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# An ethnobotany of Upper Imereti, Ukana Pshavi, Meshketi and Pankisi gorge, Sakartvelo (Republic of Georgia), Caucasus

**Abstract**

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Imereti and Meskheti are historical provinces of Georgia located on the south-facing macroslope of the western part of the Greater Caucasus (Imereti) and east of the Lesser Caucasus towards the Black Sea (Meskheti), while Pshavi and Pankisi, which is administratively part of Kakheti, lie on the Eastern extension of the greater Caucasus.
In this study we documented traditional plant use in Imereti, Meskheti, Ukana Pshavi and Pankisi. Fieldwork was conducted in October-November 2018. Interviews using semi-structured questionnaires were conducted with 34 participants (12 women and 22 men), with oral prior informed consent. We encountered 220 plant species belonging to 159 genera of 59 vascular plant families, 4 undetermined species, and 2 fungal species and 22 undetermined fungi, belonging to at least 5 fungal families being used in the research region. Of these 127 vascular plant species were exclusively wild-collected, 91 were grown in homegardens, and only 2 were both grown in gardens and collected in the wild. Plants and their uses mostly overlapped among the areas within the region, with a slightly wider divergence in uses than in plants. The environmental fit analysis showed that a large degree of this variation was explained by differences among participant communities. The elevation of the participant community significantly fit the ordination in plant-space and explained a large degree of the variation in plant species reported but not in use-space. Gender was not significant in plant-space or use-space.

*Key words*: Caucasus, ethnobotany, plant use, traditional knowledge, post-soviet development.

## Introduction

Georgia harbors a great diversity of crops and crop wild relatives, and plant use for medicine and other purposes is very common (Akhalkatsi & al. 2018a, b), and can often be traced back millennia (McGovern & al. 2018). Plant use is indeed widely shared among different ethnic and religious communities (Söderlind 2015). Imereti and Meskheti

are historical provinces of Georgia located on the south-facing macro-slope of the western part of the Greater Caucasus (Imereti) and east of the Lesser Caucasus towards the Black Sea (Meskheti), while Pshavi and Pankisi, which is administratively part of Kakheti, lie on the Eastern extension of the greater Caucasus (Kordzakhia & Javakhishvili 1971) (Fig. 1). The vegetation of the region includes montane forest, subalpine, alpine, subnival and nival zones and corresponds to the West Caucasian, i.e. Colchic, type of the vegetation vertical zonation (Gagnidze & Davitadze 2000; Zazanashvili & al. 1999). Most inhabitants speak both Georgian and Imeretian/Meskhetian/Pshavi, all belonging to the Kartvelian group of the Iberian-Caucasian family of languages, while the Chechen Kist inhabitants of Pankisi gorge also speak Chechen. The Kist people's origin can be traced back to lower Chechnya. In the 1830s and 1870s they migrated to the eastern Georgian Pankisi gorge and some adjoining areas of the provinces of Tusheti and Kakheti (Chikobava 1986; Beridze & al. 2003).

In this study we documented traditional plant use in Imereti, Meskheti, Ukana Pshavi and Pankisi and hypothesized that (1) plant use knowledge in general would be higher in isolated high elevation communities, that (2) use of home gardens would be much more restricted to lower elevation settings, (3) that the consumption of herbs as "*Phkhali*" (herb stew) and "*Pkhali*" (herb pie) would be prevalent in all areas studied, and (4) that the plant use of the Chechen Kist communities in Pankisi would greatly reflect the knowledge of the surrounding Georgian communities.


Fig. 1. Study area.

## Materials and methods

### *Ethnobotanical interviews*

Fieldwork was conducted in October-November 2018. Interviews using semi-structured questionnaires were conducted with 34 participants (12 women and 22 men), with oral prior informed consent. The participants were selected by snowball sampling, trying to reach gender balance and represent members of different age groups (25–80 years). However, most participants were over 45 years old, because only very few younger people remain in remote Georgian villages. All interviews were carried out in the participants' homes and gardens by native speakers of Georgian and its local dialects, and then translated into English. Plants grown in the home gardens were used as prompts, while wild-collected species were free listed. Wild-collected and garden species were identified directly in the field, as well as using this literature (Flora of Georgia Committee 1971-2011; Makashvili 1952-1953), and voucher collections deposited in the National Herbarium of Georgia (TBI). The nomenclature of all species follows www.tropicos.org, under APGIII (Angiosperm Phylogeny Group 2009). The spelling of vernacular names was standardized using Makashvili (1991).

### *Statistical analysis*

We ordered infromants using nonmetric multi-dimensional scaling on two distance matrices calculated with Bray-Curtis distances (Oksanen 2017). Each informant's data was one row. In the first matrix, columns represented plant species reported and cells summed each report (species-part-use combination) made for that species. In the second matrix, columns represented use categories. The resulting ordinations, in "plant-space" or "use-space", plot more closely together individuals who made more similar reports of plants and uses, respectively. We then fit different environmental vectors (elevation, age) and environmental factors (community, gender) to test how well each variable explains the location of informants in the ordination space. To calculate a measure of significance, we compared these fits to 999 randomized shuffles of the environmental variables using the R package *vegan* (Oksannen 2017).

We calculated informant consensus for a given Use Category as the number of use reports minus the number of taxa over the number of use reports minus one:

$$\frac{Nur - Nt}{Nur - 1}$$

To calculate the relative breadth with which plants were reported across the study (often called "importance"), we ranked species by three metrics: Cultural Importance Value (CIV) – the sum within species across all plant-uses of the number of informants reporting a plant-use over the number of informants reporting the plant; Use Diversity (UD) – the Shannon Index of uses; and Use Value (UV) – the number of reports of a species over total number of informants asked in a region (Philips & Gentry 1993).

## Results

We encountered 220 plant species belonging to 159 genera of 59 vascular plant families, 4 undetermined species, and 2 fungal species and 22 undetermined fungi, belonging to at least 5 fungal families being used in the research region. Of these 127 vascular plant species were exclusively wild-collected, 91 were grown in homegardens, and only 2 were both grown in gardens and collected in the wild. (Table 1). The most important use categories were food, and medicinal.

Participants were more differentiated by plant species reported (A, participants shown but plant species hidden for visual clarity) than by use reported (D, participants and uses shown). Elevation of participant community significantly fits the ordination in plant-space (B, $r^2 = 0.427$, $p = 0.001$) and in use-space (E, $r^2 = 0.375$, $p = 0.226$) (Fig. 2).

Most species and uses were widely used across the region, with more reports and unique reports from the Akhalsikhe region as well as from upper Imereti (Baghdati). The other regions showed a high overlap of both plant species utilized and their respective uses. Overall participants showed a high informant consensus in all use-categories (Fig. 3).

## Discussion

Surprisingly, the plant species number encountered in the research area was much lower than reported from other areas of Georgia. Species numbers were lower than in neighboring Svaneti-Lechkhumi (Bussmann & al. 2014, 2016a), Samtshe-Javakheti (Bussmann & al. 2017a, b), and much lower than in high altitude Tusheti-Khevsureti (Bussmann & al. 2016b, 2017c), and thus lower than species numbers and use reports than other areas in the wider Mediterranean (Bussmann & al. 2016c, Bussmann 2017). Participants in the presented study region reported mostly an inventory of plant species to Svaneti-Racha (SR, Bussmann & al. 2014, 2016a) and Guria (GU, Bussmann & al. 2018) participants from prior studies, and their locations in plant-space are clustered closer to those areas than to Tusheti-Khevsureti (TK, Bussmann & al. 2016b, 2017c), Samtshke-Javakheti (SK, Bussmann & al. 2017a, b), or Racha (RA, Bussmann & al. 2018) (Fig. 4). However, participants in the presented study region were not differentiated from prior studies by the relative frequency of different uses reported (Fig. 5).

