

REGULAR ARTICLE

The ancient wheats of Georgia and their traditional use in the southern part of the country

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Abstract

Georgia represents a biodiversity hotspot for wheat with high levels of endemism. Many local variations of wheat are found in the country due to its variable climatic, edaphic, socio-economic and cultural landscape. Local variations of seven free-threshing and seven hulled wheat landraces and old varieties are found in the country, along with wheat utilization and the different traditional uses, are described in this paper. Despite the diversity and significance of Georgian wheats, their role in the wheat phylogenesis has not been thoroughly studied and the general public is not well informed on the subject. This article aims to promote Georgian wheat landraces and underline the necessity of carrying out a detailed systematic inventory of the wild and cultivated plants in Georgia order to get more information on the state of this national heritage and of the measures to be taken for its conservation.

Key words: Ancient wheat, Traditional use, Georgia, South Caucasus, Samtskhe-Javakheti, Ethnography

Introduction

Georgia is one of the centres of the origin of wheat within the Near-East centre of origin of cultivated plants. Out of about 20 wheat species known in the world in the earlier times, 14 were cultivated in Georgia, five of them are Georgian endemics. Many names of wheat can be found in the Georgian vocabulary. There is hardly another language in the world where the wheat has so many common or wheat variety names. The most ancient Georgian names of wheat found in the written sources are those mentioned in the oldest Georgian translations of the Bible ('Asli', 'Dika', and 'Ipkli'). In the later written sources, other names appear such as Zanduri (includes *T. monococcum*, *T. timopheevii*, and *T. Zhukovskiyi*), Makha (*T. macha*, *T. Paleocolchicum*), Asli, (*T. Dicoccum*), Ipkli, (*T. aestivum*, bearded forms), Khulugo, (*T. aestivum*, beardless forms), Dika, (*T. Carthlicum*), and Tavtukhi, (includes *T. durum*, *T. turgidum*, and *T. Polonicum*).

The soft wheat variety name that is firstly mentioned in Georgian literature is 'Ipkli'; which is a winter bearded soft wheat species. Later the name begins to incorporate a large group of wheats being named as 'Dolispurebi' (Doli breads). These are: 'Tetri Dolispuri', 'Tsiteli Dolispuri', 'Shinduri Dolispuri', 'Tianuri Dolispuri', 'Korbouli Dolispuri', 'Meskhuri Dolispuri', 'Kheldeshuri Tsiteli Dolispuri', or 'Matsrani.' All these wheats are bearded forms. There are also introduced species such as 'Tetri Upkho' (White Beardless), 'Tsiuteli Upkho' (Red Beardless), 'Khulugo'. In addition to the above mentioned species, many landraces are known such as 'Adgilobrivi Khorbali' (Local Wheat), 'Semodgomis Khorbali' (Winter Wheat), 'Poshola', 'Khotora', 'Rachula', 'Gomborula', 'Gelatura', 'Dzalisura', 'Khozo', 'Dzveli Puri', 'Khuzala', 'Niksavra', 'Tskhratavtava', 'Tsiteli Parna', 'Paseni', 'Makhnia', and 'Topbashi'. This list of wheat names may contain synonyms, but, in spite of this, it was noticed that people in every locality tried to give the landrace cultivated in their locality a proper name that would be connected with the specific properties of the landrace. The second group of names belongs to the second by its economic importance wheat, the so-called hard/durum, or macaroni wheat *T. durum*. This wheat is relatively new as compared with soft wheat. In spite of this, it has many Georgian names.

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The common name, for example, is ‘Tavtuki’, the spike of which can be white, black, red, gray, honey, ebony, and finally black-bearded in colour. From free-threshing wheat, of importance is Dika wheat. According to spike colour, there are white, red, black Dika wheats. Javakhuri Dika and Dika Ipkli are mixtures of soft and durum wheat.

