Ethnobotany of the Caucasus – Georgia

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Introduction

Location

Georgia is situated between latitudes 41° and 44°N, and longitudes 40° and 47°E, with an area of ca. 70,000 km^2. Georgia politically associates with European Union and takes part in all major programs of European development and cooperation. However, Georgia's geographical location depends how the boundary between Southeastern Europe and West Asia is perceived. Most commonly, this boundary is defined as the Main Range of the Greater Caucasus. In this case, Georgia, however small, appears as a transcontinental country with its larger part located south to this divide (i.e., in Asia) and smaller but strategically important parts (Khevi, Piriketi Khevsureti, etc.) located north of the continent divide (i.e., in Europe). Therefore,

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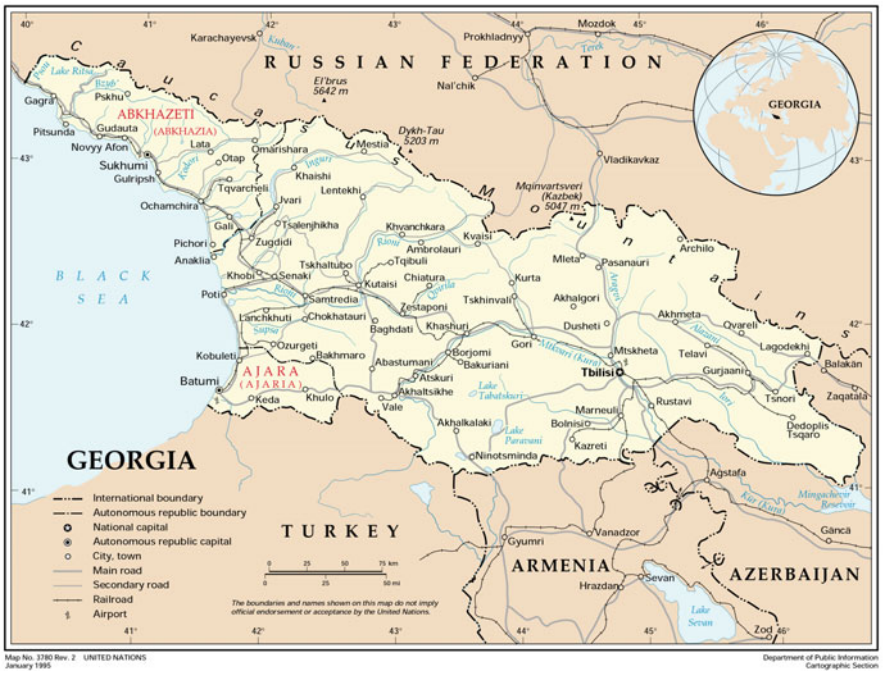

Fig. 1 Georgia map

Georgia is often described as an Eurasian country located on the crossroads of Eastern Europe and West Asia. Georgia is bounded to the west by the Black Sea, to the north and northeast by Russian Federation, to the south by Turkey and Armenia, and to the southeast by Azerbaijan (Fig. 1).

Geology

The Georgian part of the Caucasus started as the Alpine geosyncline in the late Oligocene Epoch, and the region thus reflects the same structural characteristics as the younger mountains of Europe. Therefore, the Greater Caucasus Mountains are mainly composed of Cretaceous and Jurassic rocks with the Paleozoic and Precambrian rocks in the higher regions. Structurally it represents a great anticline uplifted at the margin of the Alpine geosyncline about 25 million years ago and subsequently altered by fresh cycles of erosion and uplift. Hard, crystalline, metamorphosed rocks such as schists and gneisses, as well as pre-Jurassic granites are characteristic of the western part, while softer, Early and Middle Jurassic clayey schists and sandstones characterize the eastern part. The foots of the Greater Caucasus are built of younger limestones, sandstones, and marls. By contrast, the Lesser Caucasus Mountains are formed predominantly of the Paleogene rocks interspersed by the Jurassic and

Cretaceous rocks. The youngest geological structures of Georgia are represented by the vast volcanic plateaus in the southern part of country.

Two main plain areas – the plains of Colchis and Kura-Aras are also linked to the Alpine geosyncline; the former is related to the formation of the Black Sea, the latter to that of the Caspian. The Colchis plains is mainly represented by deposits broken here and there at the foots of the mountains by the protrusions of slightly older sedimentary rocks. Younger rock also underlies the Kura-Aras Lowland. Overall, three tectonic units can be distinguished by the degree of dislocation of the Earth's crust: (1) Fold system of the Greater Caucasus; (2) The Transcaucasian intermountain area; (3) The fold system of the Lesser Caucasus. Each of these tectonic units can be further subdivided into finer units.

Terrain

Georgia's terrain is extremely complex with steep climatic gradients. Four main units of terrain can be distinguished: (1) mountains of the greater Caucasus; (2) the inter-mountain plains between the Greater and Lesser Caucasus mountains; (3) the mountains of the Lesser Caucasus; (4) The Volcanic plateau of the Southern Georgia. These primary units can be further subdivided into secondary ones (below).

