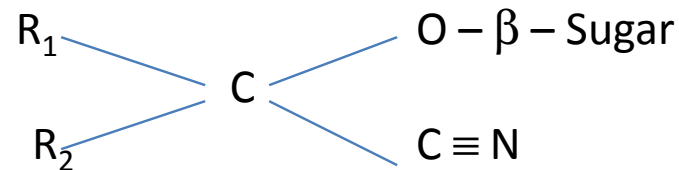


Cyanogenic Glycosidic

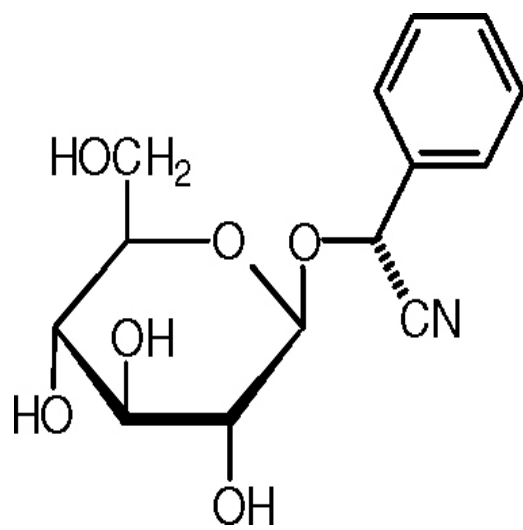
Dr. Howaida Nounou

- Nitrogen- containing compounds produced by plants are carbohydrate derivatives of cyanohydrins (CHO – CN) .

- General formula:



- There are ≈ 20 cyanogenic glycosides .
- **Sugar** residue is always β - glucose linked by β - glucosyl linkage .
- **R₁** is \rightarrow aliphatic a.a **e.g.** valine, leucine, and isoleucine
or \rightarrow aromatic a.a **e.g.** phenylalanine or tyrosine
- **R₂** is H in majority of cases.
- **Classification** of the 20 cyanogenic glycosides is **based on the amino acid** (R₁) .
- They are widely spread in families Rosaceae, feguminosae and gramineae.

