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Rediscovery of Couscous in the World

By Ayse Nur Yüksel, Mehmet Durdu Oner & Mustafa Bayram

Gaziantep University

Abstract- World food industry is changing by re-discovering traditional food tastes and techniques. Due to increase in curiosity on gastronomy, new tastes and "Geographical Indication-food origination", local foods are started to re-designing by food industry. Couscous is one of them, which is the world-wide known traditional cereal product, today. Its popularity has been increasing, recently. Especially, in the Western market, it is prepared due to its taste, rapid preparation and usage in salads (tabbouleh). There are three couscous types such as Turkish, African and pasta-like depending on the formulation, processing technique and usage. Pasta-like couscous is widely produced by pasta companies by using same pasta production line by changing the die of press. Couscous commonly produced by using semolina and sorghum in Africa and Asia, however in Turkey, traditional Turkish couscous is generally prepared by coating of bulgur granules with semolina, wheat flour; egg and water or milk. In the literature, studies have recently been made for enrichment of couscous by either substitution of semolina with legume flours and other grain flours or adding nutritious ingredients to the composition. Worldwide, total exportation and importation quantity of couscous are 124, 481 and 126, 799 tons in 2016, respectively. Nowadays, the need for easy prepared meals increased due to the fast lifestyles and people are more aware about the importance of nutritionally valued products and its benefits to health.

Keywords: *couscous, pasta-like, african, enriched.*

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I. Introduction

UNESCO started a new indication to preserve the tradition and taste comes from ancient. Therefore, "UNESCO-Creative City Network" based on gastronomy is a new issue to protect the traditional foods. Additionally, there is a big trend for "Geographical Indicated" of foods and other products overall the World. Each culture starts to re-discover their products. Bordeaux wine, Antep bulgur, bread, baklava and some other most popular products are some of "Geographically Signed" food products, and day by day the number of products dramatically increases.

Couscous is a world-wide known traditional cereal product, which is a staple food of North Africa (Aboubacar and Hamaker, 2000; Rahmani and Muller, 1996) and Middle East cuisines. It can be consumed as salad (tabbouleh) and side dish with chicken and meat meals, as an alternative for pilaf. Depending on the formulation, processing technique and usage, there are three couscous such as Turkish, African and short-cut pasta-like. Turkish and African couscouses are produced traditionally by hand, which are different from pasta-like. But, preference of pasta-like couscous in market is lower than the others.

Pasta-like couscous is generally produced mechanically by using pressing technology (Çelik et al., 2004). Also, pasta-like couscous is widely produced by pasta/macaroni companies in same pasta production line by changing the die of press. The basic industrial and traditional African couscous processing steps are: a) mixing and agglomeration of *Triticum durum* semolina with water, b) steaming to precook, c) drying to preserve (Aboubacar et al., 2006; Debbouz and Donnelly, 1996), d) cooling, e) grading to separate by size and f) storage or packaging (Dick and Matsuo, 1988). Wheat flour, semolina, sorghum, millet, maize (Galiba et al., 1988), bulgur flour (Yuksel et al., 2017; Yüksel et al., 2017; Yüksel et al., 2018) and barley (Kaup and Walker, 1986) can be used in the couscous production.

Couscous commonly produced by using semolina and sorghum in Africa and Asia, however in Turkey, traditional Turkish couscous is generally prepared by coating of bulgur granules with semolina, wheat flour, egg and water or milk (Demir et al., 2010). Sometimes egg and milk mixture is used to produce Turkish couscous. In order to increase the functional properties of regular couscous, consumed widely in the world, a new formulation and production technique should be developed. According to field and literature searches, it was found that Turkish type is especially special in Minor Asia. When the recipes of African and Turkish couscous are compared, it can be said that nutritional value of Turkish couscous are higher than the others due to raw materials used in the composition. In African and pasta-like couscous, water and semolina are only used. However, in Turkish couscous, milk, egg, bulgur and semolina are used. Pasta-like couscous is not preferred in the market due to its shape, size and properties. If Turkish type production is developed, it will be a good opportunity for the industry to produce couscous.

Substitution of bulgur with different flours in production of Turkish couscous was studied by Demir et al. (2010), Çelik et al. (2004) and Demir and Demir (2016). They investigated the effects of addition of chickpea flour, soy, oat, lupine, lentil and common bean flours, buckwheat and wheat germ on quality and sensory properties of couscous.