Of the free-threshing wheat species, the following are also mentioned in Georgian chronicles, including the so-called ‘Chagvera’ wheat, which in some localities is known as ‘Kondara’ (club) wheat - *T. compactum* Host, then the Polish wheat - *T. polonicum* L. and the English wheat - *T. turgidum* L. However, their distribution and economic importance was so insignificant that their local names are not known, although known is the local name of a branched-ear variety of the English wheat – ‘Kakhuri Datotvili’, developed by selection; however, it was rather unpopular and quickly fell out of favour and is not cultivated any longer. Another species - *T. turanicum* Jakubz., was found in Georgia. In 1923, in the Kartli village of Odzisi, P. Zhukovskiy described a new variety of this wheat - var. *odsissianum* Zhuk. No other evidence of the distribution of this wheat in Georgia is available. This variety is rather well distributed in neighbouring Azerbaijan, supposedly being introduced together with durum wheat species, which are very diverse in Azerbaijan. Thus, both hulled (seven species) and free-threshing (seven species) wheat were rather well distributed in Georgia. These species comprised in turn many local cultivars and landraces. Their exact number can hardly be established, particularly today when they are critically endangered by genetic erosion except for the germplasm material being preserved at several gene banks.

Main wheat species cultivated in Georgia

Free-threshing wheat Species

According to modern genetic classification, 7 out of 8 free-threshing wheat species were distributed in Georgia. One of them, *T. carthlicum*, is the Georgian endemic variety. These species were represented by numerous botanical varieties and landraces. The seven species are:

Triticum aestivum L., soft wheat, (common wheat, Ipkli, Khulugo, Doli, Photo 1): The oldest Georgian name of the species is ‘Ipkli’, this being evidenced in the first written sources (5th century AD). Later, only one landrace has preserved this name. The remains of soft wheat together with other cereals are found in the archaeological materials of the Neolithic Age in West Georgia and of the Eneolithic Age in East Georgia. Since then,

the soft wheat has spread in every locality of Georgia, which had at least minimal environmental conditions for wheat cultivation. This was possible due to the large diversity of the species including a large number of botanical forms. The diverse ecological conditions of Georgia made it possible to develop several ecotypes within one variant such as *T. aestivum* var. *ferrugineum*, the following three local varieties are known: Meskhuri Tsiteli Doli, Kakhuri Tsiteli Doli, and Svanuri Tsiteli Doli, which developed under completely different ecological conditions. The Meskhuri Dolispuri was developed under harsh climatic conditions to which it is adapted. The Kakhuri Dolispuri is adapted to almost subtropical conditions, whereas the Svanuri – to high-mountain conditions. Good taste and sustenance are the common traits of these landraces. The soft wheat species (*T. aestivum*) is also noted for its diverse biological properties - there are winter, spring and facultative varieties. The species of this wheat adapt well to heavy, poor soils, develop well under both irrigated and rainfed conditions. The grain size of the wheat cultivated under irrigated conditions exceeds that of the one grown under rainfed conditions, but is inferior to the latter in sustenance, fragrance and bread-baking properties. Therefore, this wheat was generally cultivated on rainfed land. Georgian species and landraces are also noted for their prolific tillering capacity, yield stability, resistance to shattering and some diseases.



Photo 1. *Triticum aestivum* L., soft wheat, (common wheat, Ipkli, Khulugo, Doli).

Georgian Doli wheat species are also noted for other advantages. However, these varieties have certain disadvantages as well. These landraces are prone to lodging under high input agriculture and

irrigation conditions, rust diseases, and small-grain size. In spite of this, the people have given it a pet name “Mother Wheat” and the bread baked from its flour – “Mother’s Bread”. Georgian soft wheat varieties are used to derive modern wheat species (Naskidashvili, 1978). Regrettably, these wheat species are critically endangered in Georgia. Fortunately, they are known and conserved in genebanks abroad. Thus, for example, Georgian Red Doli is sown in southern France which is known there as ‘Caucasus Rouge’.

Triticum carthlicum Nevski (Dika, Photo 2): According to its distribution and significance, the Georgian endemic wheat species Dika ranks second in Georgian agriculture. Dika is known as a spring wheat of the middle and high-mountain area, and since Georgia is a mountainous country and its population had to live at the altitude of 2000 m a.s.l. and over, a quality grain crop was to be cultivated. The wheat crop best suited this purpose. Dika fields were found at the altitude of 750-2000 m asl., however the main sowings were still located within 1000-2000m asl. At the altitudes over 2000m asl. Dika was represented as a cenosis - *T. carthlicum*, *T. aestivum* rather than independently. An example of the above is Javakhetian Dika – a combination of Red Dika and the spring soft wheat. Dika is characterized of a great diversity of forms. It is comprised of (1) mountain forest zone and (2) mountain steppe ecotypes; the first ecotype was distributed within the Great Caucasus Range forest belt (900-1400 m asl.), where the black-eared variety *fuliginosum* Zhuk. prevailed. It is grown exclusively in East Georgian mountain region Pshavi. It also makes the principal background in the sowings of Trialeti, Manglisi, and Marneuli (Bregadze, 1980). As a mixed crop, it is met within the Great Caucasus’s Enguri, Kvirila and Patara Liakhvi river valleys. In the second ecotype population, prevails a more drought-resistant, short-vegetation red wheat variety *rubiginosum* Zhuk.