The prevalence of wild collected species for medicinal applications, and garden species for food, was however very similar in other regions (Bussmann & al. 2017a; Pieroni & Sõukand 2017).

Overall the research region showed a similar to lower species number in comparison to a wide variety of studies published from other parts of Europe. The number of food species was not exceptionally high in comparison to other areas in the Mediterranean (Pieroni & Sõukand 2017; Nedelcheva & al. 2017; Łuczaj & al. 2017; Melián & al. 2017; Sõukand & al. 2017; Carvalho 2016; Polat & al. 2017; Kasper-Pakosz & al. 2016; Korkmaz & al. 2016; Dolina & al. 2017; Hajdari & al. 2018; Oztürk & al. 2018; Pawera & al. 2017; Pieroni 2017; Pieroni & al. 2018), and the number of medicinal species also surpassed comparative studies (Pieroni & Sõukand 2017; Nedelcheva & al. 2017; Melián & al. 2017; Sõukand & al. 2017; Carvalho 2016; Polat & al. 2017; Kasper-Pakosz & al. 2016; Korkmaz & al. 2016a; Dolina & al. 2017, Korkmaz & al. 2016b; Hajdari & al. 2018; Oztürk & al. 2018; Pawera & al.

2017; Pieroni 2017; Pieroni & al. 2018). Similar to Łuczaj & al. (2017), *Ranunculus* sp. and *Geranium* sp. were consumed especially in upper Imereti mixed with other herbs and walnuts as *Phkhali* (herb stew) and *Pkhali* (herb pie), indicating that the consumption of wild species considered somewhat toxic is indeed very widespread in Georgia. However, while the knowledge of such use was observed in other areas, none of the participants actually still used the species. The low variety of fungal species used as food was astonishing, especially when compared to other adjacent areas in Georgia, e.g. Racha, where fungal use was found to be very common. (Kupradze & al. 2015; Bussmann & al. 2018).

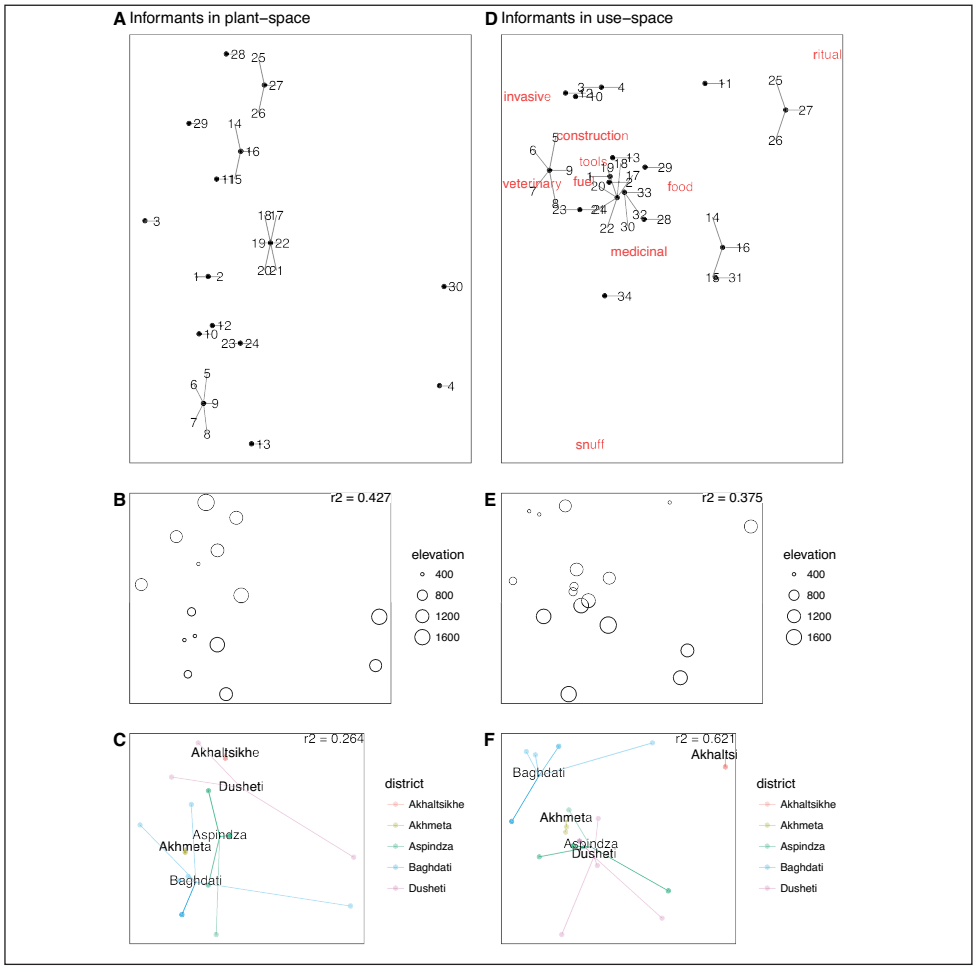


Fig .2. Participants ordered by their distance in plants reported (A,B,C) and in uses reported (D,E,F). Participants are more differentiated by plant species reported (A, participants shown but plant species hidden for visual clarity) than by use reported (D, participants and uses shown). Elevation of participant community significantly fits the ordination in plant-space (B, $r^2 = 0.427$, $p = 0.001$) and in use-space (E, $r^2 = 0.375$, $p = 0.226$).

Our results confirmed our hypothesis (1) that plant use knowledge in general would be higher in isolated high elevation communities, similar to other regions in Georgia, as well as that (2) the use of home gardens be much more restricted to lower elevation settings. However, our hypothesis (3) that the consumption of herbs as "*Phkhali*" (herb stew) and "*Pkhali*" (herb pie) would be prevalent in all areas studied was refuted, because most of the research area showed a lower consumption of *Phkhali/Pkhali* than other areas in Georgia. However, we could confirm that (4) the plant use of the Chechen Kist communities in Pankisi does indeed greatly reflect the knowledge of the surrounding Georgian communities, a fact which was also independently stated by the Kist participants in the interviews.