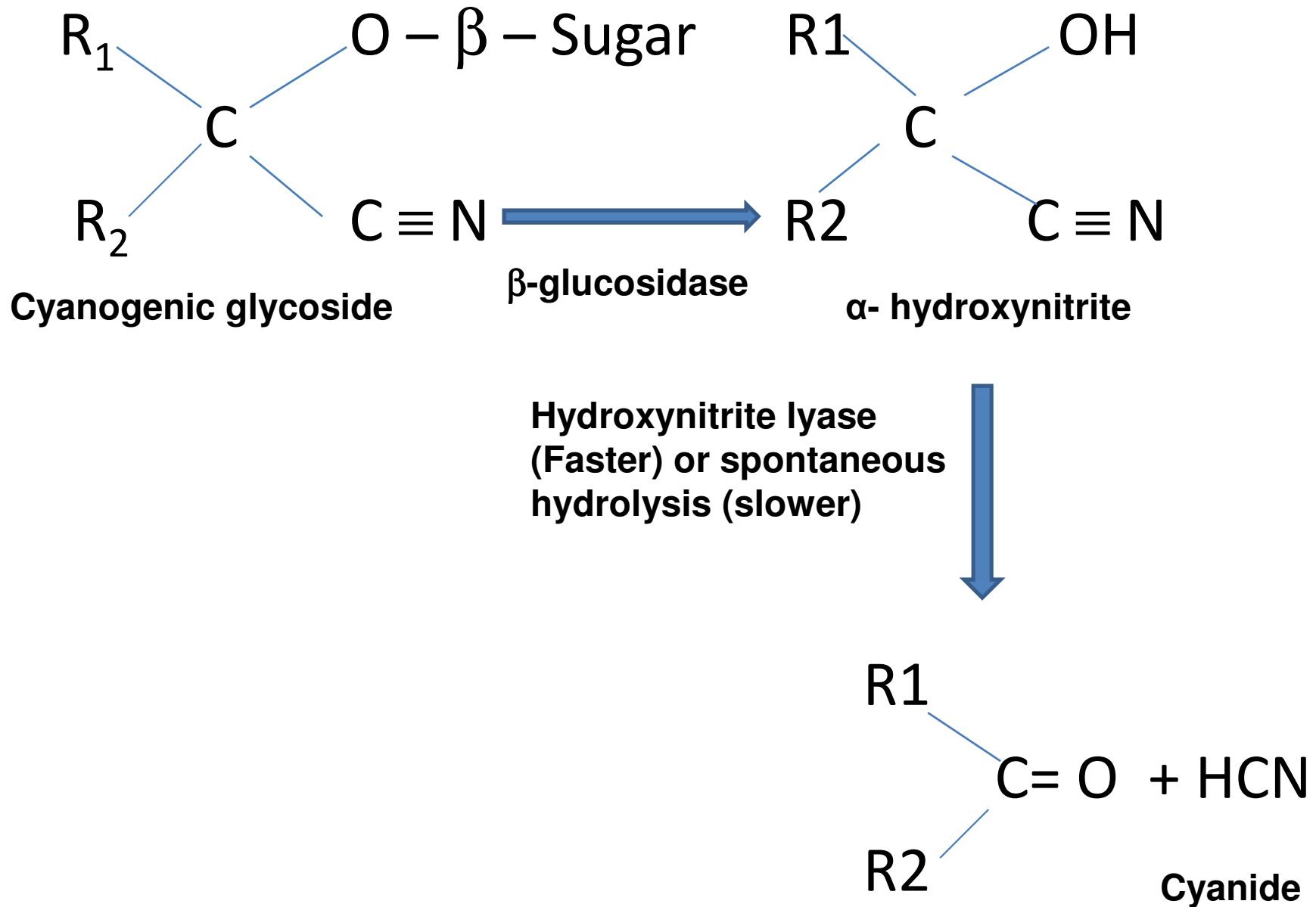


Catabolism of cyanogenic glycosides :

1- When plant tissues are **crushed**, the glycosides released from the vacuoles \rightarrow come in contact with β -glucosidase which remove the sugar.

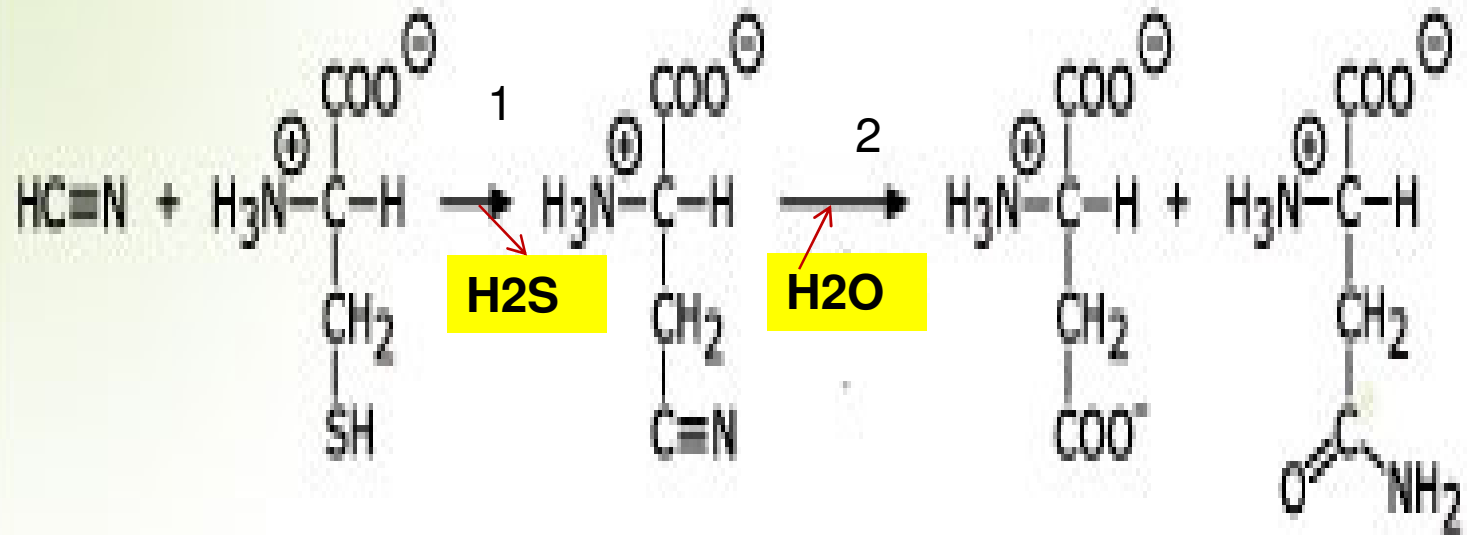
Cyanogenic glycoside \longrightarrow α - hydroxynitrite

2- Hydrolysis by hydroxynitrile lyase (faster) or spontaneous hydrolysis (slower) release cyanide (HCN) which protect the plants from animals by inhibiting the respiratory chain in animals (chelates copper from cytochrome oxidase)



In intact cyanogenic glycoside producing plants (intact cyanophores) → enzymatic liberation of HCN occurs also, but at much slower rate so cyanide in this case → fixed efficiently into asparagine by 2 enzymes :

- 1- **β -cyanoalanine synthase** → which use cysteine as second substrate and liberate H₂S
- 2- **β -cyano-alanine hydrolase: give asparagine**



cyanide

L-cysteine

3-cyano-L-alanine
(a nitrile)

L-aspartic
acid

L-asparagine