

# **To Reduce Global Hunger, We Need To Take Better Care Of The Food Resources Of The World**

Even though nowadays more food is produced in the world than ever before, global hunger remains a problem and the number of malnourished people keeps increasing. Could part of the solution be new techniques to help fruit and vegetables stay fresh all the way to our plates instead of ending their lives in the waste?

The aim of this project was to improve the survival rate of arugula leaves during freezing and subsequent thawing, which is a common way of preserving food but can be difficult to apply to plants. Two methods were used together to achieve this goal: Vacuum Impregnation and Pulsed Electric Fields treatment.

Vacuum Impregnation involves using a vacuum to expel gas from inside an object, creating free space which is then filled with a substance of our choice. This was used to fill the space between the cells of the leaves with substances that were thought to be helpful with surviving and recovering from freezing.

Pulsed Electric Fields (PEF) treatment, meanwhile, is the process of applying short electrical shocks to organic tissue. This causes the formation of pores within the cells of said tissue. The pores then serve as an easy pathway between the inside and the outside of the cell.

When used together these two methods helped get the chosen substances into spaces directly within the cell.

The combination of these two pre-treatment methods has been used to great effect to impregnate vegetable food products with cryoprotectants, which served to mitigate some of the more harmful effects of freezing and thawing. But using too much cryoprotectant can result in spoiling the taste of the product, while the application of pulsed electric fields and subsequent freezing/thawing causes stress to the cells of the organism, making it hard for them to recover. The introduction of certain substances into the solution which the leaves were impregnated with could help remedy this and increase the survival rate of the leaves.

Results showed that increasing the concentration of the cryoprotectant to a certain threshold helped improve the survival rate of the leaves without affecting the taste and adding the additional substances in specific concentrations further improved the results.