This wheat is the main crop in the regions and districts of Samtskhe-Javakheti, Bakuriani, Borjomi Tsalka, Trialeti, Kartli, Pshav-Khevsureti, Mtiuleti, Tusheti, Imereti, Racha-Lechkhumi, and Svaneti. The white-kernelled variety of Dika - *stramineum* Zhuk., is found as a mixture in Trialeti, within the Rioni, Liakhvi, Enguri, and Kvirila river valleys, and in the districts of Ertso-Tianeti, Dusheti, Manglisi, and Marneuli. Thus, Dika was distributed where the soft winter wheat was not grown. These were generally mountain regions. As regards a Dika-soft wheat mixture, it is of great importance because it gives the grain better baking quality. A

barley-Dika mixture is also known for its good performance under high-mountain cold climate conditions, where Dika followed barley, which used to ripen earlier; at this time, the barley, being much smaller in stature than Dika, occupied the first tier, while Dika the second tier of the sowing. This enabled to make the sowing thicker, without interference of the two crops. The bread baked from the flour of this mixed crop outperformed in quality the barley bread. One more mixture – wheat-rye, should be mentioned here, which was widely distributed within Samtskhe-Javakheti, where rye frequently infested wheat crops. This gave an impetus to Georgian farmers to produce such a mixture intentionally. In this case, rye occupies the second tier, because it is higher than wheat.



Photo 2. *Triticum carthlicum* Nevski (Dika).

The bread with specific flavour and taste used to be baked from the wheat-rye mixture flour. Both the soft wheat and Dika were found in the wheat-rye mixture, all this is an evidence of great keenness of observation and practicality of the Georgian farmer. This is not a simple mechanical mixture but rather represents a competition between the wheat and rye varieties in nutrient uptake from the soil, as well as of water and light, the result of which, in addition to a competition between these two crops, is also their successful cohabitation. Despite the fact that Dika wheat was so widely distributed in Georgia, today it is critically endangered. The practices of mixed-sown crops have also been forgotten. One reason is the unjustified, sometimes forcible migration of the mountain population to lowland regions. The other one is the preferential livestock development of

cattle breeding in highlands at the expense of plant cultivation reduction. However, it is known that the full-value development of cattle breeding in isolation from field crops cultivation is practically impossible.

The Association Elkana has propagated the Dika wheat in farmers' fields in Samtskhe-Javakheti. Unfortunately, the 2009 adverse weather conditions fully destroyed wheat crops within the area up to 1000 m asl., while at the altitude of 1300-1400 m asl, the wheat developed well. Such climate anomalies continued in 2010 and will probably continue in the future against the background of the global warming. Therefore, Dika sowings should be moved farther up beyond 1200 m asl.

Triticum durum Desf., durum wheat (Tavtukhi, Photo 3): By its distribution and importance, this wheat ranks third in Georgia and second in the world. Several alternative views regarding the durum wheat distribution in Georgia exist. According to V. Menabde, the old-local Georgian Dika wheat was a result of divergence of the Near East durum wheat under mountain conditions. This opinion is also evidenced by the durum wheat seed remains discovered as a result of archaeological excavations in Kvemo Kartli, dating back to the fifth millennium BC. And concerning the distribution of the term 'Tavtukhi' in the Georgian language, it coincides with the fact of second introduction of durum wheat from the West Asia. It is exactly at this time, the 17th century, when Persia started to settle the Turkmen Qizilbash tribes in Kvemo Kartli. The distribution scope of Tavtukhi in Georgia is relatively restricted geographically and vertically as well. It is a lowland zone (400-800 m asl.) crop. The main distribution area of Tavtukhi in Georgia comprises the Bolnisi-Marneuli-Gardabani districts in Kvemo Kartli. Its distribution within other districts is insignificant. The so restricted area of Tavtukhi can be explained by the fact that the territory suitable for its distribution is sown to soft winter wheat varieties that outperform Tavtukhi by their quality characteristics – adaptation to the environment, yield capacity, and bread-baking quality. At present, the durum wheat is critically endangered in Georgia, with the exception of small area where the black-bearded durum wheat (var. *apulicum* Körn.) is grown in Kvemo Kartli.

