

Teff Could Contribute to the Sustainable Development Goals of the United Nations in Low-Income Areas of Middle East and North Africa (MENA)

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Abstract:

Several Sustainable Development Goals of the United Nations are directly and indirectly related to nutrition, including SDG1 (no poverty) and SDG2 (zero hunger). Many parts of the Middle East and North African (MENA) region are experiencing poverty or suffering from micronutrient (Calcium, Iron, and Vitamin D) deficiencies, which have contributed to the high mortality rate among children and pregnant women. Teff is an old and well-known grain in MENA and a “Super Grain” in developed countries. It has a good potential to be utilized in the development of food products in MENA. The aim of this short communication is to review the limitations and opportunities that exist in the process of food product development with teff in MENA

Keywords: Teff, Calcium Deficiency, Sustainability, Food Product Development

Introduction

In September 2015, the United Nations released its global Sustainable Development Goals (SDGs) for the year 2030 in 17 areas that are critically important for humanity and the planet. Each SDG has a list of objectives that are identified with specific indicators. Surprisingly, SDG1 (no poverty), SDG2 (zero hunger) and SDG3 (good health and well-being) are directly related to nutrition and many of the other SDGs contain indicators that can indirectly be associated with nutrition. For instance, SDG10 targets the effect of economic and income inequalities. It contributes to the socioeconomic status of people and affects the access of individuals or communities to nutritious foods. It is

unfortunate that currently 840 million people do not receive enough nutrients from their regular diet, and if no action is taken, an additional 2 billion people will be undernourished in the next 30 years (1, 2). Regrettably, 95% of the poverty and undernourishment are observed in developing countries, including Middle East and North African (MENA) region. In particular, poverty in MENA is mostly observed in rural areas, where people live with less than \$2 a day (3). Financial disparity has a direct impact on the inadequate intake of nutrient-rich foods (both macro- and micronutrients) by MENA's rural dwellers (4, 6).

Micronutrients have fundamental roles in human health and micronutrient deficiencies can delay the growth and cognitive development particularly in children and fetuses. These deficiencies are most prevalent in areas where the diets lack variety, as is the case for many individuals in developing countries (4). For instance, iron, vitamin D, and calcium deficiencies are prevalent in MENA (5, 6) and have serious adverse health effects such as pregnancy complications and fetal deaths (7).

Middle East and North Africa (MENA) include countries with common sets of challenges, diverse level of Gross Domestic Products (GDP) and income, which historically depend on oil (8). The MENA's economic performance in the past four decades has been below this region's growth potential, partly because the labor force is expanding and employment opportunities are not generated (8). Unfortunately, the majority of Middle Eastern countries have been struggling with economic instabilities, corruption, and mismanagement at local and national levels (9). These factors along with infertility of soil, water shortage, extreme heat, prevalence of arid climate, and poor agricultural practices have resulted in lower agricultural GDP and excessive amount of food imports (more than 50% of the total food consumption) (6,9,10). Therefore, creating opportunities for small businesses in rural communities to add value to their agricultural products, as well as diversifying economic activities would reduce the food insecurity and increase the level of sustainability in the rural areas. Middle East and North Africa's climate has a good potential for cultivation of "Teff", an ancient but a trending "super grain" (11), which can help in improving the UN sustainability indicators in the region.

What is Teff?

Teff is a very small round grain with an average diameter of 1 mm with kernel's color ranging from white to dark brown (12). The grain is originated in eastern Africa, and, is a main grain in Ethiopian and Eritrean diet (13,14). The grain is pest-resistant, and can be stored for several years without any quality loss (11,12,15). Therefore, it can potentially be cultivated by following organic standards, which may meet more indicators of agricultural sustainability, and will make it more attractive in the markets of developed countries (15). Teff's protein content (10-12%) is slightly less than quinoa and contains no gluten, which would make it an alternative ingredient for gluten-free diets and food product development lines (12,16,17). Additionally, teff could be a good source of vitamins and minerals including iron and calcium (12,16,18,19). Specifically it has high concentrations (165 mg per 100 g) of calcium; far more than other cereals (20). Therefore, teff has been referred by some authors as a good source of calcium and a unique food in preventing osteoporosis, a prevalent disease in MENA region in women. However, some authors may overlook the availability of

phytates in this grain, which inhibits the absorption of calcium in small intestine. Though, use of probiotic or application of fermentation techniques might remove this barrier (17, 18).

Food product development with teff

Teff grain's applications in the region are very limited to traditional, local, medicinal, and seasonal use. Details about physical and functional characteristics of teff are hardly found in published literature. For instance, knowledge on behavior of starch granules (gelatinization characteristics) and amino acid sequence of teff are limited to a few publications (18,19,20). This insufficient background information is a hurdle for the product development teams in the food and nutrition industry. Fortunately, teff has found its place in the food market in terms of the healthiness and taste, and some food products have been developed from teff (20) such as "Dr Praegers Super Greens Teff Hemp Veggie Burger". Therefore, opportunities for expanding this new market can be created in MENA countries. Potential commercial products could be specialty quick breads, 100-calorie snack bars, and products that are liquid-based, which are worthy of pursuit by research development teams at academic and industrial settings.

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