

TECHNICAL SHEET

Composite bread technology

Presentation of wheat

Wheat is a monocot in the family Poaceae belonging to the genus *Triticum* (Debiton, 2010). This annual plant produces an indehiscent dry fruit, the caryopsis (Debiton, 2010). Common wheat (*Triticum aestivum*) and durum wheat (*Triticum durum*) are the two most widely cultivated species in the world (Debiton, 2010). Soft wheat consists of three genomes with 7 pairs of homeologous chromosomes each, for a total of 42 chromosomes (Debiton, 2010). It has a hexaploid genomic structure (AA BB DD) and durum wheat a tetraploid structure (AA BB). It is mainly composed of starch which represents about 70% of the dry matter of the grain and is located in the albumen (Debiton, 2010). Proteins represent between 10 and 15% of the dry matter and are found in all tissues of the wheat grain with a higher concentration in the germ and the aleurone layer (Pomeranz, 1988 cited by Debiton, 2010).

Durum wheat does not have the same requirements as soft wheat. It has high sunlight requirements, low resistance to cold and humidity, average yields (generally lower than those of common wheat, except for recent varieties), and a greater sensitivity to certain cryptogamic diseases than common wheat (Alaoui and Yasuehi, 2005). Durum wheat requires a healthy soil, well drained but not too prone to hydric stress especially during the period of accumulation of reserves in the grain (Alaoui and Yasuehi, 2005). The installation of durum wheat in poorly draining soils makes it more susceptible to cryptogamic diseases such as foot rot and fusariosis (Alaoui and Yasuehi, 2005).

Soft wheat can be grown in all agricultural regions of Morocco. Soft wheat requires a healthy soil, well drained but not too prone to water stress especially during the period of accumulation of reserves in the grain (Alaoui and Yasuehi, 2005). The installation of soft wheat in poorly draining soils can cause important damages due to cryptogamic diseases such as foot rot and fusarium (Alaoui and Yasuehi, 2005).

Wheat in the composition of bread

According to the Larousse dictionary 2016, a composite is a material is formed of various elements and not very homogeneous. In other words, it is an assembly of at least two immiscible components whose properties complement each other. The new material thus formed, heterogeneous, has properties that the components alone do not have. In the specific case, it is the manufacture of bread based on wheat flour (85%) mixed with other flours of cereals or tubers (15%).

Structure of a wheat seed

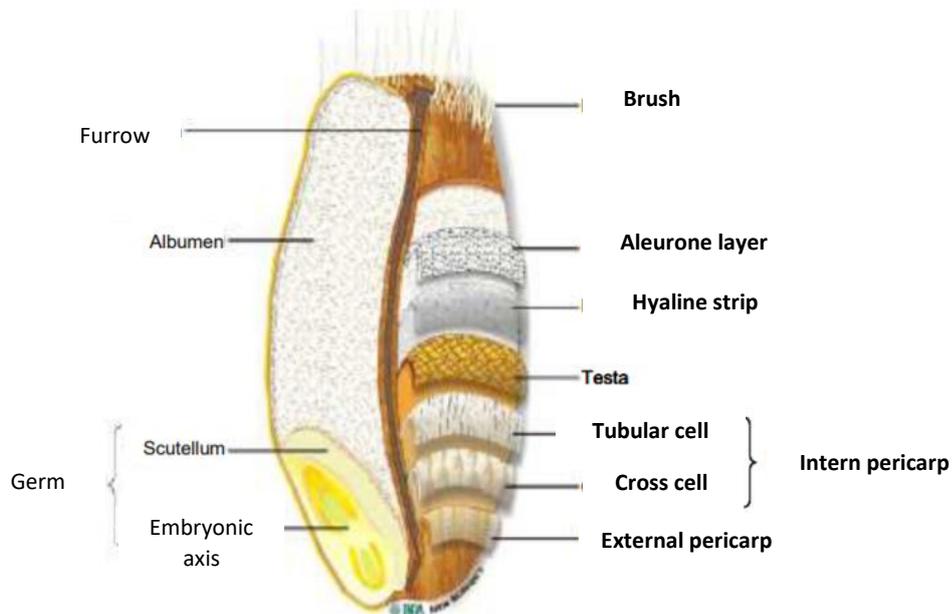


Figure 1 : structure of wheat seed (source Surget and Barron, 2005 cited by Debiton, 2010)