The mountains of the Greater Caucasus. This unit contains many ranges, gorges and depressions. The following secondary units can be distinguished: (1) the main watershed of the Greater Caucasus with peaks over 5000 m (Shkara, Babis Mta, Chanchakhi, etc.); (2) the ranges south to the main Range of the Greater Caucasus running either north to south or east to west (the ranges of Gagra, Bzipi, Chkhalta, Kodori, Shdavleri, Tsalgami, Svaneti, Egrisi, Lechkhumi, Shoda, Kedeli, Racha, Java, Avlevi, Kakheti, etc.) with peaks over 4000 m (e.g., the peak of Lahili elevated to 4010 m); (3) the ranges north to the main Range of the Greater Caucasus running either north to south or east to west (the ranges of Khokhi, Piriketi, Kuro, Shavani, Khevsureti, Tusheti, etc.), one of the highest peaks of Georgia, Mkinvartsveri or Kazbegi (5033 m), is located on the Khokhi range (Figs. 2, 3, 4, 5, 6, 7, and 8).

The inter-mountain plains. There are two major inter-mountain plains between the Greater and Lesser Caucasus mountains: those of Colchis (the Western Georgian plains) and Iveria (the Eastern Georgian plains). The terrain of both is rather hilly. The Colchis plains consists of the Colchis lowlands and hilly zones adjacent from north and south. The elevation is 200 m in average, although it can reach 1000–1200 m here or there. The plains of Iveria consists of the Shida (Inner) Kartli, Kvemo (Lower) Kartli and the Alazani or Inner Kakheti valleys. Basically the elevation ranges 200 m to 800 m, whilst in the hilly zone the elevation range can raise up to 500–1500 m. The highest range is Gombori reaching 2000 m.

The mountains of the Lesser Caucasus. The mountains of the Lesser Caucasus are considerably lower than those of the Greater Caucasus. The highest peaks here rarely exceed 3000 m a.s.l. (Mepistskaro, Kheva, Shavi Klde, Kanis Mta, Arsiani). The mountains of the Lesser Caucasus are represented by the ranges running east to west (Shavsheti, Meskheti, Trialeti and Loki) and the range of Arsiani that runs rather

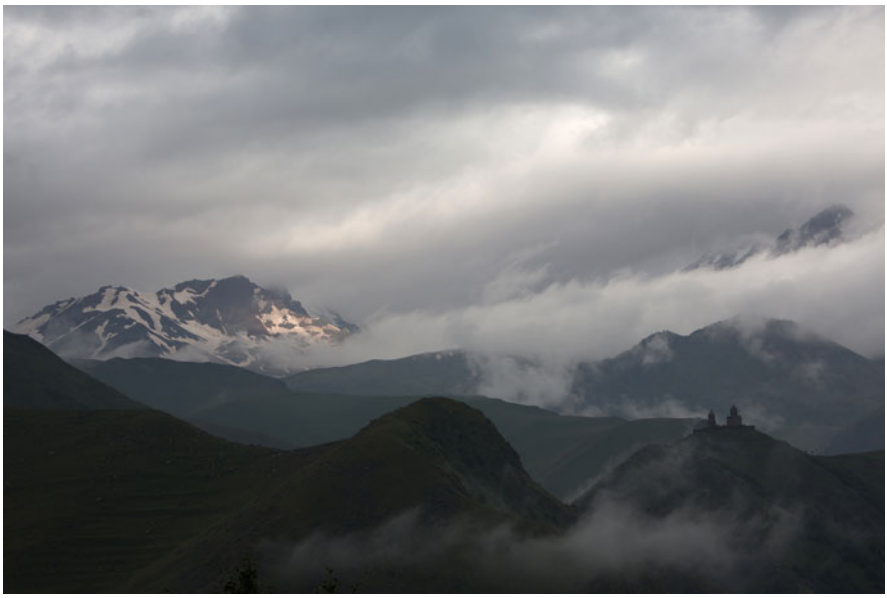

Fig. 2 Gergeti Trinity church and Kazbegi, Greater Caucasus, Khevi, Georgia (Photo R. Bussmann)