Triticum compactum Host., club wheat (Kondara, Chagvera, Nagala Puri, Photo 4): It is a phylogenetic form close to soft wheat, and some wheat taxonomists (Menabde, 1948) classify it as soft wheat. This variety should rank among the oldest wheats of Georgia, because its remains were

discovered as a result of archaeological excavations in Kvemo Kartli, dating back to the sixth millennium B.C. In spite of the above, the wheat does not have economic importance in Georgia, therefore it is rarely can be found in pure sowings, although in some districts (Tetritskaro, Dmanisi), its pure sowings are also found. Morphologically the wheat strongly resembles the soft wheat, differing by having a compact spike (head). Hence its name - *T. compactum*. Despite insignificant economic importance, its botanical diversity is rather wide. Its 11 varieties are known in Georgia. In Meskheta the variety 'Tashbashi' is known, which is also found in Kartli. The variety is considered mountain wheat and is generally found within the soft wheat sowings in mountains. Being higher than the soft wheat, it occupies the second tier of the sowing. As a result, the sowing is rather thick and its yield is relatively higher.



Photo 3. *Triticum durum* Desf., durum wheat (Tavtukhi).

Triticum turgidum L., (English wheat, Photo 5): The wheat belongs to a 28-chromosome durum wheat group. Locally, it is mainly found as a mixed crop in the sowings of *T. durum*. Up to 12 varieties of the English wheat are registered in Georgia. The plant is characterized of high stalk (100-170 cm), average-sized, sometimes branched spike/head; the number of flowers per spikelet makes 5-7; the grain is flinty, white and red. In the 1950s, its sowings were found in Lechkhumi and Abkhazia, near Gagra, in small quantities – also in Samtskhe (Adigeni district). A branchy-eared variety of the English wheat – 'Kakhuri Datotvili' has been developed but its distribution failed. The English

wheat has lately come into the focus of attention of triticologists. It is considered one of the key species in the modern genetic classification of the wheat. In particular, it comprises most tetraploid wheats (Löve & Löve, 1985; Singeren et al., 1984; 1994). In spite of its great intraspecific diversity, the wheat does not have economical importance.



Photo 4. *Triticum compactum* Host., club wheat (Kondara, Chagvera, Nagala Puri).



Photo 5. *Triticum turgidum* L., English wheat.

Triticum polonicum L., (Polish wheat, Photo 6): Polish wheat is locally found as a mixed crop within Tavtukhi fields. Its pure sowings are registered in Shida and Kvemo Kartli (V. Menabde, 1948; N. Ketskhoveli, 1957). The Polish wheat has a very attractive original spike, especially noticeable are its long (3.5cm) hulls. Its grains are of glassy consistence. The wheat is poorly distributed in Georgia, its only 3-4 varieties being found in Georgia. The Khorasan wheat - *T. turanicum* Jakubz. (P. Zhukovskiy, 1923; Udachin, 1979) is registered in Georgia. The var. *odsissianum* (Zhuk Udach. was described by Zhukovskiy (1923). This wheat is widely distributed in our neighbouring countries (Armenia, Azerbaijan, and Turkey). Supposedly, it should have been widely represented in Georgia as well.



Photo 6. *Triticum polonicum* L., Polish wheat

Hulled wheat Species

Triticum monococcum L., cultivated einkorn (Gvatsa Zanduri, Photo 7): Cultivated einkorn is diploid, 14-chromosome hulled wheat, characterized of wide distribution area. In Georgia, it was distributed both as pure sowings and in the coenosis with Chelta Zanduri. The Georgian cultivated einkorn was divided into two morphological types by Menabde (1948). These are the West Georgian einkorn - *Proles colchicum* Men. – is characterized of strong development (gigantism) and is adapted to the Kolkheti humid environment, and the East Georgian einkorn - *Proles heothinum* Flaksb. – are relatively weakly developed, xerophilic, i.e. better adapted to dry environmental conditions.