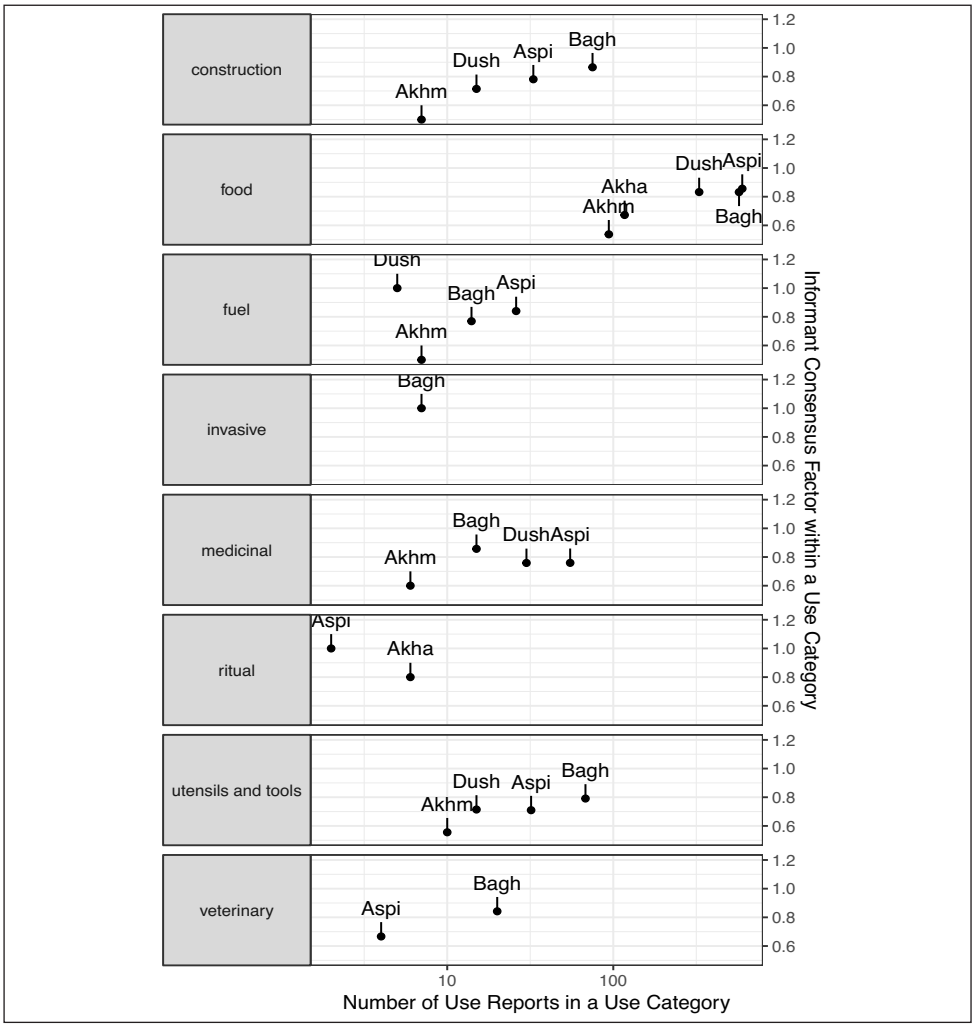


Fig. 3. Informant consensus plotted over number of use reports for each district within each Use Category. (Akha =Akhalsikhe; Akhm = Akhmeta; Aspi = Aspindza; Bagh = Baghdati; Dush = Duscheti).

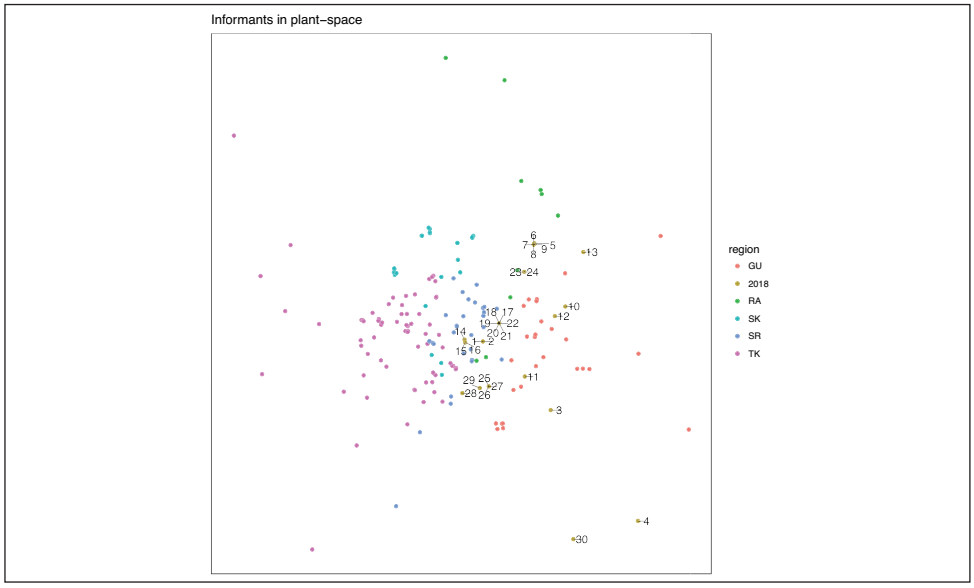


Fig. 4. Participants in the presented study region reported similar plants to Svaneti-Racha (SR) and Guria (GU) informants from prior studies, and their locations in plant-space are clustered closer to those areas than to Tusheti-Khevsureti (TK), Samtshke-Javakheti (SK), or Racha (RA).

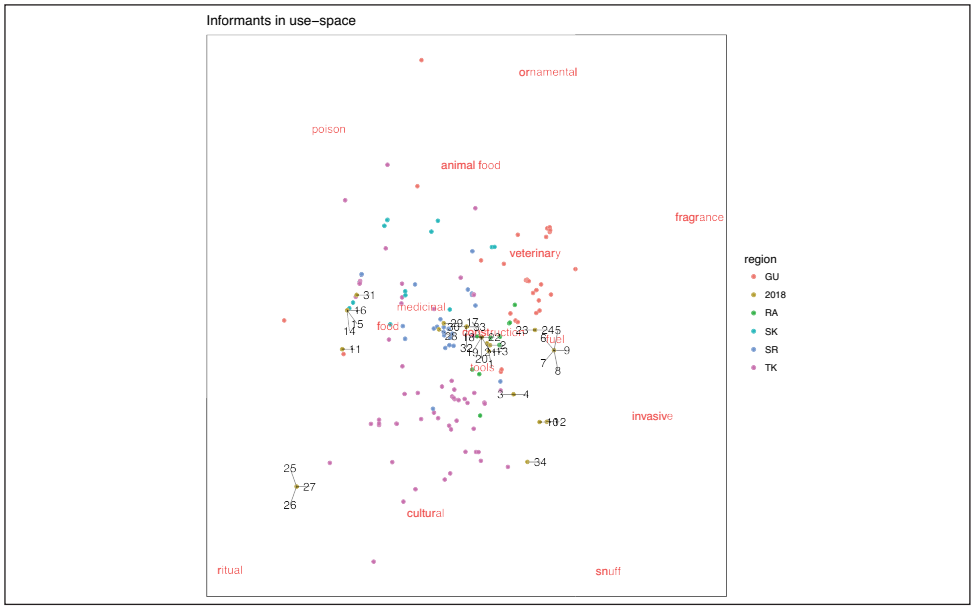


Fig. 5. Participants in the presented study region were not differentiated from prior studies by the relative frequency of different uses reported.

Table 1. Plants used in Guria and Racha.

