Kavya Jere

Fruit Juice cell Wall degrading Enzymes for liquefaction

* Juice extracted from a wide variety of fruits such as apples, pears, mango and berries is used to produce natural beverages.
* This can be done simply by squeezing the fruits but it is more common to use enzymes to increase the volume of juice produced & the speed of extraction.
* Extraction processes depend upon following parameters
  i) Type of fruit
  ii) Age of fruit
  iii) Maturity of fruit

* Role of Enzymes in juice processing

* Extraction involves maceration (a process of softening tissues by soaking in liquid) followed by pressing to separate the juice from the solids.
* Enzymes can play a key role in these processes in order to, * Improve yield
  * clarify the juice
  * Stability
* Enzymes break down cell walls within the fruits and release liquids and sugars.

* Pectinases in combination with other carbohydrates degrading enzymes, especially cellulases, are useful in breaking fruit tissues to release more juice

* Enzymatic maceration can result in extraction of more than 95% of the soluble solids from the fruit.

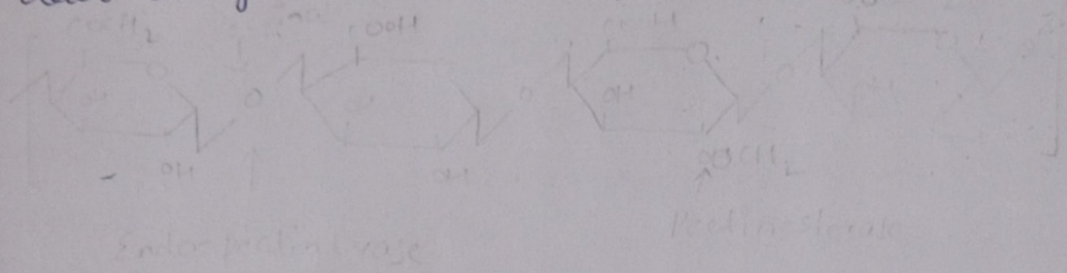
* Enzymes are also used to clarify & stabilize the juice by degrading soluble pectins and starches that would cause haze

* <u>Cell wall</u>

* Affects the extraction of juice
* Provides structure & rigidity to pulp
* Fruit is made up of cells linked by middle lamellae which contain insoluble proto- pectins
* Pectinases break down the pectin chains & therefore reduce their binding action.
* Cell wall mainly consists of
i) Pectin ii) Cellulose
iii) Hemicellulose iv) Lignin & other components

Enzymes used in fruit Processing

1) Pectinases
* Break pectin into simpler units
* clear the juice and more yield is obtained



Types of Pectinases
* Polygalacturonase 2) Pectin lyase
3) Pectin methylesterase

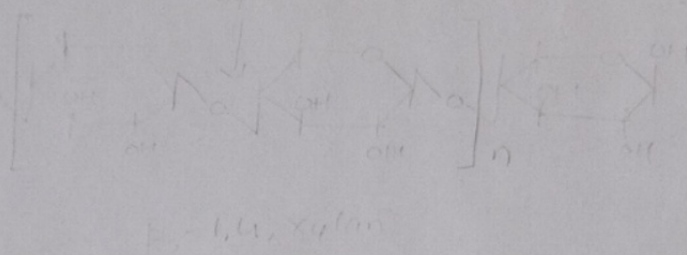
* Native Pectic Enzymes

* Apples and grapes contain pectic enzymes which can lead to spontaneous clarification of the juices and wines if they are permitted to stand for a considerable length of time.
* Significant amount of polygalacturonase and pectin methylesterase are found in apple juice.

2) Cellulase
* cellulose is a polymer of β-(1-4)-D-glycopyranosyl units
* Responsible for the cloudiness in juices.
* Cellulose is the enzyme used to degrade the cellulose in order to clarify the juice.

3> Hemicellulose (Xylanase)

Mixture of hydrolytic enzymes including xylan endo-1,3-b-xylosidase, xylan 1,4-b-xylosidase, and a-L-arabinofuranosidase presence is encouraged in order to reduce hemicellulose levels



4) Amylase

* The amylases hydrolyze the glycosidic linkages in polyglucans
* combine action of amylases on polysaccharides reduces the viscosity

*Glucose oxidase

* During juice processing a considerable air is dissolved in the juice resulting in formation of foam
* It is undesirable because it reduces the shelf life
* GO is used for the removal of oxygen from fruit juices & soft drinks