Chapter-3
Structure of Wheat Grain

3.0 Unit Overview & Description

- Overview
- Knowledge and skill outcomes
- Resource Materials
- Duration
- Learning Outcomes
- Assessment Plan

3.1 Introduction to Structure of Wheat Grain

3.2 Physical Structure

3.3 Longitudinal Structure

3.0 UNIT OVERVIEW & DESCRIPTION:

Overview:

This unit will make the students learn about the structure and composition of wheat grain. It will also help them to know the physical structure as well as the longitudinal structure.

Knowledge and skill outcomes:

i) Understand the structure of the wheat grain.

ii) Know the physical structure of wheat.

iii) Understand the longitudinal structure of wheat grain.

Resource Materials:

- Sultan, *W. J. Elementary baking*. New York: McGraw-Hill, c1969.
- Sultan, *W. J. Practical baking*. 5th edition. New York : Van Nostrand Reinhold, c1990

- Matz, *S. Glossary of milling and baking terms.* McAllen, TX: Pan-Tech International, c1993.
- Matz, S. *Ingredients for bakers. 2nd edition.* McAllen, TX: Pan-Tech International, c1996.

Duration: Total Hours 12

Learning Outcomes:

3.1 Introduction to Structure of Wheat Grain	General Overview
3.2 Physical Structure	• Understand the Physical Structure of Wheat Grain
3.3 Longitudinal Structure	• Understand the longitudinal Structure of Wheat Grain

Assessment Plan: (For the Teachers)

Unit-3	Topic	Assessment Method	Time Plan	Remarks
3.2	Physical Structure	Exercise: Question & Answer		
3.3	Longitudinal Section	Exercise: Question & Answer		

3.1 INTRODUCTION TO STRUCTURE OF WHEAT GRAIN

There are several grasses which are grown due to their edible seeds known as cereal of a grain. The various seeds are wheat, barley, oats, corn etc.,

Flour most commonly used in bakeries is derived from a wheat grain. Wheat can be classified according to the colour and hardness of the kernel. It depends on the variety and area where they are being grown.

The several factors which affect the quality of wheat are climate, soil, variety of the seed sown, moisture etc.

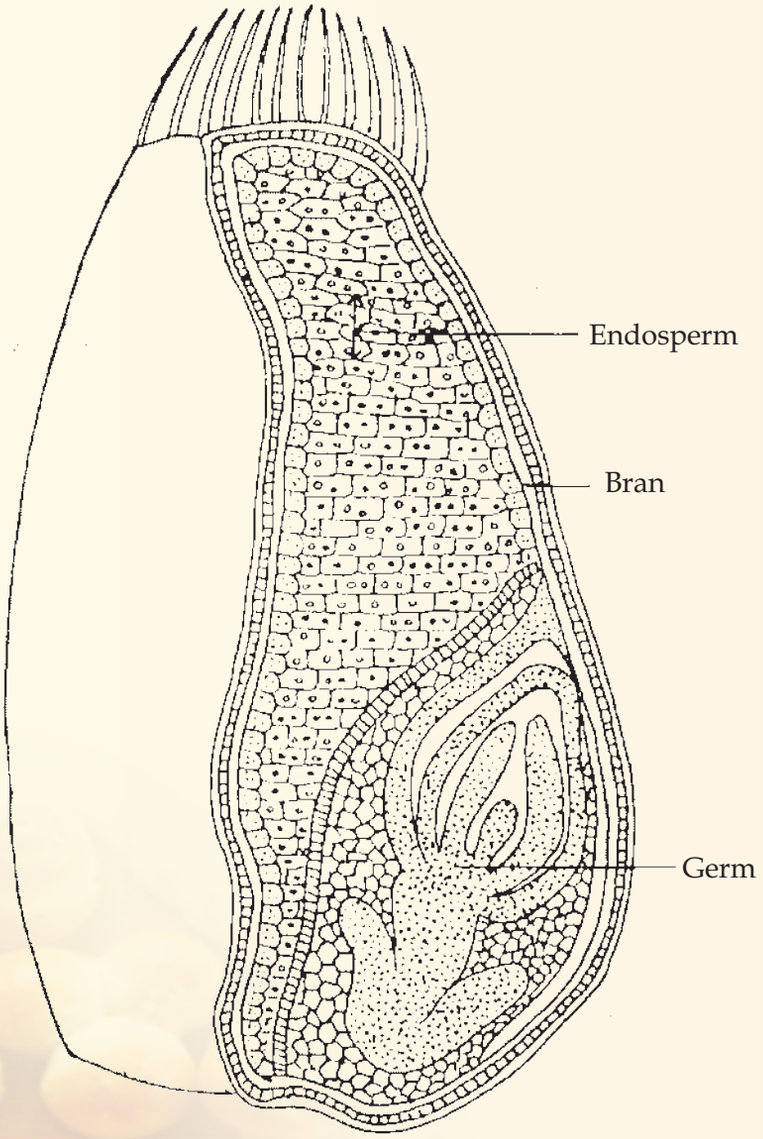
Wheat is the annual grass of triticum and it is the majorly grown in most of the countries.

A kernel is called the wheat berry. Kernel is the seed from which the wheat plant grows. It consists of three distinct parts that are separated during the milling process.

