

**The first step is to perform mutagenesis.** A variety of mutagens can be used, but some mutagens may be preferred over others for certain characteristics or microorganism species.

**Strains with desirable characteristics must then be selected.** This can be achieved through the use of inhibitors, stressors and assessment of visual characteristics.

**Finally, potentially optimized strains should be tested** to assess their properties and the stability of the new traits.

## Introduction

The single-cell oil (SCO) and carotenoids are an alternative to oil of plant and animal origin and to pigment of plant and synthetic origin, respectively. These cellular components of microorganisms can be used in the food, aquaculture and livestock feed, pharmaceutical, and cosmetic industries.

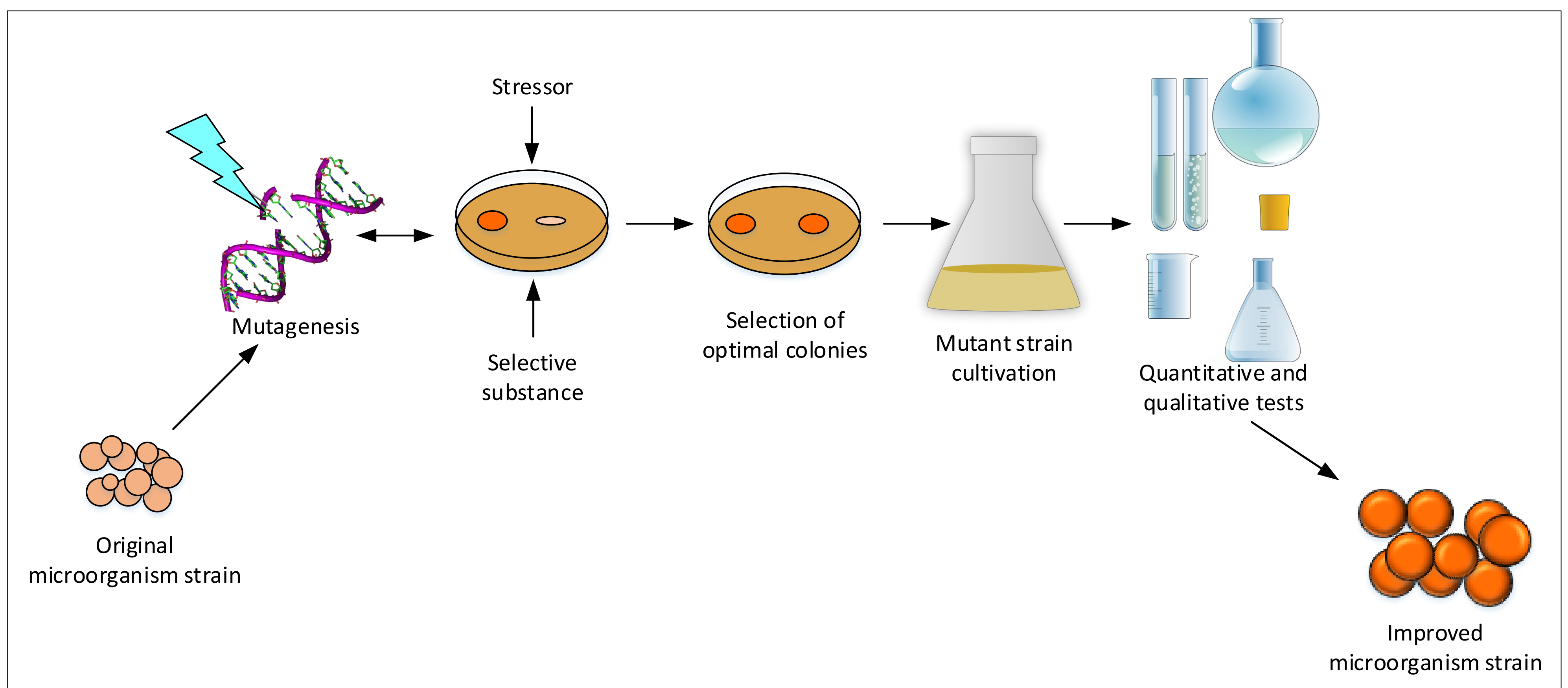
Microorganisms-based technologies have not found ubiquitous practice due to a number of limitations. One of them is the threshold of the oil and carotenoids content in the biomass of microorganisms due to their nature. Therefore, the development of the fast-growing strains with a high level of these product accumulation is required.

## Mutagenesis and selection strategies

For random mutagenesis mutagens such as UV-radiation, EMS, MNNG and others can be used. One type of mutagen may be more effective than another for certain microorganisms or characteristics.

After mutagenesis, different strategies must be applied to select a strain with optimized properties. Fatty acid inhibitors such as cerulenin, triclosan and isoniazid can be used to select an overproducing SCO strain.

For the carotenoid overproducing strain inhibitors such as  $\beta$ -ionone, antimycin A and DPA can be used. An optimized strain can also be selected by applying stressors.



Creation of mutant strains with preferable properties