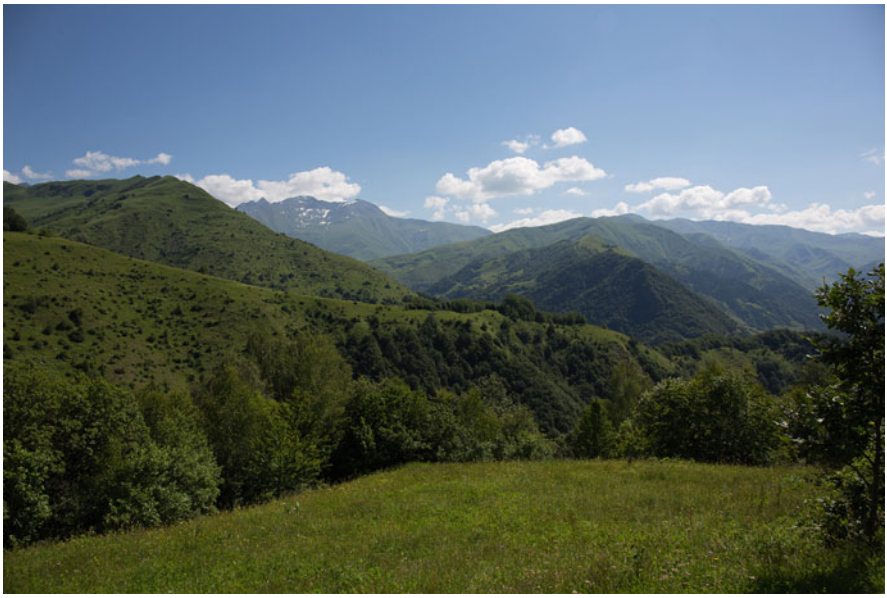

Fig. 3 Greater Caucasus landscape in Khevsureti, Georgia (Photo R. Bussmann)

Fig. 4 Village Juhta in the Greater Caucasus, Khevi, Georgia (Photo R. Bussmann)

Fig. 5 Skhara Summit, Greater Caucasus, Svaneti, Georgia (Photo R. Bussmann)

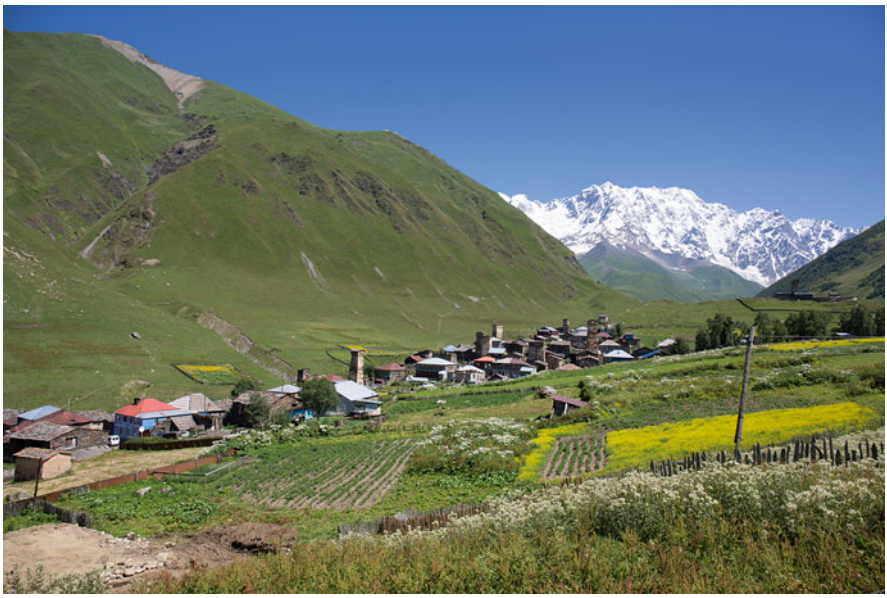

Fig. 6 Zhibiani village, Greater Caucasus, Svaneti, Georgia (Photo R. Bussmann)

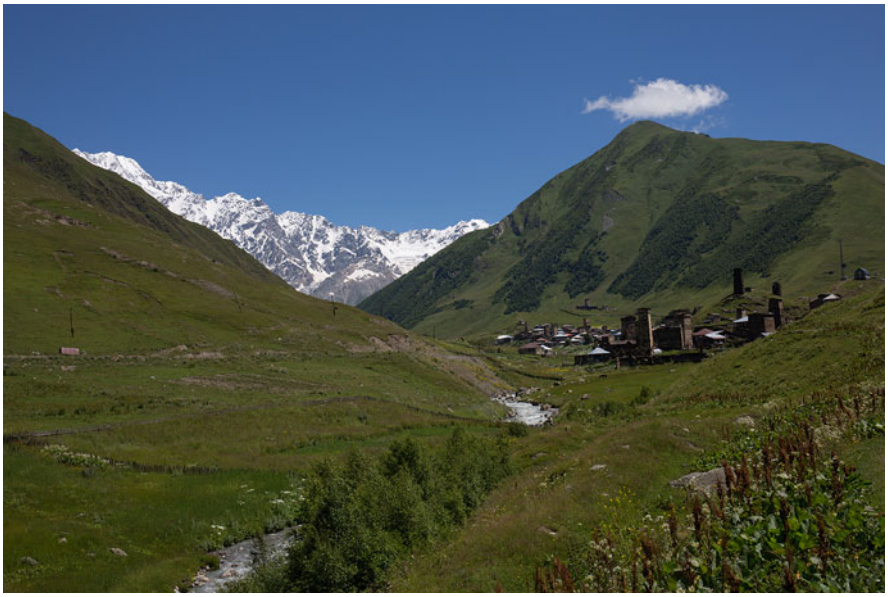

Fig. 7 Chazhashi village, Greater Caucasus, Svaneti, Georgia (Photo R. Bussmann)