Out of 4-5 varieties distributed in Georgia, one - var. *hornemannii* is present in Zanduri cenosis.

Other varieties are found both as pure sowings and as mixed crops in the durum wheat sowings. It is to be noted that the spikes of var. *hornemannii* frequently contain two-grained spikelet, which can be indicative of its bridging forms to Chelta Zanduri (*T. timopheevii* Zhuk.). Worthy of mention is a high content of protein of Gvatsa Zanduri, exceeding sometimes by 50% than of soft wheat. Also high is content of indispensable amino acids – phenylalanine, tyrosine, methionine, and isoleucine. These amino acids play a great role in the metabolism of human nerve cells. For example, phenylalanine and tyrosine participate in the synthesis of dopamine, noradrenaline, adrenaline and octopamine; these substances improve the human nervous system stability, contribute to the concentration of human spiritual strengths in terms of maintaining sobriety and stress relief. In addition to these substances, the einkorn contains the so-called yellow pigment – carotene, which is known for preventing rectal cancer. The bread baked from the einkorn flour has the hazelnut taste and flavor, which greatly improves the bread quality. The antioxidant carotene contains vitamin A. Thus, the cultivated einkorn is of many dietary uses, especially in Europe, where it is much valued and priced. It can also be used as animal feed. Earlier, its stalks, as the wholesome and strong material, were used in Georgia to cover roofs of various buildings. The stalks were also used as a binding/tying material, for stuffing mattresses, filling up various hollows, basket weaving and cap knitting.



Photo 7. *Triticum monococcum* L., cultivated einkorn (Gvatsa Zanduri).

Triticum dicoccum Schuebl., cultivated emmer (Aslim Photo 8): Emmer is the ancient hulled wheat. It was widely distributed in Asia, Europe and Africa. It is reputed to be the first cultivated wheat that originated from wild emmer (*T. dicoccoides* (Körn) Schweinf. F.Kornike 1888; A. Aaronsohn, 1906; G. Schweinfurth, 1908 et al) growing wild in the Fertile Crescent of the Near East. According to Vavilov (1931, 1935) and E. Sinskaya (1955), these two species originated in parallel from one common ancestor. Of interest is the opinion of Gorgidze (1968) that the soft emmer originated by mutation from the Colchian emmer - *T. paleocolchicum* Men., whereas Kuckuck (1964) believed that that it originated from the Georgian cultivated emmer Dika - *T. carthlicum*. In Georgia, emmer was sown in the mountain area of East Georgia, within both the Greater and Lesser Caucasus Range. Because of its adaptability to cold mountain climate Emmer was sown in the places, where other crops could not perform. It is the spring wheat noted for its resistance to diseases and drought. Its grain protein content makes 23%. It is used for making bread, gruels, as animal feed. Emmer has been critically endangered in Georgia. It has been preserved only in one place: the village Didi Gomareti of Dmanisi (Beridze et al. 1989). In 2000, Elkana received the germplasm from village Gomareti consisting of two varieties var. *farrum* Bayle & var. *rufum* Schuebl.



Photo 8. *Triticum dicoccum* Schuebl., cultivated emmer (Asli).

Triticum paleocolchicum Men., (Kolkhuri Asli, Photo 9): Kolkhuri Asli, or Colchian Emmer, is a narrow endemic species of Georgia. First (Supatashvili, 1929) it was ascribed to *T. dicoccum* var. *chvamicum* Supat. For its distinct morphological traits, L. Dekapreleovich and V. Menabde (1932) transferred it to rank of a subspecies - *T. dicoccum* ssp. *georgicum* Dek.&Men.; while, after it had been discovered in the archeological excavation dating to the Neolithic Age, V. Menabde (1940) ranked it as the species *T. paleocolchicum* Men. According to Menabde (1940), it represents a living relict of the historical past. Kolkhuri Asli is the emmer wheat. It is frequently found in the ceonosis of Macha wheat - *T. macha* Dek.Men., although its pure sowings are also found (Supatashvili, 1929). It is characterized of a compact, flat spike with 4-5 floret-bearing spikelets, the number of which per spike makes 34-36. Out of the favourable traits of Kolkhuri Asli, mention should be made of its resistance to fungous diseases. Its grain protein content amounts to 18.8%, that of lysine – 2.9%. Its high quality gluten conditions good bread-baking properties. The species adapts well to humid climate of West Georgia, also performing well under dry, hot climate conditions of East Georgia. This evidences the suggestion of its wider distribution in Georgia in the earlier times and the fact of its preservation in West Georgia where, under humid conditions, it has successfully replaced the cultivated emmer. Menabde (1948) considers Kolkhuri Asli as the ancient initial species that has arouse from the proto-macha in the Neolithic. Kolkhuri Asli is a good starting germplasm for its important desirable traits (Naskidashvili, 1978, 1984).