| Family / Scientific name | Use category (Use description) | Georgian Name (Transliteration) [variety name (and transliteration)] | Part used | Location |
|---|---|---|---|---|
| ***Aceraceae*** | | | | |
| *Acer platanoides* L. | Fuel (Firewood) | ლეკა (lek'a) | Stem | Forest |
| *Acer* sp. | Utensils and tools | ნეკერჩხალი (nek'erchkhali) | Stem | Forest |
| ***Actinidiaceae*** | | | | |
| *Actinidia callosa* Lindl. | Food (Fresh, Jam) | კივი (k'ivi) | Fruit | Garden |
| ***Adoxaceae*** | | | | |
| *Sambucus ebulus* L. | Food (Alcohol, Fresh, Jam); Medicinal (Hypertension) | ანწლი (ants'li) | Fruit | Forest, Garden |
| ***Agaricaceae*** | | | | |
| *Agaricus arvensis* Schaeff. | Food | ქამა (kama) | Leaf | Forest |
| ***Amaranthaceae*** | | | | |
| *Amaranthus retroflexus* L. | Food (Phkhali) | ჩვეულებრივი ჯიჯლაყა (chveulebrivi jijlaq'a (cveulebrivi = common)), ჯიჯლაყა (jijlaq'a) | Leaf, Stem | Forest |
| *Beta vulgaris* L. | Food (Cooked) | ჭარხალი (ch'arkhali) | Leaf, Root | Garden |
| *Beta vulgaris* L. ssp. *cicla* (L.) Moq. | Food (Phkhali) | წითელი ფხალი (ts'iteli Phkhali) | Leaf, Stem | Forest |
| *Chenopodium album* L. | Food (Phkhali) | ნაცარქათამა (natsarkatama) | Leaf, Stem | Forest |
| *Spinaca oleracea* L. | Food | ნაცარქათამა (natsarkatama) | Leaf | Garden |
| ***Amaryllidaceae*** | | | | |
| *Allium atroviolaceum* Boiss. | Food (Pickled) | ყანის ნიორი (q'anis niori) | Bulb | Garden |
| *Alium* sp. | Food (Pickled, fresh, cooked) | ყანის ნიორი (q'anis niori) | Bulb | Garden |
| *Allium cepa* L. | Food (Fresh, cooked) | ხახვი (khakhvi); [შირაქულა (shirakula)] | Bulb, Leaf, Whole plant | Garden |
| *Allium fistulosum* L. | Food | ჭლაკვი (ch'lak'vi) | Leaf | Garden |
| *Allium ponticum* Miscz. | Food (Pickled) | ყანის ნიორი (q'anis niori) | Bulb | Garden |
| *Allium porrum* L. | Food (Fresh, cooked) | პრასი (p'rasi) | Whole plant | Garden |
| *Allium rotundum* L. | Food (Pickled) | ყანის ნიორი (q'anis niori) | Bulb | Garden |
| *Allium sativum* L. | Food ((en blanco)) | ნიორი (niori ) | Bulb | Garden |
| *Allium victorialis* L. | Food (Pickled) | მთის ღანძილი (mtis ghandzili) | Whole plant | Forest |
| ***Apiaceae*** | | | | |
| *Agasyllis latifolia* (Bieb.) Boiss. | Food (Fresh, Pickled) | დუცი (dutsi) | Stem | Forest |
| *Anethum graveolens* L. | Food (Fresh) | კამა (k'ama), ცერეცო (დიდი კამა) (tseretso (didi k'ama)) | Leaf, Shoots, Seed, Stem | Garden |

Table 1. continued.

| | | | | |
|---|---|---|---|---|
| *Apium graveolens* L. | Foo (Fresh) | ნიახური (niakhuri), ცერეცო (დიდი კამა) (tseretso (didi k'ama)) | Leaf, Stem | Garden |
| *Carum carvi* L. | Food (Spice) | კვლიავი (k'vliavi) | Leaf, Stem, Seed | Forest, Garden |
| *Chaerophyllum aureum* L. | Food | ყინტორა (q'int'ora) | Buds | Forest |
| *Chaerophyllum caucasicum* (Fisch.) B. Schischk | Food (Phkhali) | ღიმი, ატოლი (g'imi, at'oli); ხიფხოლა (khipkhola) | Leaf, Stem | Forest |
| *Conium maculatum* L. | Food | კონიო (k'onio) | Buds, Fruit, Stem | Forest |
| *Coriandrum sativum* L. | Food (Spice) | ქინძი (kindzi) | Leaf, Shoots, Seed, Stem | Garden |
| *Daucus carota* L. ssp. *sativus* | Food (Fresh, cooked) | სტაფილო (st'apilo) | Root | Garden |
| *Eryngium caeruleum* M. Bieb. | Cultural use (Protects from evil eye) | ლურჯი ნარი, ლურჯეკალა (lurji nari, lurjek'ala) | Whole plant | Forest |
| *Falcaria vulgaris* Bernh. | Food (Phkhali) | კოფრჩხილა (k'oprchkhila) | Leaf, Stem | Forest |
| *Foeniculum vulgare* Mill. | Food (Fresh) | დიდი კამა (didi k'ama), ცერეცო (tseretso) | Leaf, Stem | Garden |
| *Heracleum* sp. | Food (Pickled) | დიყი (diq'i) | Stem | Forest |
| *Petroselinum crispum* (Mill.) Fuss. | Food (Fresh) | ოხრახუში (okhrakhushi) | Leaf, Stem | Garden |
| ***Aquifoliaceae*** | | | | |
| *Ilex colchica* Pojark. | No use | ბაძგი (badzgi) | Stem | Forest |
| ***Araceae*** | | | | |
| *Arum* sp. | Food (Phkhali) | ნიუკა (niuk'a) | Leaf | Garden |
| ***Asparagaceae*** | | | | |
| *Asparagus officinalis* L. | Food (Phkhali) | სატაცური (sat'atsuri) | Leaf, Stem | Forest, Garden |
| *Muscari sosnowskyi* Schchian | Food; Utensils and tools (Whistles for children) | ყაზახა (q'azakha) | Stem | Forest |
| ***Aspleniaceae*** | | | | |
| *Asplenium pesudolanceolatum* Fomin | Veterinary (Udder inflamation) | გვიმრა? (gvimra?) | Leaf | Forest |
| *Asplenium scolopendrum* L. | Veterinary (Help cows ruminate) | მამასწარა? (mamasts'ara?) | Leaf | Forest |
| *Phyllitis scolopendrium* (L.) Newman. | Veterinary (Gas in cows) | ირმის-ენი (irmis-eni) | Leaf | Forest |

Table 1. continued.

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| ***Asteraceae*** | | | | |
| *Achillea millefolium* L. | Medicinal (Stomach ache, Wounds) | ფარსმანდუკი (parsmanduk'i) | Leaf | Forest |
| *Arctium lappa* L. | Food | ოროვანდი (orovandi) | Stem | Forest |
| *Artemisia absinthium* L. | Medicinal (Sedative); Veterinary (Toothache in rabbits) | მწარე აბზინდა (mts'are anzinda) | Leaf, Stem | Forest |
| *Artemisia dracunculus* L. | Food (Fresh) | ტარხუნა (t'arkhuna) | Leaf, Stem, Seed | Garden |
| *Cichorium intybus* L. | Medicinal (Tooth problems) | ვარდკაჭაჭა (vardk'ach'ach'a) | Leaf, Stem | Forest |
| *Cirsium incanum* (S.G. Gmel.) Fisch. ex M. Bieb. | Food (Phkhali) | თეთრი ნარი (tetri nari) | Leaf | Garden |
| *Cynara cardunculus* L. | Food | ესქანური ართიშოქი - (eskanuri artishoki) | Flower | Garden |
| *Echinops* sp. | Food | თავკომბალა (tavk'ombala) | Seed | Forest |
| *Helianthus annuus* L. | Food | მზესუმზირა (mzesumzira) | Seed | Garden |
| *Helianthus tuberosus* L. | Food (Fresh) | მიწავაშლა (mits'avashla), ხმატურა (khmat'ura) | Bulb | Forest |
| *Helichrysum* sp. | Medicinal (Anti-inflammatory) | ნეგო, უკვდავა (nego, uk'vdava) | Leaf, Stem | Forest |
| *Lactuca sativa* L. | Food | სალათა (salata) | Leaf | Garden |
| *Lactuca serriola* L. | Food (Phkhali) | ნარკოკობა, ჭინჭახა (nark'ok'oba, ch'inch'akha) | Leaf | Garden |
| *Petasites vulgaris* Desf. | Medicinal (Stomach ache) | ბუერა (buera) | Leaf | Forest |
| *Senecio platyphyllus* DC. | Medicinal | ხარისშუბლა (kharisshubla) | Leaf, Stem | Forest |
| sp. 1 | Medicinal (Stomach ache, Wounds) | ბუერა (buera) | Leaf | Forest |
| *Tagetes patula* L. | Food (Spice) | ყვითელი ყვავილი - "იმერული ზაფრანა" (qhvitheli qhvavili "imeruli zaphrana") | Flower, Leaf | Garden |
| *Taraxacum officinale* Wigg. | Food (Phkhali, Sweetener) | ბაბუაწვერა (babuats'vera) | Flower, Leaf, Stem | Forest, Garden |
| *Tragopogon* sp. | Food (Raw); Medicinal (Wounds) | ფამფარა (pampara), ფარსმანდუკი (parsmanduk'i) | Latex, Leaf | Forest |
| *Xanthium strumarium* L. | Food | ღორის ბირკა (g'oris birk'a) | Leaf | Garden |
| *Xeranthemum squarrosum* Boiss. | Cultural use (Ceremonial smoke) | ოქროცოცხა (okrotsotskha) | Seed, Whole plant | Forest |
| ***Berberidaceae*** | | | | |
| *Berberis vulgaris* L. | Food | კოწახური (k'ots'akhuri) | Fruit | Forest |

Table 1. continued.

