

# Some studies on prickly pear fruits "process and uses"

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Prickly pear (*Opuntia ficus indica*) have been grown in Egypt for many years ago, especially in sandy areas. So, the production of prickly pear fruits increased in recent years due to the increase in production area. The prickly pear fruits are also very susceptible to microbial spoilage because of the low acids and high sugar content of the pulp so that the storage life of the fruit in the fresh state is limited and the available research on prickly pear still very little and the limited consumption still as a fresh fruits. Thus this study was planned to study the following points: 1-To study the chemical composition of prickly pear pulp and freezing effect and storage at  $-18^{\circ}\text{C}$  on the chemical composition, microbiological and sensory evaluation. 2-Determination of D and Z values of pectin methylesterase enzyme and evaluation of the thermal processing. 3-Study the possibility of producing some products from the prickly pear pulp such as juice (Nectars) and concentrated prickly pear. 4-To study the rheological properties and effect of temperature on pulp, juice and concentrates of prickly pears. The obtained results are as following: Summary 111 Part I: Frozen storage of prickly pear pulp: 1-General and approximate chemical composition of prickly pear fruits: The general composition of prickly pear fruits was 56.88% pulp, 38.4% peels and 4.72% seeds, while the proximate chemical composition of prickly pear pulp was 86.79, 0.75, 0.32, 0.38, 0.44 and 11.32% for moisture, crude protein, ether extract, crude fiber, ash and total carbohydrate, respectively. 2-Chemical composition of raw prickly pear pulp: Chemical composition of prickly pear pulp for total solids; total soluble solids ( $^{\circ}\text{Brix}$ ), acidity (as citric), pH value, total sugars, reducing sugars and non-reducing sugars were 13.21%, 11.53 $^{\circ}\text{Brix}$ , 0.072%, 5.72; 10.86%; 10.75% and 0.110%, respectively. Ascorbic acid (Vit. C) carotenoids, the total pectic substances, water soluble pectin, ammonium oxalate soluble pectin, acid soluble pectin and sugar/acidity ratio were 13.7 mg/100g, 0.83 mg/kg, 0.49%, 0.11%, 0.31%, 0.07% and 150.83, respectively. Mineral contents of prickly pear pulp were calcium (Ca) 333.0, magnesium (Mg) 183.6, phosphorus (P) 134.9, sodium (Na) 80.3, potassium (K) 838.9 iron (Fe) 6.43 and copper (Cu) 0.184, mg/kg of prickly pear pulp. 3-Microbiological load of raw prickly pear pulp: The total plate count, gram negative, total coliform and *E. coli* of prickly pear pulp determined by the normal methods were  $5.4 \times 10^4$ ,  $3.2 \times 10^4$ ,  $1.8 \times 10^3$  and  $3.9 \times 10^2$  cfu/g, respectively. Also the same analysis as carried out by the Four Culture Methods Summary 112 (FCM) were  $8.1 \times 10^4$ ,  $1.02 \times 10^4$ ,  $2.56 \times 10^3$  and  $3.2 \times 10^2$  cfu/g, respectively. The Count of yeasts and molds by normal methods was  $1.15 \times 10^3$  cfu/g. 4- Effect of pasteurization, freezing and storage at  $-18^{\circ}\text{C}$  on the chemical composition of prickly pear pulp: Pasteurization of prickly pear pulp at  $85^{\circ}\text{C}/3$  min reduced moisture content from 86.79 to 85.84%, while the ether extract, protein, crude fiber, ash and total carbohydrate were increased slightly after pasteurization. On the other hand, after 12 months of frozen storage, the same components were slightly reduced except carbohydrates which were increased. The pH value decreased slightly from 5.7 to 5.52, while acidity increased from 0.074% to 0.081% (as citric acid) after 12 months of storage period. The total solids and total soluble solids were 14.16 and 12.65 at the beginning of storage and were increased at the end of storage period to 14.98% and 13.32 $^{\circ}\text{Brix}$ , respectively. Vitamin C content of PP pulp was 13.70 mg/100 g and it was reduced to 4.91 mg/100 g after pasteurization. Also, carotenoids content reduced from 0.83 to 0.74 mg/kg, respectively. Vitamin C was decreased to 1.10 mg/100 g and carotenoids content were decreased to 0.58 mg/kg after 2 months storage period. The total

sugar, reducing sugar and non reducing sugar were decreased at the end of frozen storage. Mineral content for calcium, magnesium and phosphorus of PP pulp were increased after pasteurization to 356.2, 196.4 and 148.7 mg/kg. Also, sodium, potassium, iron and copper, changed to 83.17, 888.1, 6.75 and 0.193, mg/kg after pasteurization, respectively.