Effect Of Drying Method On Husk Tomatoes 
(*Physalis Peruviana* Linn) Quality

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**ABSTRACT**

The aim of this study was to evaluate the influence of both oven and solar drying on chemical composition (moisture, ash, protein, fat, fiber and carbohydrates), pH, total acidity, antioxidant contents (vitamin C and total carotenoids), antioxidant effect by using DPPH (1,1-diphenyl-2-picrylhydrazyl) radical scavenging activity, colour and organoleptic evaluation of husk tomatoes (HT) fruits. The obtained results indicated that both fresh and dried husk tomatoes fruits is considered as a good source of ash and crude fibers. The results showed that husk tomatoes fruits in either fresh or drying had a rich source of vitamin C and carotenoids and also it has an antioxidant activity by using DPPH. Color of fresh husk tomatoes fruits was recorded the highest value, followed by solar dried and oven dried. It could be concluded that both fresh and drying husk tomatoes fruits recorded highly acceptable score of color, taste, odor, texture and overall acceptability score by the panelists and solar drying showed the best results than oven drying.

**Keywords:** Husk tomatoes; solar drying; oven drying; drying methods and sensory properties.
INTRODUCTION

Husk tomatoes (P. peruviana Linn., family Solanaceae) has been mature in Bharat, Egypt, Republic of South Africa, New-Zealand, Australia and nice Great Britain (Ramadan and Moersel, 2003). Berries are shown to supply vital health advantages attributable to their high antioxidants, vitamins, minerals and fiber (Zhao, 2007).

Husk tomatoes, is thought as “Güvey Feneri” in Turkey, “Uvilla” and “Topotopo” in South American country and “Golden Berry” in English speaking countries (Puente et al., 2011). Additionally named as gooseberry, husk tomato, and winter cherry fruits (Mericli, 2011).

Generally, the fruit of husk tomatoes is consumed recent that provides Associate in Nursing acid-sweet balance of fruit and vegetable salads. Also, the full fruit will be utilized in sweetening and dried because it becomes a very nice raisin. The fruit of husk tomatoes is also used in sauces and glazes for meats and food. Also it can be used as preservative for jams and jellies (National Research Council (NRC), 1989 and Puente et al., 2011).

Currently, there are different products processed for the fruit of husk tomatoes, such as, jams, raisins and chocolate-covered candies. It can also be processed for juice Ramadan and Moersel (2007), pomace Ramadan and Moersel (2009) and other products sweetened with sugar as a snack. In European markets, it is used as ornaments in meals, salads, desserts and cakes Cedeño and Montenegro (2004).

The benefits associated to cape gooseberry are mainly due to its nutritional composition as well as to the presence of its bioactive components (Hassanien, 2011).

Consumption of Physalis in recent kind is restricted thanks to restricted post-harvest life as a result of it is high catalyst activity, that promotes its fast darkening, particularly when mechanical injury throughout transport and storage Bravo and Dsorio (2016).

Therefore, thanks to its high content of phytochemicals, husk tomato lends itself to the assembly of variety of processed products, in particular, dehydrated products. Dehydration is one in all the foremost necessary unit operations utilized in formulation of a practical nutrient (Oliveira et al., 2008).

Dominant the moisture content beneath important level that inhibits and/or slows down the organic chemistry and microbiological activities is one in all the simplest ways that for food preservation. One
in all them is drying, being a thermal treatment applied by makers to an oversized extent of food materials to enhance their shelf-lives, since food material is receptive microbial spoilage and undesirable organic chemistry changes (Esturk, 2012). Drying processes gain high importance (Doymaz et al., 2015) and recently, the assembly of fruit within the dehydrated kind to consume as a snack. The fruit contains β-carotene (provitamin A), phosphorus, iron, potassium, zinc, calcium, fatty acids (linoleic, oleic, palmitic and lipide acids), vitamin C (ascorbic acid) and polyphenols, the latter confer inhibitor activity. Additionally, husk tomato is a remarkable supply of dietary fibre that acts as a bulking agent, normalizing intestinal motility and preventing diverticular disease among different diseases. The husk tomatoes has received augmented interest worldwide thanks to its biological process composition and therefore the presence of biologically active compounds that give health benefits and scale back the risks of sure diseases such as cancer, malaria, asthma, hepatitis, eczema and rheumatism (Salazar et al., 2008, Borchani et al., 2011 and Ocampo et al., 2017).