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| ***Betulaceae*** | | | | |
| *Alnus barbata* C.A. Mey. | Fuel (Firewood); Utensils and tools (Black dye, Brown dye) | თხმელა (tkhmela), მურყანი (murq'ani) | Bark (inner), Leaf, Stem | Forest |
| *Betula litwinowii* Doluch. | Construction; Fuel (Firewood) | არყი (arq'i) | Stem | Forest |
| *Betula pendula* Roth | Construction; Fuel (Firestarter, Firewood)); Utensils and tools (Broom) | არყი (arq'i) | Stem | Forest |
| *Carpinus caucasica* Grossh. | Construction; Fuel (Firewood)); Utensils and tools (Axe handle) | რცხილა (rtskhila) | Stem | Forest |
| *Carpinus orientalis* Mill. | Construction; Utensils and tools (Axe handle) | ჯაგრცხილა (jagrtskhila) | Stem | Forest |
| *Corylus avellana* L. / *C. pontica* K. Koch. | Food; Utensils and tools (Yellow dye) | თხილი (tkhili) | Fruit, Leaf | Forest, Garden |
| ***Boraginaceae*** | | | | |
| sp. 1 | Food (Mixing wtih cheese) | ბატკნისყურა (bat'k'nisq'ura) | Leaf, Stem | Garden |
| *Symphytum grandiflorum* DC. | Food (Phkhali); Medicinal | ლაშქარა (lashkara) | Leaf, Stem | Forest |
| *Trachystemon orientalis* (L.) G. Don | Food (Phkhali) | ანჩხლა (anchkhla) | Leaf | Forest |
| ***Brassicaceae*** | | | | |
| *Brassica oleracea* L. | Food (Fresh, cooked, pickled) | კომბოსტო (k'ombost'o) | Fruit, Leaf | Garden |
| *Bunias orientalis* L. | Food; Medicinal | ხატოტი (khat'ot'i) | Latex, Leaf, Stem | Forest |
| *Capsella bursa-pastoris* L. | Food (Phkhali) | წიწმატურა (ts'ts'mat'ura) | Leaf, Stem | Forest |
| *Cardamine hirsuta* L. | Food (Phkhali) | ტყის წისმატი (t'q'is ts'its'mat'i) | Leaf, Stem | Forest |
| *Lepidium sativum* L. | Food (Fresh) | წიწმატი (ts'its'mat'i) | Leaf | Garden |
| *Raphanus sativus* L. var. *major* | Food (Fresh) | ბოლოკი (bolok'i) | Root | Garden |
| sp. 1 | Food (Spice) | პირშუშხა (p'irshushkha) | Root | Garden |
| ***Campanulaceae*** | | | | |
| *Campanula lactiflora* Bieb. | Food (Fresh) | კენკეშა (k'enk'esha) | Stem | Forest |
| *Campanula rapunculoides* L. | Food (Phkhali) | მაჩიტა (machit'a) | Leaf, Stem | Forest |

Table 1. continued.

| | | | | |
|---|---|---|---|---|
| ***Caprifoliaceae*** | | | | |
| *Viburnum lantana* L. | Food; Utensils and tools (Stick for walking) | უზანი (uzani) | Fruit, Stem | Forest |
| *Viburnum opulus* L. | Food; Medicinal (Cough) | ძახველი (dzakhveli) | Fruit | Forest |
| ***Caryophyllaceae*** | | | | |
| *Melandrium* sp. | Food (Phkhali) | სასტვენა (sast'vena) | Leaf, Stem | Forest |
| sp. 1 | Food (Phkhali) | ჭყიპანტა (ch'q'ip'ant'a) | Leaf, Stem | Forest |
| ***Commelinaceae*** | | | | |
| *Commelina communis* L. | No use | ტყის ჭორტანა (t'q'is ch'ort'ana) | Fruit, Stem | Forest |
| *Tradescantia* sp. | Medicinal (Medicinal) | უკვდავა (uk'vdava) | Whole plant | Forest |
| ***Convolvulaceae*** | | | | |
| *Convolvulus arvensis* L. | Food (Phkhali) | ხვართქლა (khvartkla) | Leaf, Stem | Forest, Garden |
| ***Cornaceae*** | | | | |
| *Cornus mas* L. | Food (Fresh, Jam) | შინდი (shindi) | Fruit | Forest, Garden |
| ***Crassulaceae*** | | | | |
| *Sedum stoloniferum* Gmel. | Food (Phkhali) | მსუქანა (msukana) | Leaf, Stem | Forest |
| ***Cucurbitaceae*** | | | | |
| *Cucumis sativus* L. | Food (Fresh, pickled) | კიტრი (k'it'ri) | Fruit | Garden |
| *Cucurbita pepo* L. | Food | გოგრა (gogra) | Fruit | Garden |
| ***Cupressaceae*** | | | | |
| *Juniperus depressa* Raf. ex McMurtrie | Medicinal | ღვია (ghvia) | Fruit | Forest |
| ***Dispacaceae*** | | | | |
| *Dipsacus sativus* (L.) Honck | Utensils and tools (Cleaning wool) | გოჭმო (goksho) | Inflorescence | Forest |
| ***Dryopteridaceae*** | | | | |
| *Polystichum* sp. | Veterinary (Mastitis in cows) | - | Leaf | Forest |
| sp. 1 | Food | ჩადუნა (chaduna) | Leaf, Stem | Forest |
| ***Ebenaceae*** | | | | |
| *Diospyros lotus* L. | Food | ჩვეულებრივი ხურმა (chveulebrivi khurma) | Fruit | Garden |
| ***Eleagnaceae*** | | | | |
| *Hippophaë rhamnoides* L. | Food | ქაცვი (katsvi) | Fruit | Forest |
| *Shepherdia* sp. | Food | - | Fruit | Forest |

Table 1. continued.