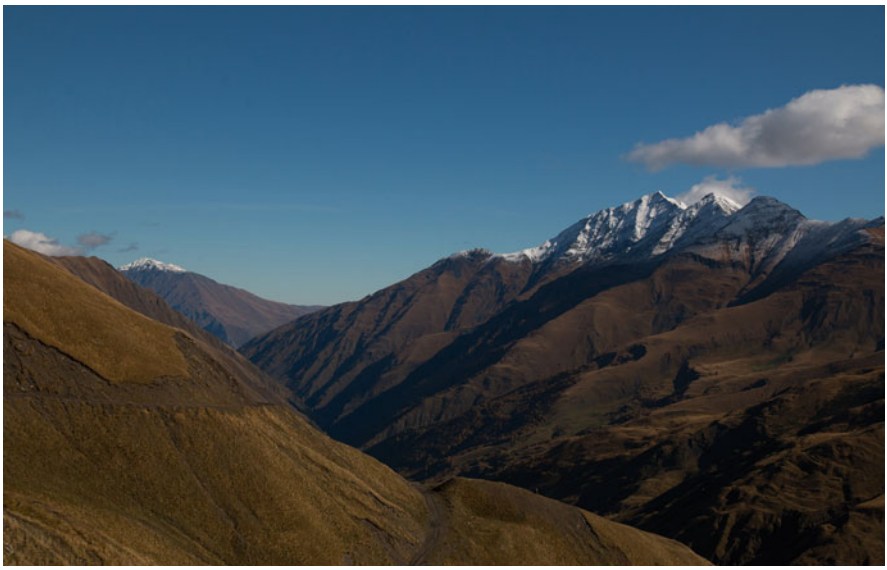

Fig. 8 Northern Caucasus, Georgia (Photo N. Paniagua Zambrana)

diagonally, the Khrami Mountains Middle Knot, and the Akhaltsikhe depression (Figs. 9 and 10).

The Volcanic plateaus of the Southern Georgia. These plateaus are featured by their vastness and elevation (1300–2200 m). The terrain is characterized by the sequence of the central volcanoes and lava warping, as well as lava plateaus with the trace of ancient glaciations and eroded canyons. The peaks of some ranges (Erusheti, Nialiskuri, Samsari and Javakheti) elevate as high as 2950–3300 m. The following units can be distinguished: (1) the Range of Erusheti, (2) Javakheti Plateau; (3) the ranges of Samsari and Javakheti, (4) Tsalka Plateau-Depression, and (4) Khrami Lava Plateau.

Climate

Georgia's climate is determined by its location within a warm temperate zone between the Black and Caspian Seas, and the complexity of its terrain in which mountain ranges and their orientation play an important part. The coastline of Georgia is 330 km long and the climate of the coastal zone is warm: the mean temperature is 4–7 °C in January and 22–23 °C in July. Precipitation is abundant (1500–2000 mm annually), especially in the southern part. At the same time, The Greater Caucasus mountains bars cold air from the north, while warm and moist air from the Black Sea spreads easily into the coastal lowlands from the west till the

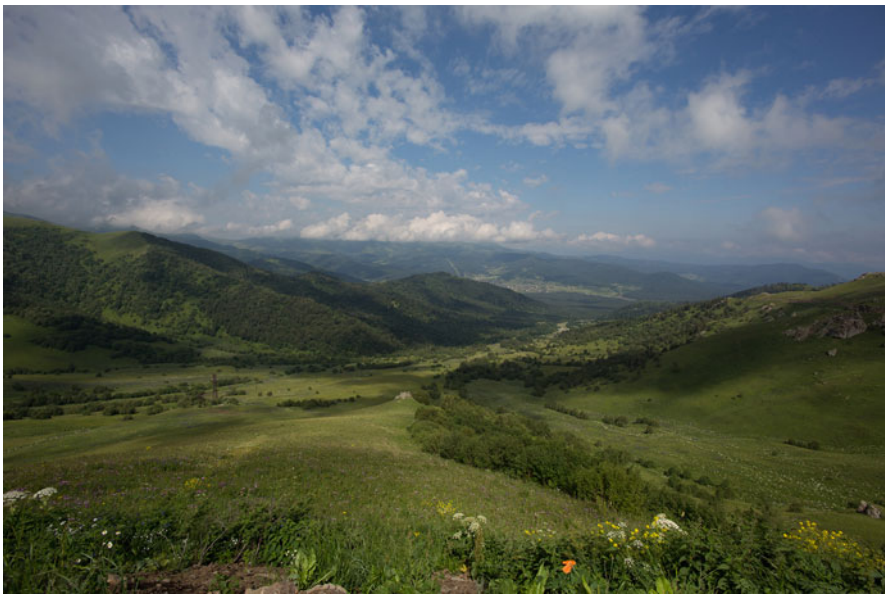

Fig. 9 Lesser Caucasus close to Bakuriani, Georgia (Photo. R. Bussmann)

