13/22) is a stronger seedling compared to one with 3 leaves and 1 tiller (Z13/21).

In the following chart, the most common growth stages used in nutrient analysis of cereals is described. It is especially important to identify leaf and tiller number as indicated for a crop in tillering stage.

Combining Zadoks Codes (chart):

	Common Growth Stages	Zadoks Scale
Seedling Stage : Often associated with early tillering (Z21 – Z22)	3 leaves and 0 tiller 3 leaves and 1 tiller 3 leaves and 2 tillers 4 leaves and 2 tillers 4 leaves and 3 tillers	Z13 Z13/21 Z13/22 Z14/22 Z14/23
Stem Elongation (Jointing) : Follows completion of tillering (Z30 – Z39)	1st node detectable 2nd node detectable 3rd node detectable Flag leaf just visible	Z31 Z32 Z33 Z37
Booting :	Flag leaf sheath extending Boots just swollen	Z41 Z45

Note :
Zadoks description of plant growth at which YEB (youngest expanded blade) is usually sampled

Growth Stage of Crop (diagram):