So, this study aimed to evaluate the effect of both oven and solar drying on chemical composition, pH, total acidity, antioxidant contents (vitamin C and total carotenoids), antioxidant effect by using DPPH radical scavenging activity, colour and organoleptic evaluation of husk tomatoes fruit.

MATERIALS AND METHODS

MATERIALS

The husk tomatoes (Physalis peruviana Linn) were obtained from local farm at Valley Al Natron, Alexandria way Desert, Desert Research Center - Egypt, sodium hydroxide, sodium metabisulphite purchased from El- Gamhoria Pharmaceutical Chemical, E- Ameriea, Cairo, Egypt.
METHODS

Drying procedure:

The husk tomatoes was brought to the laboratory within 24 hour of harvesting. The samples were selected and washed in clean water and divided in six group samples and refrigerated until the drying process. The moisture content of the fresh husk tomatoes fruits was immediately determined. Using two drying systems, first fixed the three treatment of solar drying and carried out to the National Research Centre, using Solar Power Plant, Solar Energy Department, Engineering Research Division, and husk tomatoes was dried at 50°C for four days. Another three treatment for oven drying was done at 50 To 55°C for 24 hours. After drying samples were stored packed in polyethylene plastic bags at the room temperature until analyses.

Samples of Solar drying were divided into 3 different treatments as the following:

T 1(HT): 1KG of husk tomatoes without treatment as control.

T 2(HT, NaOH): 1KG of husk tomatoes soaked in solution (distilled water + 0.2 % NaOH) / 1 min then washing by water.

T 3 (HT, MET): 1KG of husk tomatoes soaked in solution(distilled water + 0.2 % NaOH)/ 1 min then washing by water, then put in solution(distilled water + 0.1 % sodium metbisulphite)/ 5 min then washing by water.

Samples of oven drying were divided into 3 different treatments as the following:

T 1(HT): 1KG of husk tomatoes without treatment, drying at 50 To 55°C as control.

T 2(HT, NaOH): 1KG of husk tomatoes soaked in solution(distilled water + 0.2 % NaOH)/ 1 min then washing by water, drying at 50 To 55°C.

T 3(HT, MET): 1KG of husk tomatoes soaked in solution(distilled water + 0.2 % NaOH)/ 1 min then washing by water, then put in solution(distilled water + 0.1 % sodium metbisulphite)/ 5 min then washing by water and drying at 50 To 55°C.
Chemical Analysis:

Moisture, fat, total protein, fiber and ash were determined according to the A.O.A.C, (2005). The carbohydrates content was calculated by difference.

The pH was determined using digital pH meter, total acidity was determined according to A.O.A.C, (2010). Reducing sugars content was determined according to Holme and Peck, (1983). Vitamin C was determined according to Brubacher et al., (1985). Consistency was measured using viscometer, V60002, FFUNGILAB, Spain (Spindle R7) 100 rpm, torque was maintained at 100%. Total carotenoids were determined according to Lichtenthaler and Wellburn, (1985). Husk tomatoes (HT) samples were analyzed for DPPH according to the methods described by Aromatic et al., (2013). Estimation of antioxidant activities of fixed and volatile oils extracted from aromatic clove, using Spectrophotometer Laboratory Instrument “Thermo Scientific Heryios “.

Color was measured by Chroma meter (Konica Minolta, model CR 410, Japan) calibrated with a white plate and light trap supplied by the manufacturer at Cairo University Research Park (CURP), Faculty of Agriculture, Cairo University. Color was expressed using the CIE L, a, and b color system (CIE, 1976). A total of three spectral readings were taken for each sample. Lightness (L*) (dark to light), the redness (a*) values (reddish to greenish). The Yellowness (b*) value (yellowish to bluish) was estimated.

Sensory evaluation:

The sensory properties (Color, taste, texture and overall acceptability), of husk tomatoes were judged by ten experienced panelists from stuff members of Dessert Research Centre according to A.A.C.C. (2000).