| | | | | |
|---|---|---|---|---|
| ***Ericaceae*** | | | | |
| *Rhododendron caucasicum* Pall. | Food (Fresh, Jam); Medicinal (Infusion); Utensils and tools (Brown dye) | დეკა (dek'a) | Flower, Leaf | Forest |
| *Rhododendron luteum* Sweet | Food | იელი (ieli) | Fruit | Forest |
| *Rhododendron ponticum* L. | Utensils and tools (For baking) | შქერი (shkeri) | Leaf | Forest |
| *Vaccinium arctostaphylos* L. | Food (Tea) | მოცვი (motsvi), მოცვი მაღალი (motsvi maghali ) | Fruit | Forest |
| *Vaccinium myrtillus* L. | Food (Raw, compote, Tea, ); Medicinal | მთის მოცვი (mtis motsvi) | Fruit | Forest |
| *Vaccinium vitis-idaea* L. | Food | წითელი (ts'ipeli) | Fruit | Forest |
| ***Fabaceae*** | | | | |
| *Lathyrus roseus* Steven | Food (Phkhali) | არჯაკელი (arjak'eli) | Leaf, Stem | Forest |
| *Lathyrus tuberosus* L. | Food | თერო (tero) | Tuber | Forest |
| *Phaseolus sativus* L. | Food (Cooked) | ლობიო (lobio) | Fruit, Seed | Garden |
| *Robinia pseudoacacia* L. | Food (Sweetener, ); Utensils and tools (Axe and hoe handle, Axe handle, Tool handles) | აკაცია (akatsia) | Flower, Stem | Forest |
| sp. 1 | Medicinal (Wounds) | სამყურა (samq'ura) | Leaf | Forest |
| *Trigonella caerulea* (L.) Ser. | Food (Spice) | ულუმბო (ulumbo), შამბრიკა (shambrika), უცხო სუნელი (utskho suneli) | Fruit, Seed | Garden |
| ***Fagaceae*** | | | | |
| *Castanea sativa* Mill. | Construction | წაბლი (tzabli ) | Stem | Forest |
| *Fagus orientalis* Lipsky | Construction (Roof tiles) | წიფელი (ts'ipeli) | Leaf, Stem | Forest |
| *Quercus iberica* M. Bieb | Food, Construction | მუხა (mukha) | Fruit, Stem | Forest |
| ***Fungi* indet.** | | | | |
| sp. 1 | Food | არყა - (ar´qa) | Fruiting body | Forest |
| sp. 2 | Food | ბუხმისოქო - (bukhmisoko) | Fruiting body | Forest |
| sp. 3 | Food | დათოსოქო - (datosoko) | Fruiting body | Forest |
| sp. 4 | Food | ირმისკვა - (Irmis´kva) | Fruiting body | Forest |
| sp. 5 | Food | კალმახასოქო- (kalmakhasoko) | Fruiting body | Forest |
| sp. 6 | Food | კისოქო- (kisoko) | Fruiting body | Forest |
| sp. 7 | Food | კოჯობა - (kojoba) | Fruiting body | Forest |
| sp. 8 | Food | მანსითო - (mansito) | Fruiting body | Forest |
| sp. 9 | Food | მანცქვალა - (matshkvala) | Fruiting body | Forest |

Table 1. continued.

| | | | | |
|---|---|---|---|---|
| sp. 10 | Food | მათშკვალა - (matshkvala) | Fruiting body | Forest |
| sp. 11 | Food | მელნისიდა - (melnisida) | Fruiting body | Forest |
| sp. 12 | Food | მითისქლმაგი - (mitisklmagi) | Fruiting body | Forest |
| sp. 13 | Food | ნიჯული - (nijuli) | Fruiting body | Forest |
| sp. 14 | Food | ნითლუა - (nitlua) | Fruiting body | Forest |
| sp. 15 | Food | ნითლუაყყალმასოქო - (qalmasoko) | Fruiting body | Forest |
| sp. 16 | Food | სერანა - (serana) | Fruiting body | Forest |
| sp. 17 | Food | წიფელა- (tsipela) | Fruiting body | Forest |
| sp. 18 | Food | წიფლისოქო - (tsiplisoko) | Fruiting body | Forest |
| sp. 19 | Food | წირალა - (tsírala) | Fruiting body | Forest |
| ***Geraniaceae*** | | | | |
| *Geranium* sp. | Food (Phkhali) | ნემსიწვერა (nemsits'vera) | Leaf | Forest |
| ***Gomphaceae*** | | | | |
| *Ramaria flava* (Schaeff.) Quél. | Food | ირმის რქა (irmis rka ), საჩიჩელა (sachichela) | Fruiting body | Forest |
| ***Grossulariaceae*** | | | | |
| *Ribes* sp. | Food | მოცხარი (motskhari) | Fruit | Forest, Garden |
| sp. 1 | Food | ხურტკმელი (khurt'k'meli) | Fruit | Garden |
| sp. 2 | Food | ხურტკმელი (khurt'k'meli) | Fruit | Garden |
| sp. 3 | Food | ხურტკმელი (khurt'k'meli) | Fruit | Garden |
| ***Hyacinthaceae*** | | | | |
| *Ornithogalum* spp. | Food (Phkhali) | ძაღლნიორა (dzaghlniora) | Whole plant | Forest |
| ***Hypericaceae*** | | | | |
| *Hypericum perforatum* L. | Medicinal (Anti-inflammatory, Sedative) | კრაზანა (k'razana) | Leaf, Stem | Forest |
| ***Juglandaceae*** | | | | |
| *Juglans regia* L. | Food; Utensils and tools (Brown dye) | კაკალი (k'ak'ali) | Fruit, Seed | Forest, Garden |
| *Pterocarya pterocarpa* (Michx.) Kunth ex Iljinsk. | Utensils and tools (Dye) | ლაფანი (lapani) | Leaf | Forest |
| ***Juncaceae*** | | | | |
| *Juncus effusus* L. | No use | ჭილი (ch'ili) | Leaf | Forest |
| ***Lamiaceae*** | | | | |
| *Lamium album* L. | Food (Phkhali) | ჭინჭრის დედა (ch'inch'ris deda) | Leaf, Stem | Forest |
| *Lamium purpureum* L. | Food (Phkhali) | ბებრისკონკა (bebrisk'onk'a) | Leaf, Stem | Forest |
| *Mentha pulegium* L. | Food | პიტნა (p'it'na) | Leaf, Stem | Garden |
| *Ocimum basilicum* L. | Food (Fresh, cooked) | რეჰანი (rehani) | Leaf, Stem | Garden |

Table 1. continued.

| | | | | |
|---|---|---|---|---|
| *Origanum vulgare* L. | Medicinal (Tea ); Utensils and tools (Brown dye) | თავშავა (tavshava) | Leaf, Stem | Forest |
| *Satureja hortensis* L. | Food (Fresh) | ქონდარი (kondari) | Leaf, Stem | Garden |
| *Satureja spicigera* (C. Koch) Bois. | Food (Phkhali) | ტყის ქონდარი (t'q'is kondari) | Leaf, Stem | Forest |
| *Thymus* sp. | Medicinal (Tea) | ბეგქონდარა (begkondara) | Leaf, Stem | Garden |
| ***Liliaceae*** | | | | |
| *Fritillaria lutea* Mill. | Food (Fresh, Jam) | ყვითელი ღვინა (q'viteli g'vina) | Buds | Forest |
| *Gagea* sp. | Food (Phkhali) | - | Leaf | Forest |
| *Galanthus* sp. | Food (Phkhali) | თეთრყვავილა (tetrq'vavila) | Leaf | Forest |
| *Ornithogalum woronowii* Kasch | Food (Phkhali) | ძაღლნიორა (dzaghlniora) | Leaf | Forest |
| ***Lythraceae*** | | | | |
| *Punica granatum* L. | Food | ბროწეული (brots'euli) | Fruit | Garden |
| ***Malvaceae*** | | | | |
| *Althaea* sp. | Food (Phkhali) | ტუხტი (t'ukht'i) | Leaf, Stem | Forest |
| *Malva neglecta* L. | Food (Phkhali) | ბალბა (balba) | Leaf, Stem | Forest, Garden |
| *Malva sylvestris* L. | Food (Phkhali) | ბალბა (balba) | Leaf, Stem | Forest, Garden |
| ***Melanthiaceae*** | | | | |
| *Veratrum lobelianum* Bernh. | Veterinary (Digestion) | შხამა (shkhama) | Leaf, Stem | Forest |
| ***Moraceae*** | | | | |
| *Ficus carica* L. | Food | ლეღვი (leghvi) | Fruit | Garden |
| *Morus alba* L. | Food (Alcohol) | თუთა (tuta) | Fruit | Garden |
| ***Myrtaceae*** | | | | |
| *Acca sellowiana* (O. Berg.) Burret | Food | ფეიხოა (peikhoa) | Fruit | Garden |
| ***Oleaceae*** | | | | |
| *Fraxinus excelsior* L. | Utensils and tools | იფანი (ipani), კოპიტი (k'op'it'i) | Stem | Forest |
| *Ligustrum vulgare* L. | Food | კვიდო (k'vido) | Fruit | Forest |
| ***Ophioglossaceae*** | | | | |
| sp. 1 | Medicinal (Wounds) | მარგალიტა (-) | Leaf | Forest |
| ***Papaveraceae*** | | | | |
| *Chelidonium majus* L. | Medicinal (Diarrhea) | ქრისტესისხლა (krist'esiskhla) | Leaf | Forest |
| *Papaver oleracea* L. | Food (Khinkali) | - | Whole plant | Garden |
| *Papaver somniferum* L. | Food (Phkhali, Raw) | ყაყაჩო (q'aq'acho), ღაჟღაჟა (ghazhghazha) | Buds, Flower, Leaf, Stem | Forest |