Author α ρ: Gaziantep University, Faculty of Engineering, Department of Food Engineering, Gaziantep, Turkey.
e-mail: mbayram@gantep.edu.tr
Author σ: Alanya Hamdullah Emin Pasa University, Tourism Faculty, Department of Gastronomy and Culinary Arts, Alanya, Antalya, Turkey.

African and pasta-like couscouses were studied by Debbouz and Donnelly (1996) whom compared home-made, commercial and extruded couscous samples. Rahmani and Muller (1996) investigated thiamin and riboflavin contents of nine couscous samples (five traditional and four commercial) during preparation. In another study, the effects of different textures and types of endosperm on the production of couscous were observed by Galiba et al. (1988). Industrial quality (manufactured in Algeria) three durum wheat semolina were used as raw materials for the agglomeration of couscous experiments by Lefkir (2017).

Different flour additions to African and pasta-like couscous were also studied. Yuksel et al. (2017) and Yuksel et al. (2017) investigated the effects of bulgur flour (undersize bulgur) addition on the quality, sensory and texture properties of couscous. The effect of different decortications levels of sorghum kernel on couscous quality was also studied by Aboubacar et al. (2006). Sidibe (1981) presented a paper in a conference about comparison of couscous yields of different varieties of sorghum grains. Couscous produced with sweet potato was studied by Kpomasse (2014). In the study of Opata (2007), fifteen varieties of water yam were used to produce fries, couscous and flour. Besides, technological feasibility to obtain gluten-free couscous based on rice - leguminous supplementation was studied by Benatallah et al. (2008).

II. Economic Value of Couscous

Pasta-like and African couscouses are very popular products in the world, where Turkish-like couscous is produced and consumed generally in Turkey, Georgia, Azerbaijan and Armenia.

According to Union of Organizations of Manufactures of Pasta Products of E.U., about 14.3 million tones pasta (including couscous) is produced worldwide in 2015 (Anonymous, 2015). In Turkey, the production of pasta quantity has been increased to 1315 thousand tons in 2015 (Anonymous, 2014) and in terms of worldwide production quantity, Turkey ranks third after Italy and United States (Anonymous, 2015). On the contrary, the consumption quantity of pasta in Turkey is lower than other countries (7.5 kg per person per year).

In terms of worldwide import quantity of couscous, Turkey ranks one hundred nineteenth between the years of 2012 to 2016. However, Turkey ranks forty-second in the list of exporters. Quantity of exported couscous decreased from 268 to 231 tons in 2016. Exportation of pasta and couscous is made from Turkey to Iraq, Japan, and United Arab Emirates etc. In Figures.1 and 2, the importer and exporter of first fifteenth countries in the world are given and the data was obtained from Trade Map (Anonymous, 2017). Worldwide, total exportation and importation quantity of couscous are 124,481 and 126,799 tons, respectively. Italy, France and Morocco exported couscous in 2016, in terms of quantity 37281, 34809 and 22113 tons, respectively. France ranks first in importers list with 31,436 tons and followed by United Kingdom, Belgium and United States of America with 16763, 8597 and 6870 tons in 2016, respectively. In the first quarter of 2017, Turkey ranks third for exported quantity of couscous after France and United States of America (Anonymous, 2017).