Statistical analysis:

All analyses were performed in triplicate and data reported as mean ± standard deviation (SD). Data were subjected to analysis of variance (ANOVA). All tests were conducted at the 5% significant level. Statistics,”SPSS” (1998), version 20.
RESULTS AND DISCUSSION

The effects of the drying method on chemical composition of husk tomatoes (HT) fruits:

Data in Table (1) showed that chemical composition of dried husk tomatoes HT fruits. Fresh HT contained of 79.75% as moisture, 1.09% as ash, 1.15% as protein, 0.23% as fat, 2.02% as fiber, 72.37% as t.carbohydrates and 1.89% as t.acidity. While, Chemical composition of solar drying of husk tomatoes moisture was ranged from 11.02 to 12.65, protein from 17.21 to 18.21, fat from 5.23 to 6.24, fiber from 13.54 to 16.66, t.carbohydrates from 71.12 to 71.96 and total acidity from 0.09 to 0.21. Meanwhile, oven drying of husk tomatoes moisture ranged from 12.043 to 12.69, protein from 17.18 to 18.81, fat from 6.16 to 6.93, fiber from 17.69 to 22.23, t.carbohydrates from 68.43 to 71.41 and total acidity from 0.14 to 0.23(g/100g), respectively. On the other hand, pH value of dried solar energy of husk tomatoes fruits ranged from 3.84 to 3.87 and oven dried husk tomatoes ranged from 3.76 to 3.98.

Table (1): The effects of the drying method on chemical composition of husk tomatoes (HT) fruits.

<table>
<thead>
<tr>
<th>Physical properties</th>
<th>Fresh Husk tomatoes</th>
<th>Drying method</th>
<th>Solar drying</th>
<th>Oven drying</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>T1</td>
<td>T2</td>
<td>T3</td>
<td>T1</td>
</tr>
<tr>
<td>Moisture (%)</td>
<td>79.8±1.6</td>
<td>12.7±0.01</td>
<td>11.0±0.01</td>
<td>11.2±0.01</td>
</tr>
<tr>
<td>Ash (%)</td>
<td>1.1±0.01</td>
<td>4.6±0.02</td>
<td>5.7±0.01</td>
<td>5.1±0.02</td>
</tr>
<tr>
<td>Protein (%)</td>
<td>1.2±0.1</td>
<td>18.2±0.9</td>
<td>17.2±0.97</td>
<td>17.1±1.65</td>
</tr>
<tr>
<td>Fat (%)</td>
<td>0.2±0.1</td>
<td>5.2±1.8</td>
<td>5.9±0.19</td>
<td>6.2±1.61</td>
</tr>
<tr>
<td>Fiber (%)</td>
<td>2.0±0.2</td>
<td>13.5±1.6</td>
<td>14.6±1.45</td>
<td>16.7±1.59</td>
</tr>
<tr>
<td>T.CHO (%)</td>
<td>72.4±5.6</td>
<td>71.9±0.4</td>
<td>71.1±0.31</td>
<td>71.4±0.67</td>
</tr>
<tr>
<td>T. acidity</td>
<td>1.9±0.2</td>
<td>0.3±0.1</td>
<td>0.1±0.07</td>
<td>0.2±0.07</td>
</tr>
<tr>
<td>PH</td>
<td>3.7±0.2</td>
<td>3.8±0.0</td>
<td>3.9±0.02</td>
<td>3.9±0.01</td>
</tr>
</tbody>
</table>

For protein, there is no significant difference among T2,T3 in solar drying. The same result was observed in oven drying between T1, T2. In case of fat there were significant between all treatments. For fiber the best treatment was observed in T1, T3 in oven drying and showed significant difference compared with all treatments. In case T.CHO(%) there is no significant among all treatments.
These results are in agreement with those obtained by Moustufa (2002) and USDA (2006) Who concluded that both fresh and dried husk tomatoes is considered as a good source of ash and crude fibers.  

**The effects of the drying method on antioxidant and DPPH content of husk tomatoes (HT) fruits:**  

The influence of drying methods on antioxidant content and DPPH radical scavenging activity % was shown in Table (2). The results showed that vitamin C of fresh HT the mean was 45.432 mg/100g. Solar drying of HT the mean value was ranged from 12.11 to 18.13, while it was from 10.54 to 16.45 in oven drying of HT. Solar energy of HT showed higher values of vitamin C than oven drying. In case of T. carotenoids, there is no significant difference among T2,T3 in solar drying, The same result was observed in oven drying between T1, T3, for DPPH, there is no significant difference among T1,T2 and T3 in solar drying, The same result was observed in oven drying between T2, T3.  