Table 1. continued.

| | | | | |
|---|---|---|---|---|
| ***Phytolaccaceae*** | | | | |
| *Phytolacca americana* L. | Food (Pickled, Phkhali) | ჭიაფერა (ch'iapera) | Fruit, Leaf, Stem (young) | Forest |
| ***Pinaceae*** | | | | |
| *Abies nordmanniana* (Steven) Spach | Construction; Fuel (Firewood) | სოჭი (soch'i) | Stem | Forest |
| *Picea orientalis* (L.) Peterm. | Construction (Roof tiles ); Fuel (Firewood) | ნაძვი (nadzvi) | Stem | Forest |
| *Pinus kochiana* Klotzsch ex K. Koch | Construction | ფიჭვი (phich'vi ) | Stem | Forest |
| *Pinus sosnowskyi* Nakai | Construction | ფიჭვი (phich'vi ) | Stem | Forest |
| ***Plantaginaceae*** | | | | |
| *Plantago major* L. | Medicinal (Anti-inflammatory) | მრავალძარღვა (mravaldzarghva ) | Leaf, Stem | Forest |
| *Plantago media* L. | Medicinal (Cough, Stomach ache) | მრავალძარღვა (mravaldzarghva ) | Leaf, Stem | Forest |
| ***Poaceae*** | | | | |
| *Agrostis* sp. | Medicinal (Cough) | ნამიკრეფია (namikrefia), ცახცახა (tsakhtsakha) | Leaf, Stem | Forest |
| *Avena sativa* L. | Food | შვრია (shvria) | Seed | Garden |
| *Calamagrostis arundinacea* (L.) Roth | Utensils and tools | ბრძამი (brdzami) | Leaf | Forest |
| *Hordeum vulgare* L. | Food | ქერი (keri) | Seed | Garden |
| sp. 1 | Food | ჭვავი (ch'vavi) | Seed | Garden |
| sp. 2 | Food | ხორბალი (khorbali) | Seed | Garden |
| *Triticum aestivum* L. | Food (Alcohol) | ხორბალი (khorbali) | Seed | Garden |
| *Zea mays* L. | Food (Polenta) | სიმინდი (simindi) | Seed | Garden |
| ***Polygonaceae*** | | | | |
| *Rumex acetosa* L. | Food (Phkhali) | მჟაუნა (mzhauna) | Leaf, Stem | Forest |
| *Rumex alpinus* L. | Food (Phkhali ); Utensils and tools (Green dye) | მთის ღოლო (mtis g'olo) | Leaf, Stem, Root | Forest |
| *Rumex* sp. | Food (Phkhali) | მთის ღოლო (mtis g'olo) | Leaf | Forest |
| sp. 1 | Utensils and tools (Yellow dye) | წართხალი (ts'artkhali) | Leaf | Forest |
| sp. 2 | Food | წიწიბურა (ts'its'ibura) | Seed | Garden |
| ***Portulacaceae*** | | | | |
| *Portulaca oleracea* L. | Food (Phkhali) | დანდური (danduri) | Leaf, Stem | Forest |
| ***Primulaceae*** | | | | |
| *Primula* sp. | Food (Phkhali) | ტყის ფურისულა (t'q'is purisula) | Leaf | Forest |
| ***Psathyrellaceae*** | | | | |
| sp. 1 | Food | მელანა (melana) | Fruiting body | Forest |

Table 1. continued.

| | | | | |
|---|---|---|---|---|
| ***Ranunculaceae*** | | | | |
| *Adonis aestivalis* L. | Food (Phkhali) | ცხვირისატეხელა (tskhvirisat'ekhela) | Leaf, Stem | Forest |
| *Clematis vitalba* L. | Food (Phkhali) | ინგრიხე (ingrikhe), ციცაბარდა (tsitsabarda) | Leaf, Stem | Forest, Garden |
| ***Rhamnaceae*** | | | | |
| *Frangula alnus* Mill. | Utensils and tools (Stick for walking) | ხეჭრელი (khech'reli) | Stem | Forest |
| *Rhamnus cathartica* L. | Medicinal (Purgative) | ხეშავი (kheshavi) | Fruit | Forest |
| *Rhamnus imeretina* Booth, Petz. & Kirchn. | Medicinal (Purgative) | იმერული ხეჭრელი (imeruli khech'reli) | Fruit | Forest |
| ***Rosaceae*** | | | | |
| *Alchemilla* sp. | Medicinal | მარმუჭი (marmuch'i) | Leaf | Forest |
| *Crataegus* sp. | Food; Medicinal | კუნელი (k'uneli) | Fruit | Forest |
| *Cydonia oblonga* L. | Food | კომში (k'omshi ) | Fruit | Garden |
| *Eriobotrya japonica* (Thunb.) Lindl. | Food | - | Fruit | Garden |
| *Fragaria vesca* L. | Food | მარწყვი (marts'q'vi) | Fruit | Forest |
| *Fragaria* x *ananassana* Duchesne ex Rozier | Food | მარწყვი (marts'q'vi) | Bulb, Fruit | Forest, Garden |
| *Malus domestica* L. | Food | ვაშლი (vashli), მთვარეშული (mtvareshuli) | Fruit | Garden |
| *Malus orientalis* Uglizk. | Food (Alcohol) | მაჟალო (mazhalo), პანტა-ვაშლი (p'ant'a-vashli) | Fruit | Forest, Garden |
| *Mespilus germanica* L. | Food | ზღმარტლი (zghmart'li) | Fruit | Forest |
| *Prunus armeniaca* L. | Food (Fresh, cooked) | გარგარი (gargari) | Fruit | Garden |
| *Prunus avium* (L.) L. | Food | ბალი (bali) | Fruit | Garden |
| *Prunus avium* (L.) L. var. *silvestris* | Food | ბალამწარა (balamtsara), მწარე ბალი (mts'are bali), ჟიშხა (zhishkha) | Fruit | Forest |
| *Prunus divaricata* Ledeb. | Food (Tkhemali) | ტყემალი (tq'emali ) | Fruit | Garden |
| *Prunus insititita* L. | Food | ღოღნოშო (ghoghnosho) | Fruit | Garden |
| *Prunus laurocerasus* L. | Food (Jam) | წყავი (ts'q'avi) | Fruit | Forest, Garden |
| *Prunus persica* (L.) Batsch | Food | ატამი (atami) | Fruit | Garden |
| *Prunus spinosa* L. | Food (Alcohol) | კვრინჩხი (kvrinchkhi ) | Fruit | Forest |
| *Prunus* x *domestica* L. | Food | ქლიავი (kliavi) | Fruit | Garden |
| *Pyrus caucasica* Fed. | Food (Fresh) | პანტა (p'ant'a), პანტა-მსხალი (p'ant'a mskhali) | Fruit | Forest, Garden |
| *Pyrus communis* L. | Food (Fresh, Jam) | მსხალი (mskhali), გულაბი (gulabi zamtris), პიპილონდონი (p'ip'ilondoni in Kartli) | Fruit | Garden |
| *Rosa* sp. | Food (Fresh, Jam) | ასკილი (ask'ili) | Fruit | Forest |

