

FACULTY OF ENGINEERING &TECHNOLOGY DEPARTMENT OF BIOTECHNOLOGY

SELECTABLE MARKERS

- A **selectable marker** is a gene introduced into a cell, especially a bacterium or to cells in culture, that confers a trait suitable for artificial selection.
- This element is required for the maintenance of the plasmid in the cell.
- ➤ Due to the presence of the selective marker, the plasmid becomes useful for the cell.
- ➤ Under the selective conditions, only cells that contain plasmids with the appropriate selectable marker can survive.
- >Genes that confer resistance to various antibiotics are used as selective markers in cloning vectors.
- > The drawbacks of this approach are:
- 1. loss of selective pressure as a result of antibiotics degradation and inactivation.
- **2.** contamination of the product or biomass by antibiotics, which may be unacceptable from medical or regulatory considerations.

Examples of selectable markers include:

- ➤ Beta-lactamase which confers ampicillin resistance to bacterial hosts.
- ➤ Neo gene from Tn5, which confers resistance to kanamycin in bacteria and geneticin in eukaryotic cells.
- Mutant Fabl gene (mFabl) from E. coli genome, which confers triclosan resistance to the host.
- ➤ URA3, an orotidine-5' phosphate decarboxylase from yeast is a positive and negative selectable marker.
- It is required for uracil biosynthesis and can complement *ura3* mutants that are auxotrophic for uracil (positive selection).
- ➤ The enzyme URA3 also converts 5-fluoroorotic acid (5FOA) into the toxic compound 5-fluorouracil, so any cells carrying the *URA3* gene will be killed in the presence of 5FOA (negative selection).