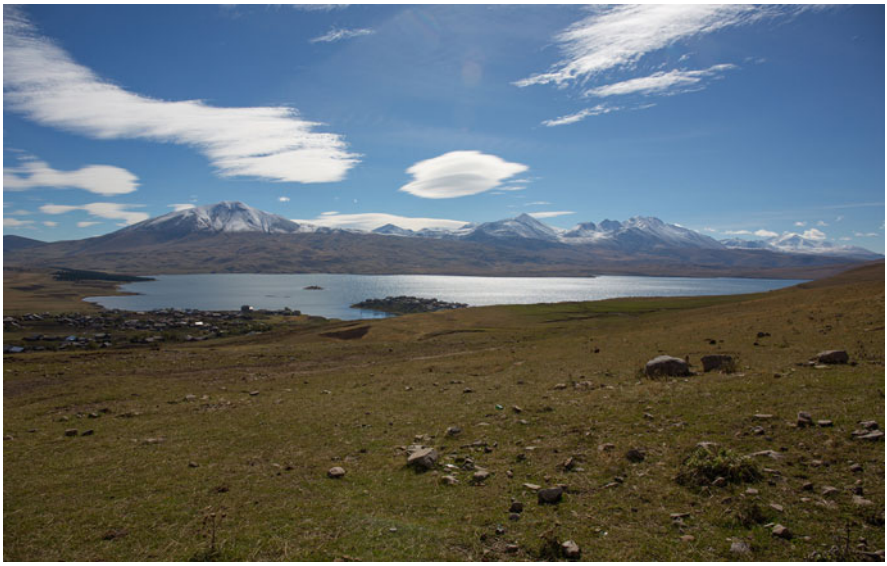

Fig. 10 Lake Tabatskhuri, Lesser Caucasus, Georgia (Photo R. Bussmann)

range of Likhi, which partly impedes further westward movement of the warm and moist air waves. The international climate classification based on the system of Koeppen distinguishes four major climate types in Georgia: (1) warm oceanic–humid subtropical (Cfa) in the most areas to the west and east of the central Georgia; (2) Temperate oceanic (Cfb) in the southwest; (3) Warm continental – humid continental (Dfa) in the central Georgia except its southern part; (4) Temperate continental – humid continental (Dfb) in the southern part of the central Georgia. However, this classification does not fully reveal the diversity of Georgia's climate – for example, in the central Georgia, precipitation in mountains can be twice of that in the plains. Likewise, in the west the warm oceanic-subtropical climate can be found only at lower elevations (less than 650 m); in more elevated terrains and also to the north and east the climate becomes moderately warm. In the mountains weather conditions change to cool and wet quite steeply with increasing elevation and above 2100 m a.s.l. the environment becomes sub-alpine and alpine; permanent snow and ice are found above 3600 m a.s.l. Overall, climatically the following provinces can be distinguished: (1) The Western Great Caucasus with humid warm climate; (2) the Eastern Greater Caucasus with continental warm to maritime intermediary climate; (3) the Colchis plains with hyper-humid warm climate where the influence of the Black Sea is most prominent; (4) the plains of Shida Kartli with moderately dry warm climate; (5) the plains of Kvemo Kartli with dry warm climate; (6) Iori Plateau with dry continental climate; (7) the Inner Kakheti with moderately humid warm climate; (8) Meskheti (Samtskhe) with dry continental climate; (9) Javakheti with continental climate, etc.

Plant Use History

The flora of Georgia is very well studied (Chikovani and Svanidze 2004; Dmitrieva 1990; Dolukhanov 2010; Flora of Georgia 1941–1952; Flora of Georgia 1971–2011; Gagnidze 2005; Gulisashvili 1959–1970; Ketskhoveli 1960; Kolakovski 1980–1986; Makashvili 1952–1953; Nakhutsrishvili 2012).

The territory of modern-day Georgia has been continuously inhabited since the early Stone Age, and agriculture was developed during the early Neolithic era (Javakhishvili 1987). In Georgian the name of the country is "Sakartvelo", and "Georgia" is semantically linked to Greek (γεωργία) meaning "agriculture" (Javakhishvili 1987). Human occupation however started in the Early Pleistocene. The 1.7-Myr-old hominid fossils of Dmanisi in Southern Georgia are the earliest known hominid-site outside of Africa (Finlayson 2005; Gabunia and Vekua 1995; Gabunia et al. 2000). This specimen has been classified as Late Middle Paleolithic and Early Upper Neanderthal and modern human occupation are well documented (Adler and Bar-Oz 2009). Upper Paleolithic fossils of Dzudzuana Cave include remnants of wool (*Capra caucasica*) and dyed fibers of wild flax (*Linum usitatissimum* L.) dated to ~36–34 Ka BP (Adler and Bar-Oz 2009).