**Table (2): The effects of the drying method on antioxidant and DPPH.**

<table>
<thead>
<tr>
<th>Physical properties</th>
<th>Fresh Husk tomatoes</th>
<th>Drying method</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Solar drying</td>
<td>Oven drying</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>T1</td>
<td>T2</td>
<td>T3</td>
<td>T1</td>
</tr>
<tr>
<td>V.C (mg/100g)</td>
<td>45.43±1.23</td>
<td>18.1±0.02</td>
<td>14.76±0.02</td>
<td>12.11±0.01</td>
<td>16.39±0.02</td>
</tr>
<tr>
<td>T.carotenoids</td>
<td>5.7±1.01</td>
<td>21.0±0.17</td>
<td>14.29±0.08</td>
<td>16.35±0.14</td>
<td>18.82±0.11</td>
</tr>
<tr>
<td>DPPH% (RSA)</td>
<td>48.14±0.96</td>
<td>44.9±0.01</td>
<td>48.52±0.01</td>
<td>50.09±0.01</td>
<td>56.39±0.02</td>
</tr>
</tbody>
</table>

Solar drying.control=(T1), Solar drying. NaOH=(T2), Solar drying. sodium metabisulphite = (T3), oven drying.control=(T1), oven drying. NaOH= (T2), oven drying. sodium metabisulphite = (T3). Mean values in the same row followed by different letters are significantly different at p≤0.05.  

Ascorbic acid is widely distributed in fresh fruits and vegetables. It is classified as a soluble vitamin, which is the reason why it is abundant in fruits with water content that exceeds 50% (Gutiérrez et al., 2007). This would explain the high level of ascorbic acid (vitamin C) in the fruit of husk tomato. This vitamin plays an important role in human nutrition, including growth and maintenance of tissues, the production of neurotransmitters,
hormones and immune system responses. Vitamin C is an important dietary antioxidant, since it reduces the adverse effects of reactive oxygen and reactive nitrogen that can cause (Naidu, 2003).

It is evident from the results that total carotenoids of fresh HT was 5.7 µg/g. Solar energy of HT showed that total carotenoids of HT was ranged from 14.29 to 21.02 µg/g, meanwhile it was from 13.52 to 18.82 µg/g in oven drying HT.

Carotenoids prevent cancer is related to the antioxidant activity that deactivates free radicals generated in tissues (Castro et al., 2008).

Phenolics in fruits are of great interest owing to their important pharmacological properties (Meyer, 1999). Good amounts of phenolics were estimated in cape gooseberry juice, wherein the level of total phenols was 6.30 mg/100 g juice as caffeic acid equivalents (Ramadan and Möersel, 2007).

Results showed that DPPH of fresh HT was 48.135 mg/100g. Solar energy of HT showed that DPPH of HT was ranged from 44.997 to 50.09mg/100g, meanwhile it was from 46.41 to 56.39 mg/100g in oven drying HT.

The antioxidant activity of husk tomatoes fruits was assessed by means of a 1,1-diphenyl-2- picrylhydrazyl (DPPH) test. Fresh fruits caused reduction about 48.14% for the absorbance of DPPH radicals’ control solution. Phenolic are responsible for the antioxidant activity of juices and wines, while ascorbic acid plays a minor role in the antioxidant efficiency of juices (Rapisarda et al., 1999). Miller and Rice- Evans (1997) found the significant contributory role of phenols to the antioxidant activity of orange juice, even if vitamin C was the most abundant antioxidant. The presence of a good amount of phenolic compound in Husk tomatoes fruits, could contribute to the high level of antioxidant capacity.

The effects of drying method on color of husk tomatoes fruits:

Data in Table (3) showed that the effect of drying methods on color of husk tomatoes fruits. Mean color values of fresh and dried husk tomatoes chromatic parameters are shown in Table(3). Values of fresh husk tomatoes L*,a*,and b* were 50.75, 9.06, and 39.63, respectively.
Except for a*, the L* and b* coordinates exhibited significant differences between fresh and dehydrated samples (P ≤ 0.05).