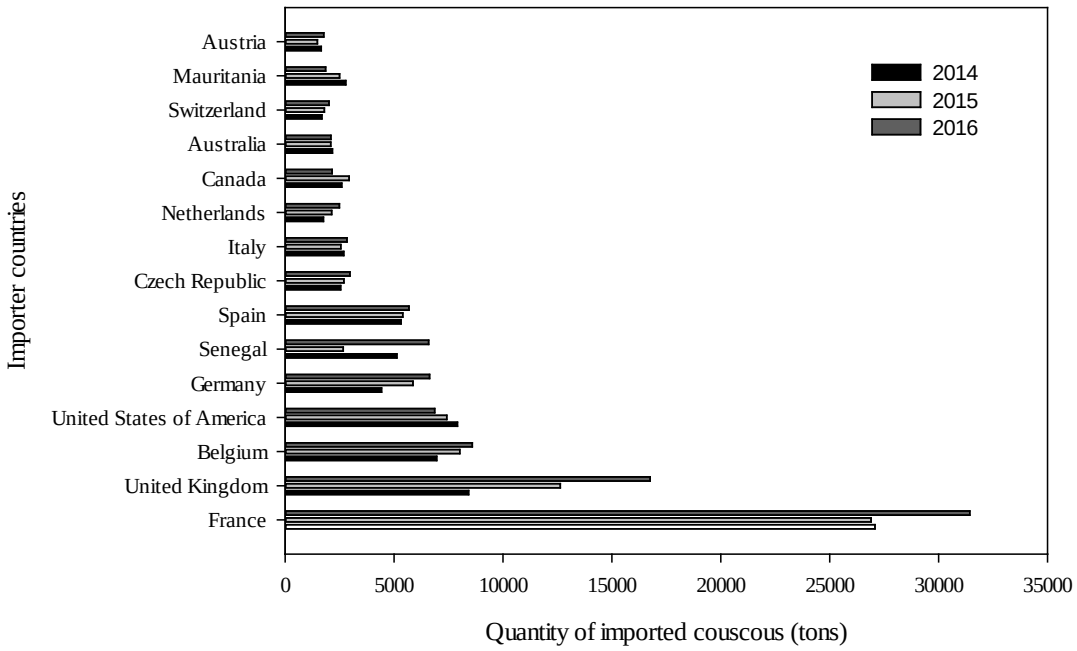

Fig. 1: Quantity of Imported Couscous by Countries

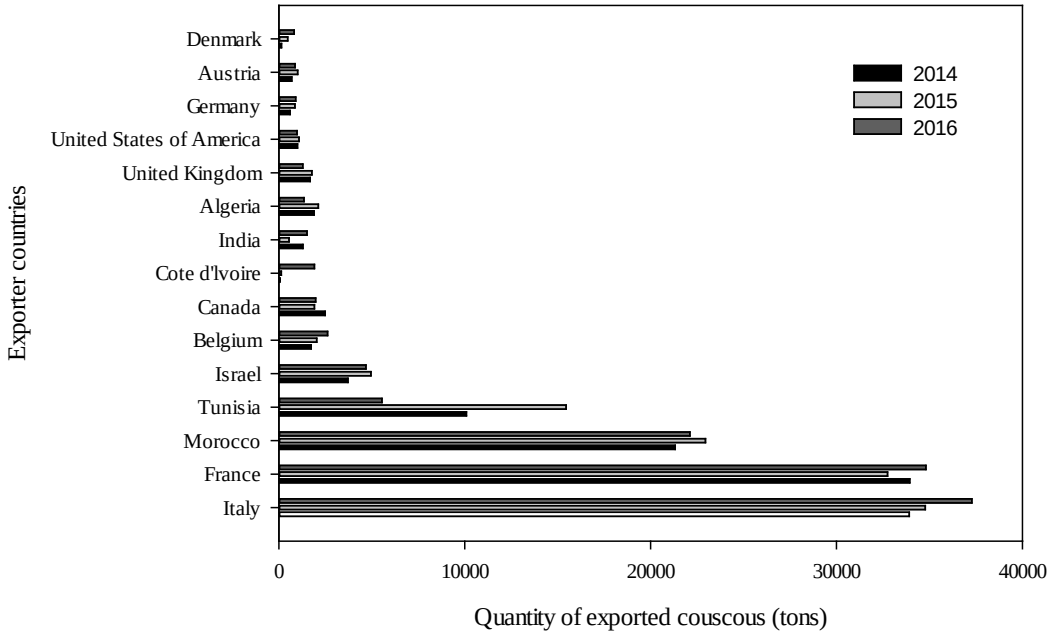

Fig. 2: Quantity of Exported Couscous by Countries

III. Nutritional Enrichment of Couscous

Wheat semolina is generally used as raw material in traditional couscous production. Durum wheat (*Triticum durum*) is the second - most widely cultivated wheat species after hard wheat (*Triticum aestivum* L.). Due to its extra-hard, translucent, light-color properties, it is mainly ground to make semolina for pasta and couscous (Gazza et al., 2011).

