vacuum impregnation to modify health-promoting properties of apples cv. Granny Smith (disk-shaped samples)

Raw Material	Composition of Vacuum Impregnation Solutions	Process Parameters	Effect
apples cv. Granny Smith (disk-shaped samples)	mandarin juice (pH 5, 8–6, 0) with an addition of *Lactobacillus salivarius* (*Salivarius* spp.)	*p*1 5 kPa *t*1 10 min *t*2 10 min	after vacuum impregnation: 1.51·108 CFU/g *Lactobacillus salivarius* spp. *Salivarius*; the highest microbial content: after 24 h incubation period, pH 6

Flow Chart

apples cv.Granny Smith(disk-shaped samples) Introduced into Vacuum Chamber

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Hydrodynamic Mechanism (HDM) Vacuum Chamber at – p1 5kPa time period t1=10 min

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Mandarin juice (pH 5, 8–6, 0) with an addition of *Lactobacillus salivarius* (*Salivarius* spp.)

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Deformation Relaxation Phenomenon(DRP) Vacuum Chamber at atmospheric pressure Time period *t*2= 10 min

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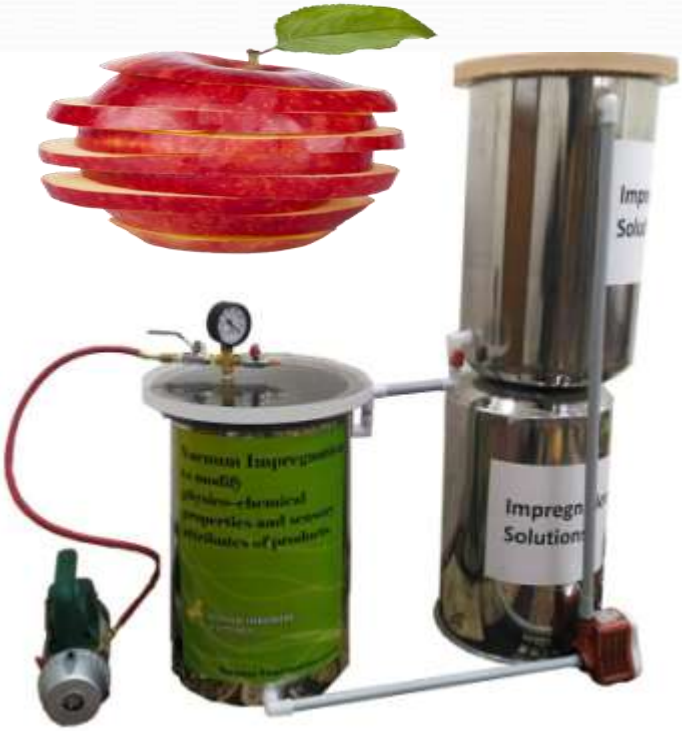
After vacuum impregnation: 1.51·108 CFU/g *Lactobacillus salivarius* spp. *Salivarius*; the highest microbial content: after 24 h incubation period, pH 6

Vacuum Impregnation Setup



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Result:

After vacuum impregnation:1.51·108 CFU/g Lactobacillus salivarius spp. Salivarius; the highest microbial content: after 24 h incubation period, pH 6. Vacuum impregnated apple slices were air dried, freeze-dried and dried in a process combining air drying and radiant energy vacuum drying. Initially, the L. rhamnosus population in apple slices tissue after impregnation was at 109 CFU/g. The freeze-drying process was most effective in protecting bacteria in comparison to the other two drying methods, reducing then microbial population by 1.1 log. In turn, a combination of air drying and radiant energy vacuum drying resulted in a smaller reduction of the level of microorganisms during room temperature storage in enriched apple snacks. Additionally, in a study by Betoret et al. (2009), a combination of vacuum impregnation and drying provided a probiotic fruit product containing microorganisms at a level comparable to that in probiotic dairy products.

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