



# BAYER BULLETIN

## GROWTH STAGES OF A *wheat plant*

### INTRODUCTION

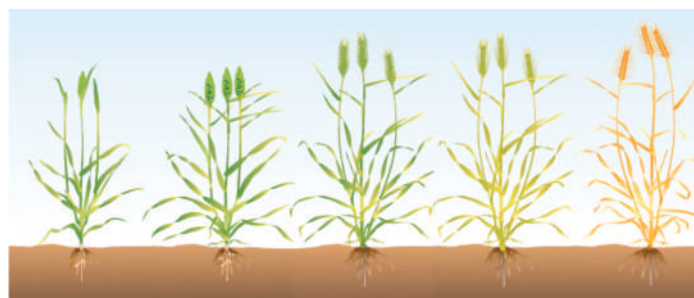
Correct identification of the basic growth stages is important for a variety of reasons. During the respective growth stages certain morphological changes occur which all play a role to determine the yield of the plant. With basic knowledge of what happens during these growth stages, this knowledge can be used to help the plant reach its optimal potential. Growth stages also give a communal understanding of the specific stage which eases communication regarding management systems.

### CROP STAGES ACCORDING TO THE ZADOKS SCALE

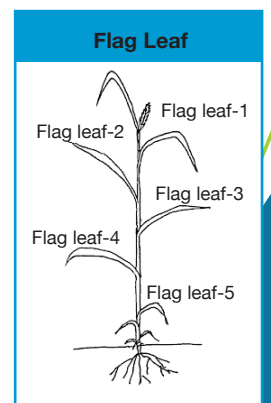
The most general scale that is used is the Zadoks scale which consists of 10 main growth stages. Each of these stages is subdivided to distinguish between small differences. See figure below.



Zadoks growth stage	GS 00 - 09	GS 10 - 19	GS 20 - 29	GS 30 - 39	GS 40 - 49
Developing stage	Germination	Seedling	Tillering	Stem elongation	Booting



Zadoks growth stage	GS 50 - 59	GS 60 - 69	GS 70 - 79	GS 80 - 89	GS 90 - 99
Developing stage	Ear emergence	Flowering	Milk development	Dough development	Ripening



Schematic representation of the Zadoks scale

(Source: GRDC, Cereal growth stages - the link to crop management, by Nick Poole)

# How does the crop growth stage influence the time of application?

It is a well known fact that the last three leaves of the wheat plant (flag leaf, flag leaf -1 and flag leaf-2) as well as the ear have a great impact on the yield potential of the plant. Some sources say up to 95%. It is thus very important that these stages are kept healthy through disease control.

The climate conditions during different times in the growth cycle, the type of disease expected, the inherent susceptibility of the cultivar to certain diseases, the area where the crop is grown as well as the planned fungicide application will influence above mentioned decision.

The period from stem elongation to ear appearance is the most critical time for protection against disease, because during this time the ear's potential is established. This is also the time the important last three leaves chute.

The saying – healing is better than control – is critical in disease control. If sprayed too early, chances are an additional spray would be needed. If sprayed too late chances are the disease could build up when the last leaves are formed.

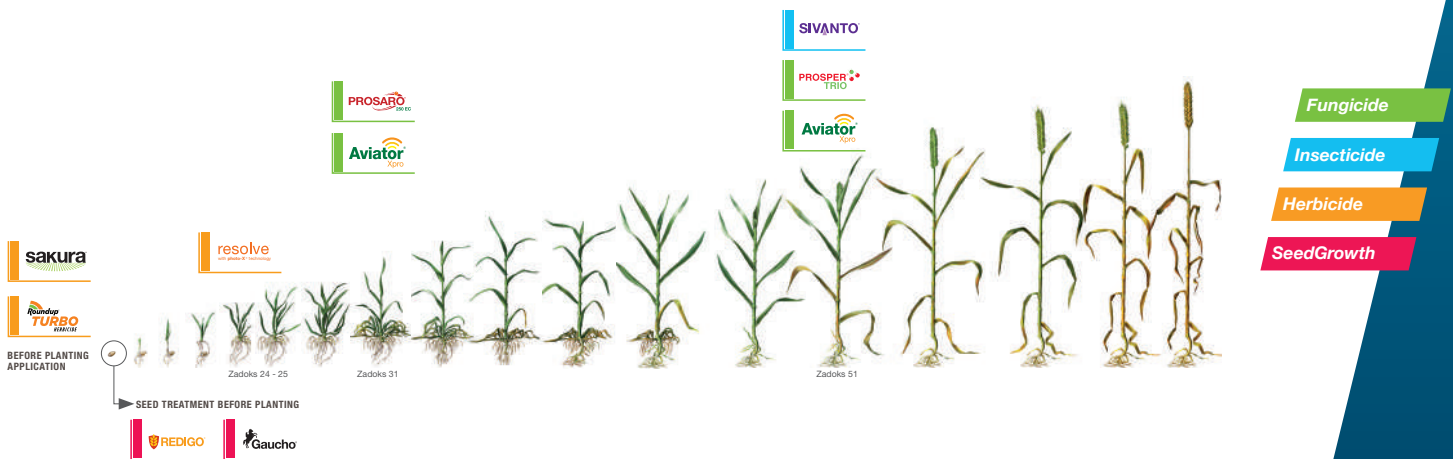
During the period of stem elongation the developing ear move upwards. During this stage the known nodes are also formed in the plant.

- // GS 31 (1st node)
- // GS 32 (2nd node)
- // GS 33 (3rd node)



The stage where the first node of the main haulm appear above the soil goes along with the appearance of the third leaf (flag leaf-2). The appearance of the second node above the soil surface goes with the appearance of the second last leaf (flag leaf-1). The appearance of the flag leaf falls with the appearance of the third node above the soil surface.

With this explanation it is clear that the most important time to keep the plant disease free is between first node (GS 31) and ear emergence. It is also important to keep the relevant plant parts free of disease during their development and not only when they have already formed. It is thus clear that the interval between sprays are also critical as to keep this period free of disease. The start of a spray programme will be determined by the disease that is expected, the potential of the crop, cultivar and climate conditions (current and expected).



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