Different stages of development of wheat

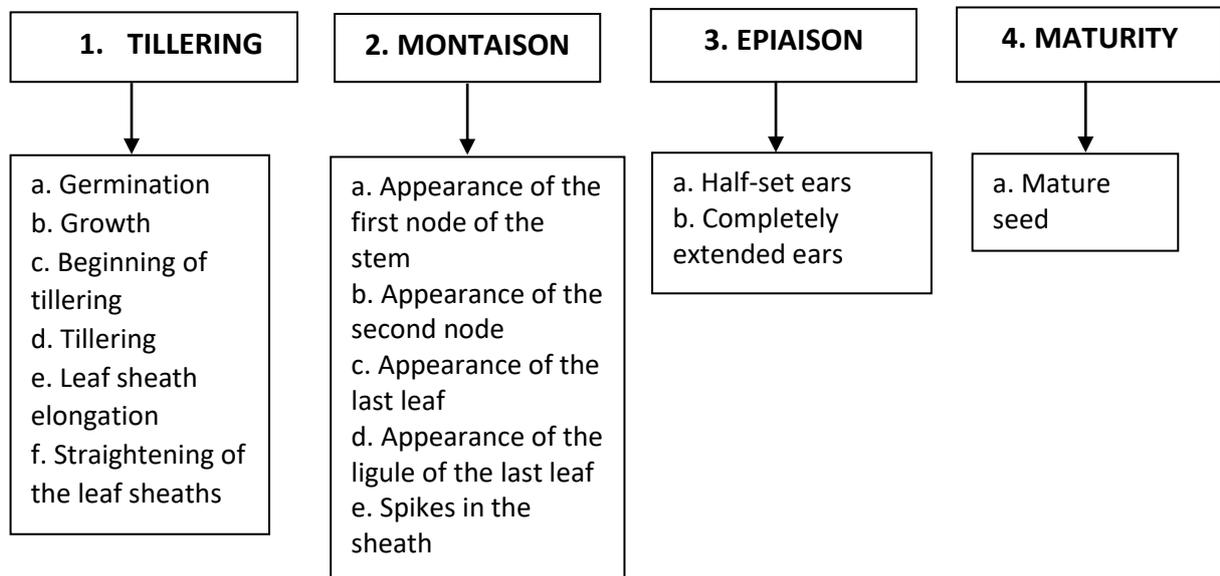


Figure 2 : Stages of development of wheat (source : Alaoui and Yasuehi, 2005)

Characteristics of the technology

Use of 15% millet, corn or cassava flour and 85% wheat flour to make bread.

Bibliographic references

ALAOUI et YASUEHI (2005) : Référentiel pour la conduite technique des principales cultures ; 10-38p.

DEBITON (2010) : Identification des critères du grain de blé (*Triticum aestivum* L.) favorables à la production de bioéthanol par l'étude d'un ensemble de cultivars et par l'analyse protéomique de lignées isogéniques waxy ; 132p.

POMERANZ (1988) : Chemical composition of kernel structures. Wheat: chemistry and technology. Volume I., 97-158p.

SURGET et BARRON (2005) : 2005. Histologie du grain de blé, Industrie des céréales 145, 4-7p.

Sites web consultés

<https://tel.archives-ouvertes.fr/tel-00625530/document> ; 30/07/2021 at 10h13

https://www.researchgate.net/publication/280803964_Referentiel_pour_la_Conduite_Technique_de_la_Culture_du_ble_tendre_Triticum_aestivum ; 30/07/2021 at 10h17

https://www.fellah-trade.com/ressources/pdf/ble_dur.pdf ; 30/07/2021 at 10h21

https://gard.chambre-agriculture.fr/fileadmin/user_upload/Occitanie/066_Inst-Gard/Documents/4_Productions_et_techniques_doc/Grandes_Cultures/Les_Bases_Culture_BI%C3%A9_Dur.pdf ; 30/07/2021 at 10h33

https://ehlgbai.org/wp-content/uploads/2016/10/BLE_TENDRE_EHLG.pdf ; 30/07/2021 at 10h45

https://www.perspectives-agricoles.com/file/galleryelement/pj/a4/19/6c/13/435_4737315565252375412.pdf ;
30/07/2021 at 11h11

<https://fr.wikipedia.org/wiki/BI%C3%A9> ; 30/07/2021 at 11h31

<https://www.larousse.fr/dictionnaires/francais/composite/17749> ; 30/07/2021 at 11h43

https://fr.wikipedia.org/wiki/Mat%C3%A9riau_composite ; 30/07/2021 at 11h47

Other references

Regional Center of Excellency on Dry Cerals and Associated Crops ; HOST INSTITUTION: CENTRE D'ETUDES RÉGIONAL POUR L'AMÉLIORATION DE L'ADAPTATION À LA SECHERESSE (CERAAS) ; Host country: Senegal; Coordinator: Ndjido KANE; Email: ndjido.Kane@isra.sn; ndjido.Kane@isra.sn; Telephone: +221 777232019 / +221 339514693