The Caucasus is counted as one of the global biodiversity hotspots, and Georgia has its fair share of the tremendous diversity of the region (Schatz et al. 2009). Botanical exploration of the Caucasus has a long history, yielding good recent treatments of the area's vegetation, in particular with regard to Georgia (Nakhutsrishvili 1999). As such Georgia has long been the center point of botanical Exploration in the Caucasus, with Bakuriani alpine Botanical Garden serving as a hub. The visitor's log of the garden reads like a "Who is who" of twentieth century Botany.

The archaeological findings from Neolithic and Early Bronze periods are rich with plant fossils and seeds of both wild species and local landraces. Seven species of cultivated wheat – *Triticum aestivum* L., *T. carthlicum* Nevski, *T. compactum* Host, *T. dicoccum* Schrank, *T. macha* Dekapr. and Menabde, *T. monococcum* L., *T. spelta* L., one wild relative, *Aegilops cylindrica* Host., as well as millet – *Panicum milliaceum* L., barley – *Hordeum vulgare* L., Italian millet – *Setaria italica* L.) P. Beauv., oats – *Avena sativa* L., wild lentil – *Lens ervoides* (Brignolidi and Brunhoff) Grande, and pea -*Pisum sativum* L. have been discovered in Arukhlo, dating back to the 6th–2nd millennium BC (Melikishvili 1970). The earliest grapevine seeds indicating cultivation were excavated in southern Georgia and date to ~8.000 years BP (Ramishvili 1988). Due to its long tradition, agriculture in Georgia is characterized by a great diversity of landraces, and endemic species of crops. These show a high level of adaptation to local climatic conditions and often-high disease resistance. Early research documented this great variety (Dekaprelevich and Menabde 1929; Ketskhoveli 1928, 1957; Ketskhoveli et al. 1960; Menabde 1938; 1948), but a rapid loss of local cultivars of cereals, legumes and flax began in the 1950s with Soviet agricultural reform (Akhalkatsi 2009; Akhalkatsi et al. 2010; Akhalkatsi et al. 2012). Despite the long cultural history, recent studies on cultivated plants are rather scarce (e.g. Pistrick et al. 2009; Zhizhizlashvili and Berishvili 1980).

Georgia counts as one of the oldest Christian regions, adopting Christianity around 320 CE. A great example for early church construction is Gergeti Trinity Church, built in the fourteenth century, located at 2170 m at the base of Mount Kazbeghi (5047 m), overlooking the narrow valley leading from Georgia to Ingushetia. However, ancestral shrines are still very common in many regions of Georgia.

Grapes – *Vitis vinifera* L. (Vitaceae) show genetic diversity in Georgia, with about 500 varieties known (Javakhishvili 1987; Ketskhoveli et al. 1960; McGovern 2003; Ramishvili 1988; This et al. 2006), and in most regions the population takes great pride to produce their own wine and share it with visitors. Hardly any house in the Georgian lowlands is without at least some grapes in its garden or backyard. Today, 41 cultivars of grapevine are used as commercial varieties in Georgia (Bedoshvili 2008), and good wine is readily available, but the history of grape cultivation and winemaking goes back millennia. Like in other parts of Europe, Georgian grapes were devastated by the *Phylloxera vastatrix* (Planchon) Signoret and after the infestation in the 1860s most Georgian grape varieties are now grafted on rootstocks of American grapes resistant to *Phylloxera* (Figs. 11 and 12).

Fig. 11 Wine Grapes, Imereti, Georgia (Photo R. Bussmann)

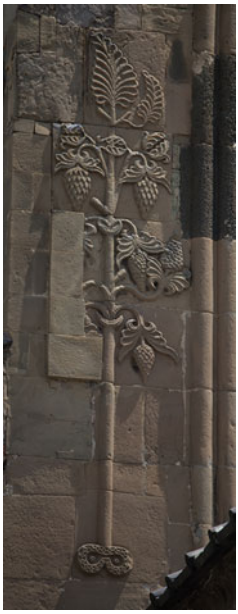

Fig. 12 Wine grape ornamento on Mtskheta Cathedral, Georgia (Photo R. Bussmann)

Wheat – *Triticum* L. (Poaceae): In the 1940s 16 species, 144 varieties, and 150 forms of wheat were registered in Georgia (Menabde 1948). This diversity has however greatly diminished and most species had already disappeared by the 1960s, when introduced cultivars were favored in Soviet kolkhoz systems. At present, none of these species are sown in Georgian commercial agriculture. Pistrick et al. (2009) report some traditional varieties of bread wheat in Tusheti, Meskheti, Javakheti and Svaneti

Barley – *Hordeum vulgare* L. (Poaceae) is also an ancient agricultural crop in Georgia, and had particular importance in beer production, as well a function in religious rituals and traditional medicine (Badr et al. 2000; Javakhishvili 1987).