Table (3): The effects of drying method on color of husk tomatoes fruits

<table>
<thead>
<tr>
<th>Color properties</th>
<th>Fresh Husk Tomatoes</th>
<th>Drying method</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Solar drying</td>
<td>Oven drying</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>T1</td>
<td>T2</td>
<td>T3</td>
<td>T1</td>
</tr>
<tr>
<td>L*</td>
<td>50.75* ± 1.2</td>
<td>37.85* ± 1.5</td>
<td>34.91* ± 0.8</td>
<td>35.63* ± 0.9</td>
<td>34.45* ± 0.2</td>
</tr>
<tr>
<td>a*</td>
<td>9.06* ± 0.9</td>
<td>8.66* ± 0.8</td>
<td>9.49* ± 0.5</td>
<td>9.93* ± 0.3</td>
<td>5.96* ± 0.2</td>
</tr>
<tr>
<td>b*</td>
<td>39.63* ± 1.6</td>
<td>12.59* ± 0.6</td>
<td>10.38* ± 0.6</td>
<td>14.24* ± 0.6</td>
<td>13.76* ± 0.5</td>
</tr>
</tbody>
</table>

Solar drying, control = (T1), Solar drying, NaOH = (T2), Solar drying, sodium metabisulphite = (T3), oven drying, control = (T1), oven drying, NaOH = (T2), oven drying, sodium metabisulphite = (T3). Mean values in the same row followed by different letters are significantly different at p ≤ 0.05. L*, brightness/darkness. a*, greeness/redness. b*, yellowness/blueness.

All treatments decreased brightness (L*), which indicates that fresh fruits had a bright color as well as high luminosity as compared with processed samples. There were reports showing that the higher the degree of browning, the lower the sample L* value (Prathapan et al., 2009).

Moreover, dehydrated physalis fruits become darker probably because of an extensive Maillard reaction (Vega-Gálvez et al., 2009). These chemical reactions are a consequence of reducing sugars and amino acids in the material being dehydrated (Perera, 2005). Some non-enzymatic causes of browning in foods include the Maillard reaction, auto-oxidation reactions involving phenolic compounds, and the formation of iron-phenol complexes (López-Nicolás and García-Carmona, 2010). At oven NaOH drying, parameter b* showed a decrease to 8.14% in its value as compared with fresh samples; this generates brown products caused by non-enzymatic reactions (Vega-Gálvez et al., 2009). The effect of different drying methods on sensitive components, such as proteins and carbohydrates; this indicates appreciable differences in dehydrated husk tomatoes color according to Chen, (2008). Golden berry color changes caused by the thermal treatment may be caused not only by the non-enzymatic browning reaction, but also by the destruction of pigments present in the fruits, such as β-carotene.
Sensory evaluation of dried husk tomatoes fruits:
Organoleptic properties (color, taste, odor, texture and overall acceptability) of drying husk tomatoes fruits are illustrated in Table (4). Results indicated was slightly that colour acceptability ratings of the oven drying decreased. Dried above 22°C leads to loss of yellow-orange carotenoid pigments responsible for color of the fresh fruits (Krokida et al., 1998). The colour of solar dried was acceptable as compared to oven drying. This is probably because oven dried was dried for a longer time (24 hours) and thus lost more of its yellow-orange color and underwent more browning reactions. Colour acceptability for solar dried could be improved by preventing browning reactions, minimizing carotenoid degradation or addition of colour additives.

Table (4): Sensory evaluation of dried husk tomatoes fruits.

<table>
<thead>
<tr>
<th>Physical properties</th>
<th>Solar drying</th>
<th>Oven drying</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>T1</td>
<td>T2</td>
</tr>
<tr>
<td>Color</td>
<td>9.6±0.52</td>
<td>9.1±0.21</td>
</tr>
<tr>
<td>Taste</td>
<td>9.1±0.21</td>
<td>8.9±0.52</td>
</tr>
<tr>
<td>Odor</td>
<td>9.2±0.42</td>
<td>9.1±0.52</td>
</tr>
<tr>
<td>Texture</td>
<td>9.2±0.54</td>
<td>9.0±0.75</td>
</tr>
<tr>
<td>Overall</td>
<td>9.3±0.22</td>
<td>9.0±0.10</td>
</tr>
</tbody>
</table>

Solar drying,control = (T1), Solar drying. NaOH=(T2), Solar drying. sodium metabisulphite = (T3), oven drying,control=(T1), oven drying. NaOH=(T2), oven drying. sodium metabisulphite = (T3). Mean values in the same row followed by different letters are significantly different at p≤0.05.