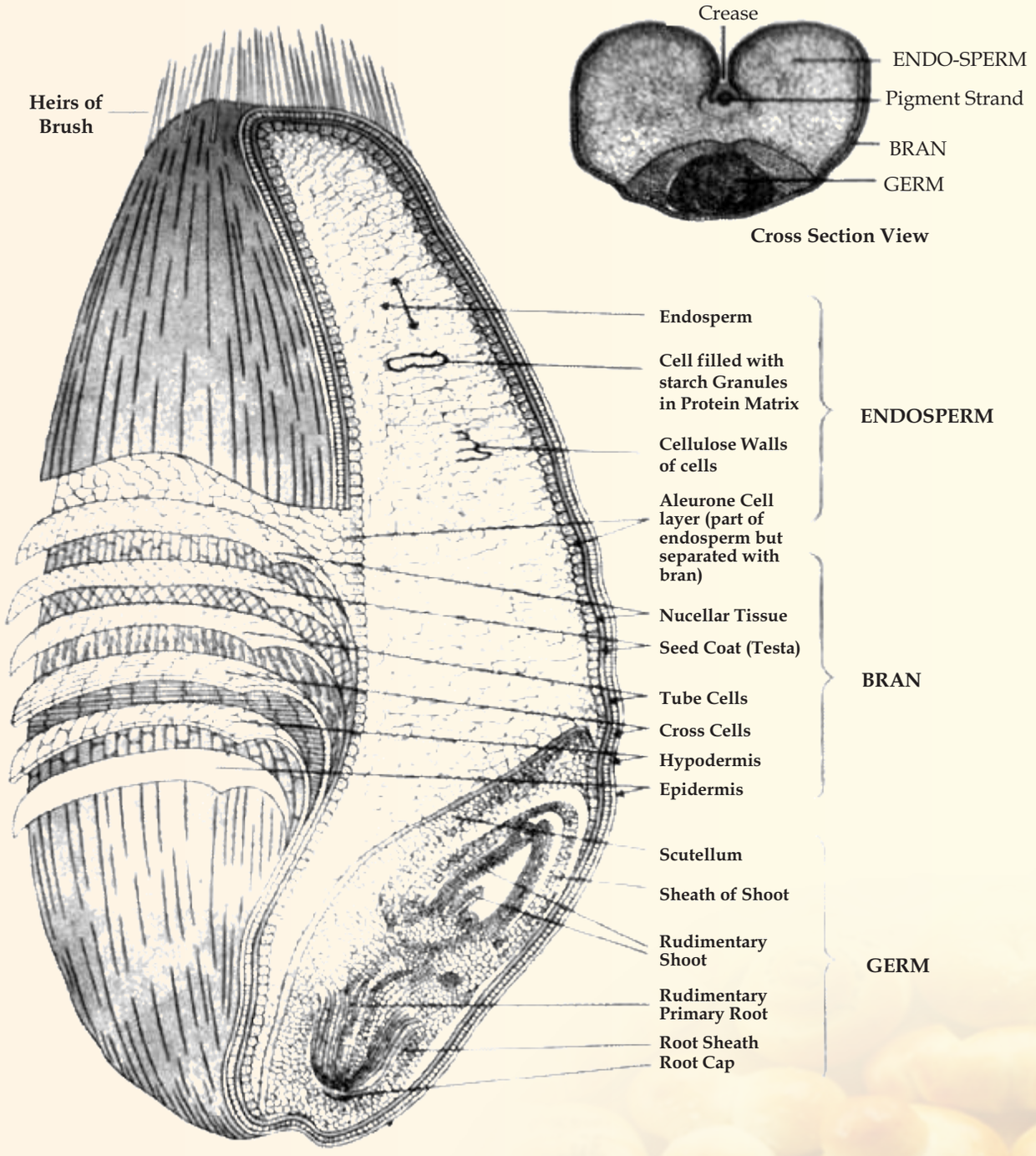
The physical structure of wheat majorly consists of:

1. BRAN-15%
2. ENDOSPERM-82.5%
3. GERM-2.5%

3.2 PHYSICAL STRUCTURE



3.3 LONGITUDNAL SECTION



Cross Section View

Bran:

Bran consists of 15% of a kernel weight. It is the outer most layer of the wheat grain. It contains small amount of protein, vitamin B-complex, trace minerals and is rich in dietary fiber (insoluble fiber).

Bran is made up of six layers. These layers are broadly classified as:

1. Epidermis (outermost layer)
2. Epicarp
3. Endocarp
4. Testa
5. Nuclear tissue
6. Aleurone (innermost layer)

The fourth layer "Testa" comprises the colouring matter which decides the colour of wheat and also influences colour of flour." Aleurone" the sixth layer has a softening effect on flour proteins and contains protease enzyme. Bran is rich in dietary fiber and thus helps in digestion.

Endosperm:

Endosperm consists of 83% of the kernel weight. It is the largest part of the kernel and primary site of starch and protein storage. It is also a source of soluble fat. It has 60-80% of starch and 5-15% of proteins. Endosperm is the major source of white flour.

Germ:

Germ comprises of 2.5% of kernel weight. It is the sprouting or embryo section of the seed. It contains great deal of b-complex vitamin and trace minerals. It is often separated from flour due to its fat content (10%) which limits the shelf life of the product.

Wheat can also be classified into soft wheat and hard wheat.

A. Soft Wheat

1. Less WAP
2. Less protein content
3. Poor mixing capacity

B. Hard Wheat

1. More WAP
2. More protein content
3. Good mixing capacity

Exercise

Activity:-

Q 1) What is a kernel?

Q 2) Name the major parts of wheat?

Q 3) What is bran?

Q 4) What are Testa and Aleurone?

Q 5) Draw a longitudinal section of wheat grain?

Q 6) Differentiate between hard wheat and soft wheat?