Caucasian Rye – *Secale cereale* L. (Poaceae) used to be cultivated in the high mountain regions of Georgia (1800–2200 m), and entered into bread and beer production, although barley was preferred for beer.

Legumes, especially peas (*Pisum sativum* L.), lentils (*Lens cornicularis* L.), chickpeas (*Cicer arietinum* L.), faba beans (*Vicia faba* L.) are still commonly grown in home gardens, and Green Pea (*Pisum sativum*) is thought to have originated in the Southern Caucasus. Traditional vegetables like garden lettuce (*Lactuca sativa* L.), beans (*Phaseolus vulgaris* L.), sweet basil (*Ocimum basilicum* L.), peppermint (*Mentha x piperita* L.), onions (*Allium cepa* L.), sugar beets (*Beta vulgaris* L.), spinach (*Spinaca oleracea* L.), carrots (*Daucus carota* L.), radishes (*Raphanus sativus* L.), turnips (*Brassica rapa* var. *rapa* L.), Welsh onion (*Allium fistulosum* L.), Amaranth (*Amaranthus viridis* L.), Goosefoot (*Chenopodium album* L.), leeks (*Allium apeloprasum* L.) and garlic (*Allium sativum* L.) are still very common throughout the region, and herbs like parsley (*Petroselinum crispum* (Mill.) Fuss.), coriander (*Coriandrum sativum* L.), tarragon (*Artemisia dracunculus* L.), savory (*Satureja hortensis* L.), gardencress (*Lepidium sativum* L.), dill (*Anethum graveolens* L.), fennel (*Foeniculum vulgare* Mill.), celery (*Apium dulce* Mill.), *Allium fistulosum* L., *Brassica rapa* L. subsp. *rapifera* Metzger, *Lathyrus sativus* L., *Linum usitatissimum* L., *Medicago sativa* L., *Onobrychis transcaucasica* Grossh., *Pisum arvense* L., *Trigonella caerulea* (L.) Ser. are cultivated almost everywhere. In addition, introduced species like zucchini (*Cucurbita pepo* L.), cucumber (*Cucumis sativus* L.), eggplant (*Solanum melongena* L.), marigold (*Tagetes patula* L.), watermelon (*Citrullus lanatus* (Thunb.) Matsum. and Nakai), sunflower (*Helianthus annuus* L.), tomato (*Solanum lycopersicum* (Mill.) Wettst.), pepper (*Capsicum annuum* L.), potato (*Solanum tuberosum* L.), and maize (*Zea mays* L.), and were found to be popular ingredients of local cuisine.

Nicotiana rustica has been cultivated for a long time and is found in the most regions, including high mountain areas, of Georgia. *N. tabacum*, was only introduced during the Soviet period for commercial use.

A large number of additional species is traditionally also grown in home gardens, e.g. Sour plum (*Prunus cerasifera* var. *divaricata*) is commonly used as sauce with meat, Rose hips (*Rosa canina* L.) are often used for tea and to make jam, and *Staphyllea pinnata* L. (Bladdernut) inflorescences are a favorite pickle (Fig. 13).

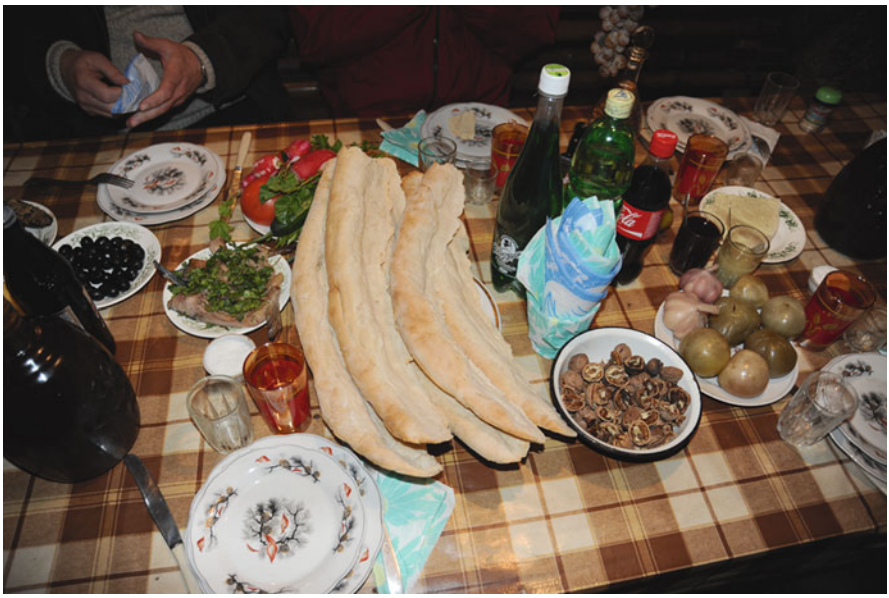

Fig. 13 Food diversity in Georgia (Photo R. Bussmann)

