

Health Benefits of Mackdouse: An Ancient Syrian Functional Food

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Received: September 12, 2017; **Published:** October 11, 2017

Introduction

The small-sized black-colored boiled eggplants units (*Solanum aethiopicum*) are the major components which are making, the product Mackdouse. Said product is an ancient Syrian food characterized with healthy and functional properties. The product is still prepared and consumed at the family level in the Mediterranean region (Syria, Lebanon, Jordan and Palestine). However, the product been has been lately produced at the commercial scale in said region, but at a limited scale. The following food materials are included in the formulation of the product: eggplant units, walnuts, garlic, salt and paprika as well as olive oil, which serves as a preservative as well as being a noted source of health and energy. It is of importance to stress the fact that this product is still at large a family-prepared food product in the said region of the world. The product is appetizing and it is as well loaded with noted nutrients. The product is well accepted by all members of the family. Mackdouse is usually eaten at breakfast, thereby providing the called-upon required energy with the start of a new day. Mackdouse is a product that is usually prepared at homes during the autumn period when the relatively small- sized eggplant units (black- or white-colored, but preferably the black ones) are available. The time of the year when Mackdouse is usually prepared coincides with that when small and tender black-colored eggplants are available to cut in autumn. The fall season (when the product is usually prepared) co-indices also with the harvest of walnuts, ripeness of red pepper and for garlic bulbs to dig out and collect. It is also the time of the year when olive oil is to reap from olives. The said product Mackdouse serves as a main source of energy mainly derived from olive oil. In addition to olive oil being a major source of energy, it serves also as a preserving material. The walnuts contained in the stuffing mix represent a significant component of Mackdouse. Walnuts are rich in dietary fibers and in un-saturated fatty acids and minerals. The fall season is the time of the year when preparing Mackdouse coincides with that of maturity of eggplants. It is also an optimal time for the availability of other components. The fall season is also the time of the year most suitable for collection of walnuts from trees in the middle-eastern countries (Syria, Lebanon and Palestine). It is also the harvest time of red peppers and digging for garlic bulbs. Needless to mention that

Ingredients

- 1000g. middle sized or small red-colored eggplants.
- 100g. sweet red pepper.
- Tow red hot peppers fruits.
- 150g. white walnuts pulp.
- 2 garlic pulps.
- 150g. white-colored and coarsely cut walnuts.
- 2 garlic cloves.
- Rock salt (required quantity to dehydrate the product and help attain preservation).
- 1 liter olive oil.

Methods

1. The eggplants units are washed, placed in a pan and boiled in water for a period of fifteen-minutes.

2. Drainage of water followed by cooling and removal by hands of the green portion surrounding the upper part of each of the eggplant units being handled.
3. Making a one-sided longitudinal cut in each unit of the trimmed eggplants units. This operation is usually performed by use of a sharp knife.
4. Each unit of the so-far handled eggplants is stuffed with coarse granulated table salt. A good covering of salt shall be done to surround each unit of the treated eggplants.
5. The previously boiled, drained and salted eggplant units are contained in a way allowing for water drainage thereby getting rid of most of the contained water in eggplant units. Said units are placed on top of a strainer and left aside for about five to six hours, allowing thereby for a further release of contained water. This operation ends up with the removal of a high percentage of water previously contained in each of the boiled eggplant units. The eggplant units are also exposed to a gentle pressure allowing for a further removal of water droplets.

*The eggplant vegetable is a product also known by other names such as: aubergine, garden egg, guinea squash, melongene, and brinjal.

The in- stuffing order

The whole walnuts are exposed to a sufficient pressor sufficient for breakage of the shell, but not macerating the internal pulp components. The use of sharp-ended pointed knife helps in this regard. A knife with a sharp pointed ending may be used to attain the desired small, but coarse pieces. The red pepper units are usually passed through a suitable cutting machine to yield moderate- sized pieces. Any quantity of juice coming out of the cut pepper units shall be discarded. Garlic bulbs should be peeled and slightly crushed. Sodium chloride is included in the mix of ingredients to maintain a ratio of 1.5 - 2.0% of the finished mixture.

The Stuffing Operation

A longitudinal knife cut is made in each of the eggplants units being handled starting from the top and ending at the bottom. However, said cut should not reach the opposite side of the treated units. The stuffing (Figures 1 and 2) operation is performed by stratifying the stuffed units. Of eggplants in a circular order until a complete fill of container (Figure 3).



