

## Cereal growth stages



### Seedling growth

- GS10 First leaf through coleoptile
- GS11 First leaf unfolded (ligule visible)
- GS13 3 leaves unfolded
- GS15 5 leaves unfolded
- GS19 9 or more leaves unfolded

### Tillering

- GS20 Main shoot only
- GS21 Main shoot and 1 tiller
- GS23 Main shoot and 3 tillers

- GS25 Main shoot and 5 tillers
- GS29 Main shoot and 9 or more tillers

### Stem elongation

- GS30 Ear at 1cm (pseudostem erect)
- GS31 First node detectable
- GS32 Second node detectable
- GS33 Third node detectable
- GS37 Flag leaf just visible
- GS39 Flag leaf blade all visible

### Booting

- GS41 Flag leaf sheath extending
- GS43 Flag leaf sheath just visibly swollen
- GS45 Flag leaf sheath swollen
- GS47 Flag leaf sheath opening
- GS49 First awns visible (if an awned variety) *Barley only*

### Ear emergence

- GS51 First spikelet of ear just visible above flag leaf ligule

- GS55 Half of ear emerged above flag leaf ligule
- GS59 Ear completely emerged above flag leaf ligule

### Flowering

- GS61 Start of flowering
- GS65 Flowering half-way
- GS69 Flowering complete

### Milk development

- GS71 Grain watery ripe
- GS73 Early milk
- GS75 Medium milk
- GS77 Late milk

### Dough development

- GS83 Early dough
- GS85 Soft dough
- GS87 Hard dough (thumbnail impression held)

### Ripening

- GS91 Grain hard (difficult to divide)
- GS92 Grain hard (not dented by thumbnail)
- GS93 Grain loosening in daytime



**Correct timing of sprays and fertiliser treatments is critical to success in growing cereals. Many instructions and guides state 'Apply at GSXX.' This guide aims to help you understand the decimal growth stage (GS) key.**

**Sampling crops**

Take 5-10 typical plants from across the field, ideally digging them up rather than pulling up to avoid damaging stems and leaves.

**Spray timings and Growth Stages**

| Spray timing | Winter wheat                                            | Winter barley |
|--------------|---------------------------------------------------------|---------------|
| T1           | GS31-33<br>Emergence of Leaf 3 is critical <sup>+</sup> | GS30-32       |
| T2           | GS39                                                    | GS39-49       |
| T3           | GS61-65                                                 | —             |

**T0** is not defined by Growth Stage

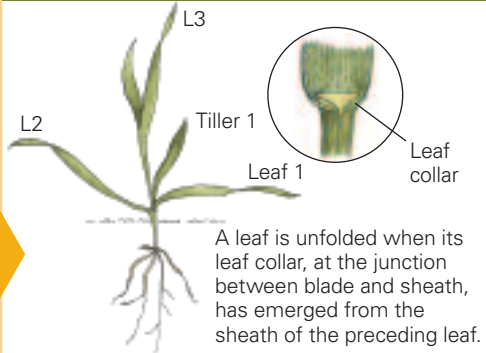
+ To identify if emerging leaf is Leaf 3, unroll its sheath to check that only two further leaves remain to emerge.

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**GROWTH STAGE 09**  
*Leaf at coleoptile tip (peri-emergence)*



**GROWTH STAGE 13, 21\***  
*3 leaves unfolded, 1 tiller*



A leaf is unfolded when its leaf collar, at the junction between blade and sheath, has emerged from the sheath of the preceding leaf.  
\* Two numbers reflect GS of main shoot and tillering respectively, eg GS13 – 3 leaves unfolded on main shoot, GS21 – main shoot and 1 tiller.

**GROWTH STAGE 15, 23**  
*5 leaves unfolded on main shoot, 3 tillers*



When stem elongation begins it is necessary to split the main shoot to determine the correct crop Growth Stage.  
For a quick, but crude assessment, fold back the leaf sheaths then count the slight 'bumps' caused by each node.  
The exact stage is revealed by stripping off leaves and cutting the main stem longitudinally with a sharp knife.

The publishers acknowledge: DR Tottman, R.J. Makepeace, Hilary Broad (1979).  
**An explanation of the decimal code for the growth stages of cereals, with illustrations.**  
*Annals of Applied Biology*, 93 (2), 221-234, Association of Applied Biologists

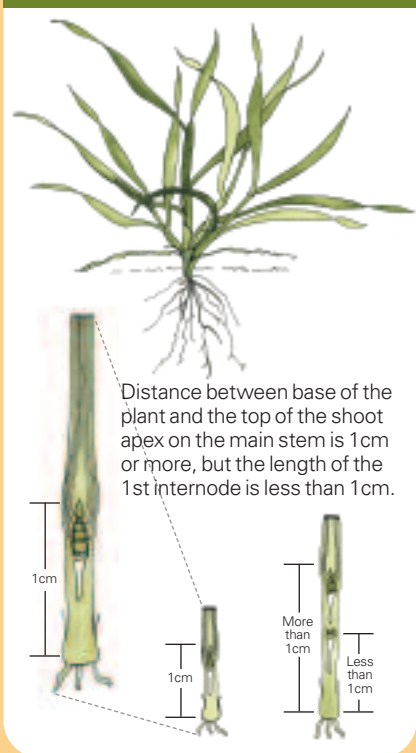
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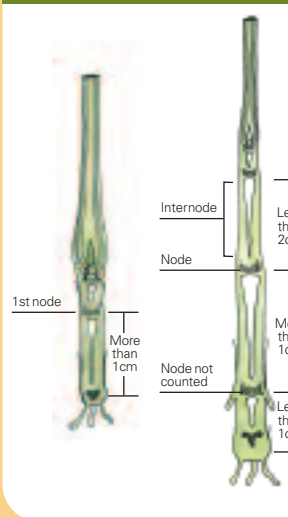
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**GROWTH STAGE 30**  
*Ear at 1cm (pseudostem erect)*



**GROWTH STAGE 31**  
*1st node detectable*  
An internode is 1cm or more but the internode above is less than 2cm



Sometimes a node may be below the ground and may bear roots. Even if this occurs, as long as the internode below it exceeds 1cm it is still counted.

**GROWTH STAGE 32**  
*2nd node detectable*