Photo 9. *Triticum paleocolchicum* Men., (Kolkhuri Asli).

Triticum timopheevii Zhuk. (Zanduri, Chelta Zanduri, Photo 10): Thanks to its unique properties, Zanduri is the most important wheat. Of its unique properties, mention should be made of Zanduri's absolute immunity to both - diseases and pests. Wheat is known to be prone to numerous diseases and pest. Some fungus diseases (rusts, smut, powdery mildew, etc.) may lead to a 25-30% loss of the yield. After Zanduri, wheat had become known to the general public not only in Georgia but abroad as well (in 1932, when Zhukovskiy described and classified the wheat as *Triticum timopheevii*), the intensive utilization of the wheat as germplasm began. The initial information about Zanduri comes from Gldenstdt (1771-1773), then Georgi (1795-1800). They described Zanduri wheat as the cultivated einkorn - *T. monococcum*, which can be explained by the fact that this very variety predominated in Zanduri sowings. Later, when as a result of divergence, the share of *T. timopheevii* in the ceonosis had increased, arose a need to define their name. Locals used to name *T. monococcum* and *T. timopheevii* according to their spike shape - Gvatsa Zanduri and Chelta Zanduri respectively, while the ceonosis retained its common name Zanduri; later (1958), a new (third) variety - *T. zhukovskiy* Men. & Er., was added to the ceonosis. In 1948, Menabde delineated the exact distribution area of this wheat, which looks as follows: the northern boundary of distribution goes along the Tsageri-Orbeli-Lailashi-Patara Oni line; the eastern boundary is Kvanchkara-Dghnori; the western – Tamakoni-Gordi-Mekhena-Dghnori. These sites are known as the wheat's exclusive distribution area. New varieties derived in crosses with the wheat in Australia, and America, such as Konly, Timsten, Timgalen, Timvera, Gabo, Bledzoe, Georgia 1123, etc., share Zanduri wheat's disease immunity traits. These varieties are also immunity donors and gave rise to numerous other varieties.

Another direction in wheat breeding with the active involvement of Zanduri wheat is the cytoplasmic male sterility (CMS) and fertility restoration. The ability of Zanduri wheat to produce a CMS line was demonstrated in 1962 by Wilson and Ross (1962). When crossed with soft and durum wheat species, the first line – Wilson (that gave rise to the new Wilson variety) was reported to possess Zanduri cytoplasm. Sterile analogs of the wheat with Zanduri cytoplasm are not distinct from the initial form. After studying many sources of CMS, the Zanduri cytoplasm was found to be most valuable among them. Within pollen fertility restorers, particularly in the chromosome 1A, two

fertility restoration genes - Rf1 and Rf2. are localized. Several fertility restoration genes are reported to be identified in the Zanduri wheat cenosis (Fedin, 1972). Zanduri restores fertility in the lines having its cytoplasm, but in no case of Egilops'. This fact evidences that Zanduri is free from *Aegilops* genes. The fact that Zanduri had a restricted distribution area in Racha-Lechkhumi is indicative of its specific use for food. Zanduri bread was generally baked during special events – to celebrate the occasion, and to treat guests of honour. Zanduri has many desirable economic traits and should therefore be more widely utilized in the future for producing high- immunity & grain protein varieties.



Photo 10. *Triticum timopheevii* Zhuk. (Zanduri, Chelta Zanduri).