Figure 1: The stuffing operation.



Figure 2: A stuffed eggplant .



Figure 3: Stuffed eggplants prior to addition of olive oil.

Once a complete fill of the container is finalized by the stuffed eggplants, said units are topped with a strainer, reverted upside down and left as such for a couple of days. This process will allow dewatering of the stuffed eggplants, thereby getting rid of surplus water. However, when making Mackdouse at home the already stratified units of the product are taken out of the container at a later day, whipped up with a tissue paper for the removal of any droplets of water being adhered at the surface of each unit. This process is performed in order to rid the already stuffed eggplant units of any surface moisture. The said eggplant units are then placed stratified within a clean glass container. The final step of the whole process is then done by pouring olive oil until a full cover of the contained product. (Figure 4).



Figure 4: Stuffed and covered with olive oil.

Dietary and Functional Aspects of Mackdouse

Eggplant is a vegetable product with a lot to offer: a high amount of antioxidants, special phytonutrients including phenolic compounds, flavonoids as well as a high content of dietary fibers and numerous vitamins and minerals too. All of these eggplant nutrition benefits come at a low calorie count of only 35 calories per cup, thanks to eggplant's high fiber and water content.



Figure 5: Components of Mackdouse.



Figure 6: A Syrian rooted functional food (Mackdouse).

Consuming fruits and vegetables of all kinds including eggplants is associated with a reduced risk of many lifestyle-related health conditions. The functional components present and contained in Mackdouse product include the following: dietary fibers, olive oil, walnuts and garlic. The content of fiber, potassium, vitamin C, vitamin B6 and phytonutrient content in eggplants all support heart health.

Many studies have suggested that increasing consumption of plant foods like the eggplant (which are loaded with dietary fibers) decreases the risk of obesity, overall mortality, diabetes and heart disease. It does also help in promoting a healthy complexion and in an increased energy resulting in attainment a lower body weight.

Reported health benefits of eggplants:

1. **Heart health:** Each unit of the final product represents a full store of health benefits being Packed full of fiber, vitamins B1, B3, B6, C, K, and phytonutrients. Eggplants are cardiovascular saviors.
2. **Combats Cancer:** Polyphenols in this veggie, such as delphinidin, protect cells from damage caused by free radicals, prevent development of tumors, and stop the spread of cancer cells.
3. **Other compounds contained in eggplants include anthocyanins and chlorogenic acid that possess powerful antioxidant and anti-inflammatory effects on the body. Chlorogenic acid can also inspire cleansing enzymes inside cells, which encourage cancer cell death warding off other viral diseases.**
4. **Improves Brain Function:** Phytonutrients within eggplant units are known to increase cognitive ability and benefit overall mental health. By fighting off free radicals, these substances protect the brain against disease and toxins and promote blood flow throughout the brain enhancing memory.
5. **Better Blood Circulation:** With high levels of Vitamin K along with bioflavonoids, consuming eggplant regularly can prevent blood clots and strengthen blood vessels.
6. **Dynamic Digestion:** Containing very little fat or cholesterol, this fibrous and filling vegetable called eggplant is a huge help in maintaining a healthy digestive system. The fibers contained in eggplants enables the body to easily process foods and support the absorption of nutrients by producing gastric fluids within the stomach.
7. **Anemia:** Those who suffer from an iron deficiency may be able to battle some of the debilitating symptoms by including eggplant in their meals. The ample flesh of this purple or black plant have many essential minerals, including iron and copper assist in improving the health of red blood cells within bloodstream. Eating foods with these compounds can significantly boost energy and eradicate feelings of exhaustion.
8. **Regulates Diabetes:** With high fiber and low soluble carbohydrates, eggplants are ideal to include in meals in case of watching blood glucose and insulin levels.
9. **Prosperous Pregnancy:** Folic acid is imperative if you are expecting, because it protects infants from defects within the neural tube. Foliates are important to every one's nutrition, but should be increased in case of carrying a baby to protect the brain development as well.

10. Bone Benefits: The eggplant units are loaded with a great amount of copper and Vitamin K, along with phenolic compounds which also help to prevent osteoporosis, increase bone mineral density and strength an overall bone health.