Solar dried had comparable scores which were significantly (P ≤ 0.05) greater than oven dried. The taste of solar is contributed by the amount of sugars contained in the fresh pulp, increase in the amount of sugar beyond optimum amounts may, however, reduce the taste ratings thus requiring optimization (United Nations Industrial Development Organisation (UNIDO),2008). It is important to note that taste may also be influenced by and may correlate with aroma (Fennema, 2000). Therefore, enhancing aroma may also improve taste acceptability.

The aroma for both solar and oven dried leather was acceptable (scores ≤ 5). Jain and Nema (2007) found that produced
jackfruit leather using a cabinet dryer at 50˚C for 24 hours with acceptable aroma. The aroma of products results from volatile substances in the fresh food such as esters, ketones, terpenes, aldehydes and others (Cremer and Eichner, 2000 and Fennema, 2000). The loss of these volatiles leads to a decrease in aroma detection. High aroma acceptability scores for solar dried could be attributed to the short drying times (3-4 days) used as opposed to 72 hours in solar drying. Longer drying times may allow for greater loss of volatiles. Jain and Nema (2007) used direct sun drying to produce guava leathers of 15% moisture content with acceptable aroma (UNIDO, 2008).

The highest acceptability rating for texture was observed for solar dried from 8.8 to 9.2, followed by oven dried from 8.1 to 8.7. The acceptability for texture of oven. This illustrates the importance of sensory methods in quality assessment of leather texture. The texture of fruit leather can be improved by adding malto-dextrin, coconut oil or chopped nuts (Jain and Nema, 2007).

Results showed that overall acceptability of the Table (4) was the highest for both solar 9.28 and oven 8.53. The results obtained are similar to those obtained for all the other sensory attributes rated. It is reported that the acceptability of fruits and vegetables is influenced by their aroma (Karmas and Harris, 1988).

CONCLUSION:

The obtained results indicated that both fresh and dried husk tomatoes fruits is considered as a good source of ash and crude fibers. The results showed that husk tomatoes fruits in either fresh or drying had a rich source of vitamin C and carotenoids and also it has an antioxidant activity by using DPPH. Color of fresh husk tomatoes fruits was recorded the highest value, followed by dried HT by solar energy and oven dried. It could be concluded that both fresh and drying husk tomatoes fruits recorded highly acceptable score of color, taste, odor, texture and overall acceptability score by the panelists. Solar drying of HT showed the best results than oven drying.
REFERENCES:


Puente, L. A.; Pinto-Muñoz, C. A.; Castro, E. S. and Cortés,M.


تاثير طريقة التجفيف على جودة ثمار الحرنكش

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تهدف هذه البحث إلى دراسة تأثير كل من التجفيف الشمسي و التجفيف بواسطة الفرن الكهربائي على التركيب الكيميائي (الروطوية، الرماد، البروتين، الدهون، الألياف و الكربوهيدرات)، مضادات الأكسدة (فيتامين سي و الكاروتينات الكلية) و كذلك دراسة التأثير المضاد للاكسدة باستخدام الشوق الحرة. و اللون و التقييم الحسي (الطعم، القوام، الرائحة، اللون و القبول العام) في ثمار فاكهة الحرنكش. وقد ذكر النتائج المرجعية أن ثمار الحرنكش الطازجة و المجففة سواء بالطاقة الشمسية أو بالفرن الكهربائي مصدر جيد لكل من الألياف و المعادن. و أن الحرنكش الطازج و المجفف كمصدر على مضادات الأكسدة (فيتامين سي و الكاروتينات الكلية) و لها تأثير مضاد للاكسدة و ذلك باستخدام الشوق الحرة. سجل اللون درجات عالية في الحرنكش الطازج ليه المجفف بواسطة الطاقة الشمسية ثم التجفيف بالفرن الكهربائي. سجل التقييم الحسي للحربكش درجات قبول عالية لدي المحكرين من حيث اللون، الطعم، و الرائحة و المظهر العام ، ولذلك تبين أن التجفيف بالطاقة الشمسية أعطي أفضل النتائج من التجفيف بالفرن.