Ash content of durum semolina indicates the bran content. The ash in commercial durum semolina is normally ranges from 0.55 to 0.75 %. The protein content of semolina is important because it influences the functional quality of pasta. Suitable amounts of gluten protein are necessary to provide desirable attributes of mechanical strength and cooking quality of pasta. Protein level is between 11.0-13.0 % (Dick and Matsuo, 1988). According to USDA National Nutrient Database for Standard Reference (Anonymous, 2001) dry semolina couscous nutrient value is given in Table 1. Another common ingredient in production of traditional African couscous is sorghum. Protein and ash contents of sorghum are in between 8.0-11.6 % and 0.60-1.31 %, respectively (Aboubacar and Hamaker, 2000).

Table 1: Dry Couscous Nutrient Data (Anonymous, 2001)

Nutrient	Unit	Value per 100 g	1 Cup = 173.0g
Proximates			
Water	g	8.56	14.81
Energy	kcal	376	650
Protein	g	12.76	22.07
Total Lipid (Fat)	g	0.64	1.11
Carbohydrate, by Difference	g	77.43	133.95
Fiber, Total Dietary	g	5	8.7
Minerals			
Calcium, Ca	mg	24	42
Iron, Fe	mg	1.08	1.87
Magnesium, Mg	mg	44	76
Phosphorus, P	mg	170	294
Potassium, K	mg	166	287
Sodium, Na	mg	10	17
Zinc, Zn	mg	0.83	1.44
Vitamins			
Vitamin C, Total Ascorbic Acid	mg	0	0
Thiamin	mg	0.163	0.282
Riboflavin	mg	0.078	0.135
Niacin	mg	3.49	6.038
Vitamin B-6	mg	0.11	0.19
Folate, DFE	µg	20	35
Vitamin B-12	µg	0	0
Vitamin A, RAE	µg	0	0
Vitamin A, IU	IU	0	0
Vitamin D (D2 + D3)	µg	0	0
Vitamin D	IU	0	0
Lipids			
Fatty Acids, Total Saturated	g	0.117	0.202
Fatty Acids, Total Monounsaturated	g	0.089	0.154
Fatty Acids, Total Polyunsaturated	g	0.252	0.436
Cholesterol	mg	0	0

As mentioned previously, bulgur, egg and milk mixture are traditionally used as ingredients in Turkish couscous production. Bulgur is a whole grain product, which is generally produced from *Triticum durum* wheat by cleaning, cooking, drying, tempering, debraning, milling, polishing (optional) and size classification (Bayram and Öner, 2005; Bayram and Öner, 2007). Protein and ash contents of bulgur are in average 13.36 % and 1.79 %, respectively (Balcı and Bayram, 2017). It is nutritionally richer than semolina. Moreover, it has high dietary fiber content, having 18.3 g dietary fiber per 100 g. Its dietary fiber content is 3.5, 6.8, 1.8, 2.3, 1.3 and 4.3 times greater than rice, wheat flour, oatmeal, whole wheat bread, soybean and pasta, respectively (Bayram and Öner, 2007; Yıldırım et al., 2008a, 2008b). The protein contents of egg and milk are 12.17 and 3.30 g 100 g-1 (Çelik et al., 2004), respectively. In addition, they are rich in Na (sodium), K (potassium) and Ca (calcium). Turkish couscous produced with and without eggs have 11.04 and 11.27 % of protein, 0.73 and 0.79 % of ash, 3.13 and 4.16 % of dietary fiber, respectively (Çelik et al., 2004). In another study, Yüksel et al. (2017)

produced pasta-like couscous by using only bulgur flour and water. They observed higher protein and ash contents when compared to semolina couscous.

IV. Future Aspects of Couscous

In modern life, need of easy and fast prepared, precooked and ready-to-eat, or ready-to-eat with the addition of small amount of hot water foods is increased. Besides the faster preparation, people are more aware that the nutritional value of a food product should be high. Therefore, higher protein and ash contents of bulgur are highlighting the economic and possible health benefit of milk, egg and bulgur containing enriched couscous.

Further studies especially on enriched couscous are required to evaluate and improve its nutritional and sensory properties. Studies should be concentrated on the production of functional and/or gluten-free couscous, which can be a different and nutritious option for pasta or noodle.

About couscous industry and market, the production technology should also be developed. Increase in consumption of traditional couscous will force the industry to produce couscous having traditional properties. Because, pasta-like couscous do not have big interest in contrast to traditionally produced couscous. Therefore, as a recommendation; couscous in industry should be produced at high capacity by using modern technology to obtain same specification with traditional ones.

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