Functional Properties

The slightly boiled eggplants are drained off excess-water and left to cool at room temperature. A longitudinal cut is made in each of the already boiled, cooled and drained eggplant units. This longitudinal cut is made by the tip of a sharp knife and performed at one side of each of eggplant unit. The said cut should not reach the other side of each eggplant unit. The well-prepared eggplant units are exposed to a moderate pressor for the release of any contained loosely-contained water droplets. While preparing the product at home, it is customary and a routine process to up-side down the vessel containing the product thereby letting any loose water droplets to be released and drained out of the whole setup. Stuffing of each unit of the eggplants is performed (Figure 1) by a filling process of a complex material composed of coarsely crushed walnuts (2.0 - 2.5%), macerated garlic pulps (1.5 - 2.0 %) and table salt to maintain a percentage in the end product at 2 - 2.5%. At time of preparing the stuffing mix a small quantity (0.5%) of finely-cut red hot peppers is also included, thereby shadowing a reddish color in the filling material as well as establishing a slightly hot flavor which adds to the foreseen desirable and well accepted taste. The stuffed eggplant units are usually stratified in a suitable glass container (Figure 1), set after filling upside down and left as such for a period of 2 - 3 days permitting thereby for an added release of water droplets. Any water droplets released from the stuffed and orderly stratified eggplant units are received in a container, which is placed right under the tip of the above-mentioned set-up. However, it is a common practice when performing the production at home to recover each single unit of the so-far handled product from their containing vessel, whipping each with tissue paper to get rid of any residual water droplets followed by an orderly placement in another clean and dry glass jar. Finally, the last step of the whole operation is usually performed by pouring olive oil into the jar containing the stuffed eggplant units up to the close tip of the container making sure of a complete coverage of the contained.



Figure 7: (A) Stuffed and stratified (B) eggplants units contained in a plenty surrounding of olive oil being the end product of Mackdouse.

A stuffed final statement should be mentioned regarding Mackdouse being a product made and consumed in the Middle East region as a food item since ancient times. The said food item had been developed and still consumed for centuries by people living in the eastern countries of the Mediterranean region (Syria, Lebanon, Jordon and Palestine). The main components of the product Mackdouse are naturally available in abundance during the fall season of the year in said area of the world.

Functional Properties of Mackdouse Components

The major components of Mackdouse include the following materials: Eggplant units (dietary fibers), olive oil, garlic, walnuts and table salt. Each- one of these specified items is functional nutrient connoting a set of health benefits. These major health benefits of Mackdouse are briefly noted as follows denoting a highly nutritive foodstuff.

Eggplant units: A carrier of large amounts of plant-derived dietary fibers, antioxidants, phytosterols and vitamins (Niacin, E, K and Folate).

Olive oil: A well-recognized food item being one of the healthiest edible oils. Additionally, olive oil composes linoleic (omega-6) and linolenic (omega-3) essential fatty acids at a recommended 8:1 ratio.

- Rich in mono-unsaturated fatty acid s (MUFA) that help to decrease LDL or “bad cholesterol” and increase HDL “good cholesterol” in the blood.
- Helps to prevent coronary artery disease and strokes.
- The extra virgin olive oil contains tyrosol phenolic compounds, which are responsible for bitter derivative hydroxytyrosol the nature’s most powerful antioxidants. Together with vitamin-E and carotenoids, the said hydroxytyrosol play a vital role in fighting against cancer, inflammation, coronary artery disease, degenerative nerve diseases, diabetes, etc. The product olive oil is characterized with very high levels of plant sterols, especially β -sitosterol. Phytol-sterols competitively inhibit cholesterol absorption in the gut and thereby can reduce total cholesterol levels by 10% to 15%.

Olive oil is rich in vitamin E. providing thereby a powerful lipid soluble antioxidant, required for maintaining the integrity of cell membrane of mucosa and skin by protecting it from harmful oxygen-free radicals. Extra-virgin oil is an excellent source of vitamin-K being characterized with a potential role in the increase of bone mass by promoting osteotropic activity in the bone. It has been established its role in the treatment of Alzheimer’s disease patients by limiting neuronal damage in the brain. Olive oil is a popular medium used for preserving pickles in the eastern Mediterranean countries. It simply seals off the air from the item pickled units such as Mackdouse. Although most oils do not add much to the flavour of pickles, this situation does not exist as per olive oil. However, this particular aspect does not apply on olive oil, but it shall be augmented by the use of spices and chilies in Mackdouse. The olive oil included in the process also helps a better adherence of the seasonings to the stuffed eggplant units of the finished product.