Threats to Diversity

The process of genetic erosion of ancient crop varieties was originally of little concern for the mountain areas of Georgia, which until the 1990s acted as a depository of ancient crops. Nowadays the main reason for genetic erosion of ancient crop varieties is the demographic decline in mountain regions due to harsh economic conditions and lack of modern infrastructure (Nakhutsrishvili et al. 2009). The shift from ancient cultivars to modern high-yielding crops such as maize and potato, which took place in the lowland areas much earlier, began in mountain villages after the end of Soviet occupation, when local inhabitants who had been forced to the lowlands, returned to their original villages. However, many villages in high altitude Georgia were abandoned under pressure during Soviet occupation, and while some families have returned at least for the summer, many villages were completely abandoned in the 1980s and remain in ruins. In occupied villages old household utensils like butter barrels are often to be found in storage, but not used anymore (Figs. 14 and 15).

Small bridges are still made from wood, but many other wooden household items like beautiful bed-headboards are simply discarded. Some implements, e.g. snowshoes or brooms are still maintained. Agricultural tools such as hay rakes are a common sight in abandoned barns, but more sought afar items like ox-drawn threshing sledges could only be found in museums. While sheep were produced on a

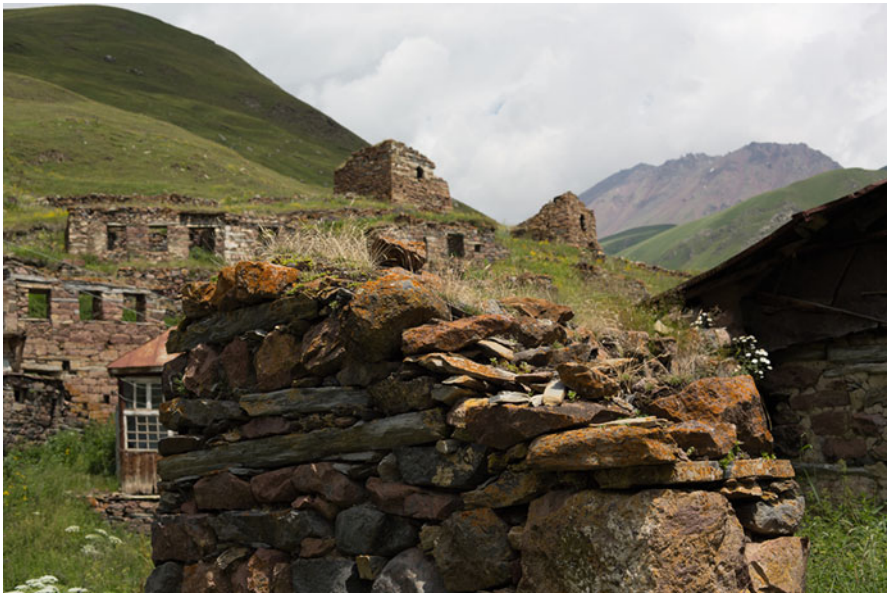

Fig. 14 Abandoned village, Khevi, Georgia (Photo R. Bussmann)

Fig. 15 Abandoned terraces, Shenako, Svaneti, Georgia (Photo R. Bussmann)

large scale during Soviet times, leading to widespread overgrazing, nowadays only a few scatterd herds remain, and traditional wool items are getting more difficult to find, while tourist products abound along roadsides especially in the outskirts of Tbilisi and resort areas like Borjomi and Barisako. Sadly, we could not find any grain cultivation anywhere, although old landraces of wheat and barley were formerly preferred to prepare bread and beer for religious rituals. Around Jutha village, Khevi, as well as in Khevsureti, many abandoned terrases indicate where grain was formerly grown. However there, as well as around Tabatzqhuri village, Samtskhe-Javakheti, fallow fields were long overgrown. Many old barns still contain clay lined grain storage baskets made from *Salix* sp., which quite often contain old grains. However, no grain has been grown in the region for decades. Giorgi Tsiklauri from Roshka indicated that last time barley was cropped 30 years ago, and gave us the last remaining grains form that harvest. Similarly, Anait Tonoyan from Tabatzqhuri said that barley was cropped "in early times" – when she was a child (50 years ago), but not any more. One old storage chest in an abandoned barn was still half full of oats, harvested in the 1970s, and some wheat bran was still found in an abandoned house Now villagers buy wheat to distil alcohol or to bake bread, or buy commercial beer making mixtures to brew their own beer.

The National Botanical Garden in Tbilisi runs a large seed bank and in-situ growing program for rare local species and varieties of *Triticum*, *Panicum*, and *Sorghum*, and some material is grown at the Ethnographic Museum in Tbilisi, where *Sorghum* is grown and dried and gruel with *Prunus* sauce is available to visitors (Bussmann et al. 2014, 2016a, b, c, 2017a, b, c).

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