Triticum macha Dek. & Men. (Macha, Photo 11): According to V. Menabde (1948), the term 'makha' is the term of basic meaning in the vocabulary of the ancient civilization nations, which, in his opinion, is confirmed by the Sumerian language data (Grozny, 1913). As it is found out, the word 'mah' means – dear, respected, and splendid. In the vocabulary of West Georgians, 'makha' has a polysemantic meaning. For example, in Samegrelo 'makha' means 'man', in Lechkhumi – 'wheat', in Svaneti – 'makhashi' (a populated place). In Lazika, the word 'mokha' was given to the very special wheat. Possibly, asserts Menabde, a divine cult was meant under the word 'makha'. The same Sumerians had grain goddesses. Menabde believes that 'makha' had also a totemic loading and that is the reason why it has preserved to our days. Menabde concludes that Makha wheat

represents a type of soft wheat of the Stone Age. It existed together with free-threshing wheats, the distribution area of which was in West Asia. Makha is brittle and needs to be harvested in two stages. First, using a special implement – a hand thresher known locally as 'shnakvi' ('shamkvi') – spikes were collected and then the stem was cut. In spite of being hulled, grains in Makha wheat spikelet are not so densely set as in other hulled wheats (Zanduri, Asli). Based on the above, Menabde (1948) asserts that Makha is the progenitor of soft wheat species which, after acquiring the Q factor – the easy threshing character and the rachis stability – it, as a result of anthropogenic selection, has developed into a modern bread wheat. Makha is noted for its varietal diversity (14 varieties). For this reason, Dekaprevich (1954) divided it into two subspecies - ssp. *imereticum* and ssp. *tubalicum*. Makha is a winter wheat. Among its desirable traits are: adaptability to humid environments, rather high resistance to diseases and pests, ability to produce large biomass; it is less demanding to soils, has high stem; its grain protein content makes 18%; it has good bread-baking quality and good yield potential under conditions of a humid environment, where other wheats become susceptible to fungus diseases. Because of being the carrier of the RF genome, Makha also represents the restorer of fertility in hybrid forms possessing the Zanduri wheat cytoplasm (Kihana and Tsunewaki, 1966).



Photo 11. *Triticum macha* Dek. & Men. (Macha).

Triticum spelta L., spelt (Photo 12): This wheat species has a rather interesting history. It was described as far back as the 18th century by Linné and was considered as the species spread in West Europe. According to Flaksberg (1935), it was

developed by the Old Germanic tribes – Alemanians and Schwabians. However, spelt was also distributed in Spain Asturias (where it was threshed by means of a shnakvi-like implement, like in Lechkhumi), to a lesser extent in Switzerland, Belgium, Australia. In 1957-58, the German scholar Kuckuck during an expedition in Iran discovered many forms of spelt in the territory inhabited by Bakhtrians. After that, spelt was also found in the countries neighbouring Iran – Turkey, Azerbaijan, and Armenia, but was not yet found in Georgia. Although, N. Ketskhoveri (1957) describes a case evidencing that spelt was known in Georgia. In particular, one of German encyclopaedias belonging to the Georgian prince Ioane Bagrationi bears an inscription ‘asli’ made in the hand of its owner beside the picture of spelt. Spelt as the emmer wheat should certainly have been distributed in Georgia as well. In 1967, several spikes strongly resembling spelt in the spikelet morphology were found in fields sown to Tetri Doli wheat in the village of Nichbisi, Mtskheta district. The forms with such hulls are known as speltiforms. The obtained material used to be sown and observed during years on an experimental plot. As a result of observations, the spike was found to be difficult to thresh, its rachis – brittle; the spike itself is beardless, of light blue color. This wheat variety failed to be placed in a set of the existing varieties. Therefore, it was decided to name it according to the place where it was collected, that is Kartli – var. carthlicum, without the Latin binomial.



Photo 12. *Triticum spelta* L., spelt.

Some researchers (Melia, 1972) think that the origin of speltoid plants in soft wheats results from the Q-factor weakening and the q factor

strengthening. The spelt origin ways should be sought in the interaction of hexaploid wheats. There are known crosses between soft wheat and makha, during which speltoid forms are intensively segregated in the F2 generations, which if subjected to purposeful selection, may end up with creation of new varieties. True, macha wheat has been preserved only in Georgia, however there is an opinion (Menabde 1971), and not ungrounded, that it should have been distributed within much larger territory, together with soft wheat and that their spontaneous intercrossing was taking place at a larger scope. For the people, for whom Makha is not a totemic plant, the cultivation of other varieties, spelt in this case, in a wider territory should not pose a problem. That is why Makha wheat and not spelt has been preserved in Georgia. However, why has it (spelt) been preserved in Europe? It is known that eastern peoples were moving westwards along the northern coasts of the Mediterranean Sea towards Spain. The territories through which this road went were exactly the places where these nations lived (Switzerland, Germany, and Austria) and where spelt was spread.