Table 1. continued.

| | | | | |
|---|---|---|---|---|
| *Rubus fruticosus* L. | Food (Baking, Fresh, Jam ); Utensils and tools (For baking) | მაყვალი (maq'vali) | Fruit, Leaf | Forest |
| *Rubus ideaus* L. | Food (Fresh, Jam) | ჟოლო (zholo) | Fruit | Garden |
| *Rubus* sp. | Food (Baking ); Utensils and tools (For baking) | მაყვალი (maq'vali) | Fruit, Leaf | Forest |
| *Sorbus aucuparia* K. Koch | Food; Urinary (Sorbus torminalis Crantz.) | ცირცელი, ჭნავი (tsirtseli, ch'navi), ჭნავი (ch'navi), ჭნავი, ცირცელი (ch'navi, tsirtseli) | Fruit, Stem | Forest |
| *Sorbus torminalis* Crantz | Food | თამელი (tameli) | Fruit | Forest |
| sp. 1 | Food | ამპურა, მაპურა (amp'ura, map'ura) | Fruit | Forest |
| sp. 2 | No use | ბირკავა (birk'ava) | Fruit | Forest |
| ***Rutaceae*** | | | | |
| *Citrus limon* (L.) Burm. f. | Food | ლიმონი (limoni) | Fruit | Garden |
| *Citrus recticulata* Blanco | Food | მანდარინი (mandarini) | Fruit | Garden |
| *Citrus sinensis* Osbeck | Food (Fresh, Jam) | ფორთოხალი (portokhali) | Fruit | Garden |
| ***Salicaceae*** | | | | |
| *Populus pyramidalis* Rozier | Fuel (Firewood) | ალვის ხე (alvis khe) | Stem | Forest |
| *Populus* sp. | Fuel (Firewood) | ვერხვი (verkhvi ) | Stem | Forest |
| *Salix alba* L. | Construction | ტირიფი (t'iripi) | Stem | Forest |
| *Salix caprea* L. | Utensils and tools (Baskets) | მდგნალი (mdgnali), ტირიფი (t'iripi) | Branches, Stem | Forest |
| sp. 1 | Construction | წნორი (ts'nori) | Stem | Forest |
| ***Sapindaceae*** | | | | |
| *Acer laetum* C.A. Mey. | Fuel (Firewood) | ქორაფი (korapi) | Stem | Forest |
| ***Simaroubiaceae*** | | | | |
| *Ailanthus altissima* (Mill.) Swingle | No use | ხემყრალი (khemq'rali) | Stem | Forest |
| ***Solanaceae*** | | | | |
| *Capsicum annuum* L. | Food | წიწაკა (ts'its'ak'a), მწარე წიწაკა (mts'are ts'its'ak'a) | Fruit | Garden |
| *Capsicum annuum* L. var. *bulgari* | Food | წიწაკა ბულგარული (tzitzaka bulgaruli) | Fruit | Garden |
| *Datura stramonium* L. | No use | ლემა (lema) | Whole plant | Forest |
| *Hyoscyamus niger* L. | No use | ლენცოფა (lentsopa) | Whole plant | Forest |
| *Lycopersicum esculentum* L. | Food (Fresh, cooked, pickled) | პომიდორი (p'omidori) | Fruit | Garden |
| *Nicotiana rustica* L. | Cultural use (Snuff) | თამბაქო (tambako) | Leaf | Garden |
| *Solanum melogena* L. | Food (Cooked) | ბადრიჯანი (badrijani) | Fruit | Garden |

Table 1. continued.

| | | | | |
|---|---|---|---|---|
| *Solanum tuberosum* L. | Food (Phkhali) | კარტოფილი (k'art'opili) | Fruit, Leaf, Stem, Tuber | Forest, Garden |
| sp. 1 | Food | - | Tuber | Garden |
| ***Staphyleaceae*** | | | | |
| *Staphylea colchica* Steven | Food (Pickled) | ჯონჯოლი (jonjoli) | Flower, Stem (young) | Forest, Garden |
| ***Taxaceae*** | | | | |
| *Taxus baccata* L. | Food; Construction | უთხოვარი (utkhovari), ურთხელი (უთხოვარი) (urtkheli (utkhovari)), ხერკინა (kherk'ina) | Fruit, Stem | Forest |
| ***Tiliaceae*** | | | | |
| *Tilia caucasica* Rupr. | Utensils and tools (Tool handles) | ცაცხვი (tsatskhvi) | Stem | Forest |
| ***Tricholomataceae*** | | | | |
| sp. 1 | Food | ღრუბელა (ghrubela) | Fruiting body | Forest |
| ***Ulmaceae*** | | | | |
| *Ulmus elliptica* C. Koch | Utensils and tools (Tool handles) | თელამუში (telamushi) | Stem | Forest |
| *Ulmus* sp. | Utensils and tools (Tool handles) | თელა (tela) | Stem | Forest |
| *Zelkowa serrata* Makino | Utensils and tools | ძელქვა (dzelkva) | Stem | Forest |
| ***Urticaceae*** | | | | |
| *Urtica dioica* L. | Food (Phkhali ); Utensils and tools (Dye) | ჭინჭარი (ch'inch'ari) | Leaf, Stem | Forest |
| ***Violaceae*** | | | | |
| *Viola* sp. | Food (Phkhali) | ია (ia) | Leaf, Stem | Forest |
| ***Vitaceae*** | | | | |
| *Vitis vinifera* L. | Food | ყურძენი (q'urdzeni); [ადესა (adesa), ალადასტური (aladast'uri), კაბისტანი (k'abist'ani), მწვანე (mts'vane), ოჯალეში (ojaleshi), პინო თეთრი (pino tetri), პინო შავი (pino shavi), სუფრის ყურძენი (supris q'urdzeni = Table grape (lalrge clusters)), ციცკა (tsitsk'a), ცოლიკაური (tsolik'auri)] | Fruit | Forest, Garden |
| ***Zygophyillaceae*** | | | | |
| *Peganum harmala* L. | Cultural use (Incense) | მარიამსაკმელა (mariamsak'mela) | Fruit | Forest |

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R.W. B., N.Y. P.-Z., S. S., Z. K., D. K., D. T. and K. B. designed the study; R.W. B., N.Y. P.-Z., S. S., Z. K., D. T. and K. B. conducted the fieldwork, R.H. E. conducted the main statistical analysis; R.B. U., N.Y. P.-Z. and R.H. E. analyzed the data and wrote the manuscript; all authors read, corrected and approved the manuscript.

**Competing financial interests**

The authors declare that they have no competing financial interest.

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