Walnuts: The following effects have been stated in connection with walnuts as per its inclusion and functions in the product Mackdouse:

1. To decrease the level of low-density lipoprotein cholesterol (by ~9 - 16%) and blood pressure (diastolic blood pressure by ~2 - 3 mm Hg), both effects are major risk factors for CVD.
2. To improve endothelial function, decrease both oxidative stress and some markers of inflammation and increase cholesterol efflux. The walnuts on multiple CVD targets over relatively short periods supports effect of recommendations for their inclusion in a heart-healthy diet.
3. Nuts are good sources of fiber, phytosterols, and unsaturated fat.
4. The results of most prospective cohort studies suggest that regular nut consumption of about 28 - 30g. at least five times weekly is associated with a significantly lower risk of cardiovascular disease..
5. One prospective cohort study has found that regular nut consumption is associated with significantly lower risk of developing type 2 diabetes.
6. Most prospective studies have shown that people who consume nuts regularly weigh less than those who rarely consume nuts. Nonetheless, since an ounce of most nuts provides about 160 kcal of energy, substituting nuts for other less healthy snacks is a good strategy for avoiding weight gain when increasing nut intake.
7. Garlic is rich in antioxidants. In human body, exist harmful particles called free radicals. These free radicals build up as you age and may contribute to heart disease, cancer, and Alzheimer disease. Antioxidants like those found in garlic fight off free radicals, and may reduce or even help prevent some of the damage they cause over time.

8. Garlic is used to help prevent heart disease including atherosclerosis or hardening of the arteries, high cholesterol, high blood pressure, and to boost the immune system. Eating garlic regularly may also help protect against cancer.

Red pepper

The capsaicin in bell peppers has multiple health benefits. Studies show that it reduces 'bad' cholesterol, controls diabetes, brings relief from pain and eases inflammation.

- If cooked for a short period on low heat Which Is Not The Case Of Makdouse Making bell peppers retain most of their sweet, almost fruity flavor and flavonoid content, which is a powerful nutrient.
- The sulfur content in bell peppers makes them play a protective role in certain types of cancers.
- The bell pepper is a good source of vitamin E, which is known to play a key role in keeping skin and hair looking youthful.
- Bell peppers also contain vitamin B6, which is essential for the health of the nervous system and helps renew cells.
- Certain enzymes in bell peppers, such as lutein, protect the eyes from cataracts and macular degeneration later in life.
- They contain plenty of vitamin C, which powers up the immune system in humans and keeps a youthful skin. The highest amount of Vitamin C in a bell pepper is concentrated in the red variety.
- Being a component of Mackdouse, red bell peppers contain several phytochemicals and carotenoids, particularly beta-carotene, lavishing with anti-oxidant and anti-inflammatory benefits.
- The capsaicin in bell peppers has multiple health benefits. Studies show that it reduces 'bad' cholesterol, controls diabetes, brings relief from pain and eases inflammation.
- If cooked for a short period at a low heat, bell peppers retain most of their sweet, almost fruity flavor and flavonoid content, which is a powerful nutrient.
- The sulfur content in bell peppers makes them play a protective role in certain types of cancers.
- A bell pepper material is recognized as a good source of vitamin E, which is known to play a key role in keeping skin and hair looking youthful.
- Bell peppers also contain vitamin B6, which is essential for the health of the nervous system and helps renew cells.
- Certain enzymes such as lutein are contained in bell peppers. These enzymes protect the eyes at a later period in life from cases of cataracts and macular degeneration.

Table salt in Mackdouse

Sodium chloride constitute an important ingredient of Mackdouse product. It is as well a principal component as per not only the desired salty sensation in the final said product but it is as well to the desired and looked for mild and well accepted sour taste developed in the final product. The noted sour taste- being developed within the already stuffed boiled and drained eggplant units is due to presence of salt at a certain ratio in the final product. This noted availability of sodium chloride included in the stuffing material of eggplants is inductive to a mild fermentation process with-in the finished product units. The said fermentation ends up with the formation of a looked-for pleasant sour taste in the finished and left- aside contained product at room temperature for a couple of weeks period. Sodium is a mineral that human body must have in order to function properly. The primary source of dietary sodium is sodium chloride, or salt. It is of interest to state that more than three-quarters of which comes from processed foods like Mackdouse. Although sodium is vital to a number of routine body functions, but too much can have adverse effects, particularly for people who are sensitive to sodium. Excessive sodium uptake may cause hypertension, which in turn can lead to other health problems.

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Volume 11 Issue 4 October 2017

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