Triticum Zhukovskiyi Men. & Er., (hexaploid Zanduri, Photo 13): This wheat is one of the youngest varieties discovered in the 20th century. Menabde (1958-59) isolated it from the Zanduri wheat ceonosis. For its morphological and biological characters, and then based on the identified number of chromosomes ($2n=42$), the wheat was classified as hexaploid Zanduri endemic to Georgia. *T. zhukovskiyi* is very close to *T. timopheevii*. Its leaves and stem joints are bristly; the spike is long and relatively narrow. In terms of ecology, it resembles *T. timopheevii* for its ability to perform well in humid, cool foothill; its grain protein content makes 23.6%, that of lysine – 2.9%. The bread baked from its flour is noted for its quality and nutritional value. The wheat is also known for its good immunity. Zhukovskiyi wheat arose through autopolyploidy of *T. monococcum* - Gvatsa Zanduri (V. Menabde, 1958, 1960; Gorgidze, 1968; Chkhaidze, 1969). According to them *T. zhukovskiyi* includes six genomes of *T. monococcum* and its genomic formula is $AAAAAA=6A$. According to the research conducted by Tavrini (1963) and Upadhyya and Swaminathan (1965), *T. zhukovskiyi* is allohexaploid species and comprises genomes of *T. monococcum* and *T. timopheevii*. The same was stated by Bowden, 1959. This actually corroborates the opinion of Georgian triticologists regarding the characteristics of the Zanduri cenosis and its being

free from the *Aegilops* genome. Both directions - autopolyploidy and allopolyploidy were taking place in the Zanduri cenosis, under conditions of Georgia, while people fixed this process through selection and divergence. If earlier three species made up one sowing, thereafter the Georgian agriculturist managed to isolate them according to the morphological and quality traits that were characteristic of these species. Thus, the origin of Zanduri cenosis species is closely connected with the creative and agronomic activity of the Georgian people.



Photo 13. *Triticum Zhukovskiyi* Men. & Er., hexaploid Zanduri.

Utilization of wheat products in Samtskhe-Javakheti region, South Georgia

Wheat grains are used to prepare various authentic Georgian dishes – Korkoti (wheat gruel), Khalipapa (thin wheat gruel), various porridges and soups. Various nutrition dishes and cookies are made with the wheat flour and grains together with fat. There are water mills throughout the region where the local people mill their wheat harvest. There are also big stone mortars in rural households where the wheat grains are formed into Korkoti (grains without husks), which is used for preparing various dishes. Also, wheat grain is used to feed domestic animals, in particular, wheat grains are used as the poultry feed and the bran is used to supplement cattle feed. Grain is fed to livestock whole or coarsely ground. Straw is made into mats, carpets, baskets and used for packing material, and

cattle bedding. Samtskhe-Javakheti is known for dishes using local cereal crops. Wheat flour and grains are used in the local cuisine. Bread baking with the wheat flour has a long history in the region; many rural households still keep this tradition. A *purne* (bread oven) holds a special place in Samtskhe-Javakheti homes and is used to bake a variety of breads including *lavashi* (soft, paper-thin flat bread), *shoti* (Meskhetian holed bread), *kakala* (round bread made by dividing the dough into round pieces and cooking them on a thick stone), and *somin* (*somun* in Turkish is bread baked on a moderate fire and noted for longer shelf-life and freshness).

Dough is also used in cooking other local dishes such as *tatarberagi*, which is a flattened dough shaped like a butterfly and boiled in salty water, eaten with the addition of *matsoni* (yogurt), garlic, and onion roasted in melted butter; *bishi* and *fatirbishi* (dough fried in oil or cooked in melted butter); *lukhumi* (round pieces of soufflé-like paste roasted in oil or melted butter); *katmar*, a five-layer rolled butter pastry similar to Georgian *kada*; *sironi*, which are Meskhetian noodles eaten with *matsoni*. Another dough-based food is home-made macaroni, called *erishta*. A traditional Meskhetian dish is *khinkali*, ravioli-like boiled dumplings found all over Georgia, but here also stuffed with *apokhti* (goose or other meat cured and dried), seasoned with pepper and steamed.

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