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# Natural preservatives minimizing products waste in the supply chain of the future

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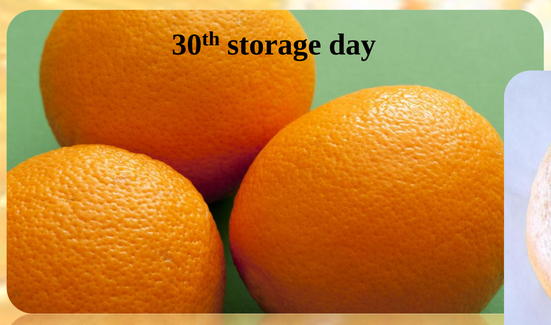
The global population is expected to increase from 7.3 billion in 2015 to around 9 billion by 2050. As a result world demand for food is expected to be 70% higher in 2050 compared to 2015, mostly in developing and emerging economies in Asia.

## Research Goals:

Reducing chemical preservatives
maintaining the nutritional and sensorial properties
increasing the shelf-life

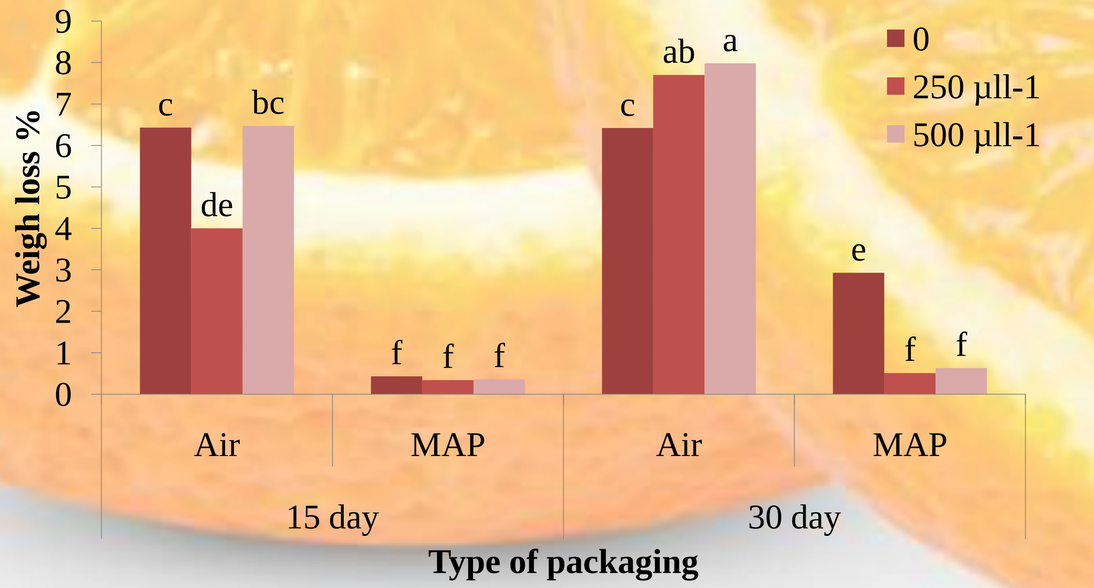
## Material &Methods:

Essential oils resource (0, 250 and 500 µll$^{-1}$) :
Sour orange old leaves
Sour lemon peels
Iranian native citrus (*C. sinensis*) treated and hold in passive MAP condition 30 days in 4 ◦C




500 µll$^{-1}$ Sour orange oils treatment


Left: control
Right: 250 µll$^{-1}$ Sour lemon oils treatment




The effect of Sour orange oil treatment, storage time and type of packaging on the weight loss percentage

**Essential oils** are a good source of several bioactive compounds, which possess antioxidative and antimicrobial properties; they can extract from different non-edible parts of plants; which are considered as **agricultural wastes**.

It was found that all treatments have significant effects on various parameters of citrus fruit. Independent of treatments, total sugars and organic acids decreased continuously with increasing storage duration.

Packaging provided protection against weight loss and loss of firmness; although delaying the rate of color change in compare to control was observed with high concentration of sour orange oils.

Regarding antifungal activity, the results were satisfactory against gray and green mold growth which varied significantly ($p < 0.05$) with respect to concentration

Efficient use of natural preservatives has an important role on prevention of losses in supply chain.

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