

plant proteins

Dr. Howaida Nounou

Leaf proteins

- **Functions of leaves:** photosynthesis (occurs in chloroplast)
- Most proteins in leaves are involved in light & dark reactions .
- **Stroma** contains the enzymes of CO₂ fixation (dark reactions) & enzymes of starch metabolism, fatty acids and chlorophyll synthesis .

Rubisco :

- the regulatory enzyme of the dark reactions .
- the most important enzyme found in the stroma .
- made up of regulatory & catalytic subunits . (multi subunit protein complex) .

Proteins in the thylakoid membranes :

I. Extrinsic (peripheral) proteins :

1. the most important is Cytochrome F1
2. Ferredoxin – ANDP^+ oxidoreductase

II. Integral (intrinsic) proteins:

Cytochrome F0

The chlorophyll proteins :

- **30 % of chlorophyll a and almost all of chlorophyll b** are present as light harvesting complexes **in PS II** .
 - * The chlorophyll molecules are bound to **poly- peptides in the thylakoid membrane** .
 - * **15 % of chlorophyll a** is bound to **another polypeptide present in the reaction center of PS I**

Seed proteins:

- provide nitrogen and amino acids for germinating seedling and a rich source of proteins for animals & humans.

Seed proteins :

- they mainly Function as enzymes, structural proteins and storage proteins .
- they are present only in the seed , not in any other part (not even in seed coat)
- **In cereals;**
- **70 % of proteins** is **gluten** which is made up of equal amounts of **prolamines & glutelin** .
- **30 % of proteins** is made up of **albumin & globulin**

- **In wheat;**
- Prolamine is called **Gliadin** (major storage protein)
- Glutelin is called **Glutenin**
- Both **Gliadin and Glutenin** make **gluten complex**
- In wheat **prolamines** may cause **allergic reactions** (sneezing-inflammation)
- **Prolamines** (storage proteins of cereals) are rich in **Glutamine** (Gln) and **proline** (Pro)

Wheat:

Triticum durum is hard variety that make macaroni and spaghetti hard (high content of prolamines)

Triticum aestivum is the protein of bread

- **legume seeds;**
- About **80 % is albumin & globulin**
- **In non-leguminous** dicotyledons especially oil rich seeds, the major protein is **globulin**

- **castor oil;**
- Ricin is the protein, it is toxic in large amounts.
- **Maize;**
- High content of **prolamines** (60%) called **zein**
- **Zein = Gln + Leu + ala + pro**
- **Zein is deficient in lysine and tryptophan (essential amino acids)**

- **Barely** (Hordeum Vulgare);
- It contains **Hordein** protein (50%)
- **Oats** (Avena Sativa);
The major protein is **globulin**
- **French beans** (phaseolus vulgaris);
the major protein is **globulin**
- **Peas;**
- Contains **90% legumin and vicilin**

- **Soya beans;**
- Major protein is **Glycine max** when ultracentrifugated three different **fractions sediment** at different rates (at sedimentation coefficients 25.75.115)
- 25 Fraction : α -conglycinin
- 75 Fraction : B & γ conglycinin
- 115 Fraction : glycinin (major storage protein) .