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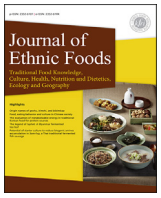

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Review Article

Traditional flat breads spread from the Fertile Crescent: Production process and history of baking systems

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A B S T R A C T

The "flat" breads include a multitude of bread types different from each other but are always relatively thin, ranging from a few millimeters to a few centimeters in thickness. These breads, whose origin is very ancient, fit well into the context of a subsistence economy: i) they can be obtained from cereals other than wheat, such as pseudocereals or legumes, allowing the use of sustainable local productions from marginal lands; ii) they do not necessarily require an oven to be baked; iii) they can serve as a dish and as a spoon/fork; iv) they can be dehydrated by a second baking process, preventing the growth of molds and extending the shelf life; v) they are transported with little encumbrance. These strong points make flat breads very popular, traditionally in Near East and Central Asia and also in some Mediterranean areas, in the Arabian Peninsula, and in the Indian subcontinent. By a multidisciplinary approach, this review gives an insight into the variety of traditional flat breads from the Fertile Crescent and related regions, classifying them on the basis of their production process. Moreover, the baking systems adopted to prepare flat breads are reviewed, such as vertical ovens (*tannur* and *tabun*) and griddles (*saj*), whose structure, origin, history, and values are described in detail. This overview shows that these breads have survived until today because of their versatility. In fact, flat breads can be produced both in the same way as they were made thousands of years ago and in modern fully automatic industrial lines, allowing tradition to meet innovation.

1. Introduction

The "flat" breads include a multitude of bread types different from each other but are always relatively thin, ranging from a few millimeters to a few centimeters in thickness. These breads, whose origin is very ancient, as demonstrated by the findings from Mesopotamia, ancient Egypt, and the Indus civilization, were probably the first processed foods [1].

Flat breads present numerous advantages over "high" and voluminous bread loaves in the context of a subsistence economy, when every resource has to be rationalized. For example, they can be obtained from cereals other than wheat, pseudocereals or legumes, allowing the use of sustainable local productions from marginal lands. They do not necessarily require an oven to be baked as they can be cooked simply by covering by sand and embers or by laying down on a metal or a terracotta plate placed on the fire. In addition, flat breads can serve as a dish, containing food inside them, and as a spoon/fork because with a piece of flat bread, it is possible to take portions of food out from a container [2].

Flat breads can be dehydrated by a second baking process, which prevents the growth of molds and considerably extends shelf life. Moreover, these breads are transported with little encumbrance by stacking them on top of each other, as done by the Sardinian shepherds in the past when they brought the Italian flat bread *carasau* with them, during the transhumance [3]. All these strong points explain the success of flat breads also in the geographic areas where nomadic life, necessarily based on the transport of a few essential things, was – or still is – predominant [2]. Although flat breads originated in a rural society, quite different from the currently prevailing situation even in developing countries, their strong points make them still very popular, even beyond the areas of origin.

This article, based on a multidisciplinary approach, reviews scientific literature in the fields of food technology, history, and ethnography to give an insight into the traditional flat breads from the Fertile Crescent and related regions, including the processing conditions and baking systems traditionally adopted to prepare them. In fact, flat breads are becoming increasingly appreciated in

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Western countries also where, however, these products are not well known, are generally perceived as a single category, and often are wrongly considered as only unleavened. The aim of the work, therefore, was to shed light on the high diversification degree of these products and highlight the peculiarity of their traditional baking methods to make flat breads better known, along with the cultural richness behind them.

2. Geographical distribution of flat breads

The agricultural practices of the world have different centers of origin, i.e., they arose independently in several geographical areas: the Fertile Crescent, sub-Sahara, Ethiopia, China, New Guinea, Mesoamerica, Amazonia, Andes, and eastern United States [4,5]. Focusing on Eurasia, hunter–gatherers of the Fertile Crescent domesticated wild wheat and barley, beginning around 8500 BC and becoming the world's first farmers [5–7]. This wheat–barley agriculture spread westward around the Mediterranean, across North Africa and southern Europe, northward across the Balkans to Eastern Europe, and eastward to India (Harlan, 1998). Archaeological evidence indicates an extensive introduction of crops from the Fertile Crescent into central and southern Asia [6,8,9] although genetic studies suggest an independent domestication of barley also to east of the Fertile Crescent [10]. Isolated wild barley populations across central Asia as far as Tibet have been reported [8].

Meanwhile, an independent agriculture was evolving in Africa: an array of crops, including sorghum, pearl millet, cowpea, and African rice, were domesticated in sub-Sahara, with no obvious center from the Atlantic to the Indian Ocean, whereas Ethiopia, having the characteristics of a center of origin, contributed some indigenous crops, including teff [4]. Moreover, a form of tetraploid wheat (*Triticum turgidum* L.), differing from durum wheat (*Triticum turgidum* L. ssp. *turgidum* var. *durum*) by the presence of brownish and larger kernels, could have been introduced into Yemen from Ethiopia, which is considered a center of secondary diversity of tetraploid wheat [11].

The diffusion of flat breads substantially followed the same path of cereals, starting from the Fertile Crescent. From there, flat breads spread to the Mediterranean area (North Africa, Sardinia island, and coastal Spain), the Arabian peninsula, the Indian subcontinent, and the Anatolian peninsula, then to the Balkan area and the Caucasian region, up to Xinjiang (Fig. 1). These diffusive paths followed predominantly an east–west axis, according to the theory that moving along the same latitude requires less evolutionary change or adaptation than between different latitudes [5].

In spite of their ancient origin, nowadays, these very traditional breads are still produced and appreciated in the same areas and are further spread to other countries after modern migrations of people.

3. Production process and classification of flat breads

The production steps of flat breads are not different from those of more voluminous breads: kneading of ingredients (flour, water, salt, sometimes little amounts of fatty ingredients, with or without yeast according to the specific bread type); leavening (which may be absent); shaping (by pouring the batter on a griddle or by sheeting and eventually punching the dough); and baking.

Depending on the gluten content of the starting flour, flat breads can be obtained from either compact and elastic dough, which requires strong and extensible gluten, or from a semi-fluid batter, which, on the contrary, can be obtained from an array of gluten-free flours. Consistent dough, usually wheat based, can be spread into sheets with a rolling pin, whereas the semi-fluid batters are directly poured onto the cooking surface, resulting in “pancake-like” flat breads. These variations allow obtaining an array of flat breads, which are characteristic of different geographical areas (Fig. 2).

The various types of flat breads can be schematically classified according to the consistency of the dough, the presence or absence of a leavening phase, the baking system used, and the thickness and

Fig. 1. Diffusive pathway of flat breads. Flat breads substantially followed the same path of cereals (wheat and barley), starting from the Fertile Crescent. From there, flat breads spread westward around the Mediterranean, across North Africa and southern Europe, northward across the Anatolian peninsula to the Balkans and to Central Asia, and eastward to India. Interlinks with another agricultural center of origin in Ethiopia, contributing some indigenous crops including sorghum, teff, and pigmented tetraploid wheat, are found across the Arabian Peninsula.

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