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Case Study

An economic evaluation of plant products in the traditional heritage - A case study from Kenger - Kula, Turkiye

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Abstract

This study aims to document important traditional practices related to the daily livelihoods of local people in the Kenger area, located within the borders of Kula volcanic park, a historical site in Turkiye. The area is also known as "Katakekaumene" or "Burnt Country", with an area of nearly 300 km^2. A total of 13 categories of traditional uses were identified: livestock (33 plants); ornamentals (16); cosmetics (4); paints (1); soap (1); handicrafts (4); jewelry (2); toys (5); beliefs (5); fuel (3); brooms (2); fencing (2) and wood products (2). The most prominent categories were recorded as livestock and ornamentals. The wood carving and wooden handicrafts were noted to have lost popularity but still represent an important part of the traditional heritage, particularly for the elderly. This study was undertaken with the hope that the local knowledge on traditional plant-based uses is transmitted to future generations.

Keywords: Kula, Turkiye, Traditional Heritage, Different Practices

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Introduction

Throughout human history, people have identified and cultivated plants they found beneficial and used them for different purposes. The plants used and their applications have varied over time and between cultures, but generally, these have been evaluated as food, medicine, tools and equipment, fuel, animal feed, dyes, magic, and religious purposes, such as protection against the evil eye. This knowledge, along with changes and developments in usage patterns over time, has been passed down through the generations and has survived to the present day [1 - 3]. The use of plants collected from nature is increasing, and these are identified as part of ethnobotanical research in various countries around the world [4].

Lately, the number of ethnobotanical studies examining the use of wild plants with significant genetic diversity, for medicinal purposes, such as foods, dyes, ornaments, and others has increased [5 - 9]. This paper covers our findings related to the traditional uses of plants by people in Kenger Village in the Kula District of Manisa Province in Turkiye. This area is

located within the borders of Kula volcanic park, a historical site, also known as "Katakekaumene" or "Burnt Country" [10 - 12]. It is the youngest volcanic area in western Anatolia, resembling in many ways the "Yellowstone" area in the USA. The area is nearly 300 km^2 and the elevation rises from 200 m in Salihli to 600 m in Kula. This area has been declared as the first geopark in Turkiye and the 58th in Europe by UNESCO [13]. The present study will significantly contribute towards the passing of our traditional knowledge to future generations, as well as improve our understanding of the traditional folk botany in this interesting ecological area.

Materials and Methods

Kenger village lies within the borders of the Kula district in the State of Manisa. It is situated on a volcanic terrain, surrounded by mountains to the north as well as a shallow valley formed by a stream. The terrain is partly flat and partly rugged [14]. Traditional knowledge relevant to the study was obtained from local people living in Kenger Village, covering details on the use of regionally distributed plants. The data was obtained following face-to-face interviews and short questionnaires asking about intended use, which parts of the plant were used, and how they were used. Identifications of plants identified for potential traditional use were made using Flora of Turkiye and the East Aegean Islands [15].

Results and Discussion

A total of 13 categories were identified based on the information obtained for different traditional uses in the study area. Each category was examined separately, and local knowledge regarding the traditional plant-based uses within each category was documented.

Category 1 - livestock

Although the lifestyles of local people vary across different geographic regions, it is crucial to understand the diversity and characteristics of natural forage resources for traditional animal husbandry [16, 17]. All knowledge of wild plant resources commonly used in traditional practices can offer considerable economic and ecological benefits, such as adaptability to various environmental conditions, risks, and climate change impacts [17, 18]. The traditional knowledge of forage species, passed down through generations within local communities, is also invaluable in plant breeding as it reliably indicates the quality of forage crops [17, 19, 20].

We identified a total of 33 plant species that can be used as animal feed. The local population is primarily engaged in agriculture and animal husbandry; the remaining parts of cultivated plants are dried and ground after harvesting and used to feed livestock, particularly cattle and small ruminants, and occasionally poultry. These plants are: *Avena barbata, Cicer arietinum, Pisum sativum, Secale cereale, Sesamum indicum*, and *Triticum aestivum*. The remnants are dried in the field, collected and ground, and then fed to livestock in the form of straw packs at proper timings. Additionally, *Brassica napus* cv. *Napobrassica* is chopped whole, and *Cucurbita pepo* is fed to livestock fresh. *Phacelia tanacetifolia* (Boraginaceae) is also popular with some local beekeepers. These plants are favored by the local population for use as animal feed and have traditionally been considered a high-quality source in this connection. Other forage plants are typically native species consumed by livestock in grazing areas. The list of forage plants identified in the study area is presented below:

Alopecurus myosuroides, Avena barbata, Bromus tectorum, Digitaria sanguinalis, Hordeum vulgare, Phleum pratense, Secale cereale, Triticum aestivum (Poaceae); *Anagallis arvensis* ssp. *foemina* (Primulaceae); *Brassica napus* cv. Napobrassica (Brassicaceae); *Cheno-*

podium album (Amaranthaceae); *Cicer arietinum, Coronilla parviflora, Lathyrus digitatus, Medicago orbicularis, Pisum sativum, Trifolium campestre, Trifolium nigrescens* ssp. *petrisavi, Trifolium spumosum, Vicia faba* (Fabaceae); *Cistus salviifolius* (Cistaceae); *Convolvulus arvensis* (Convolvulaceae); *Cucurbita pepo* (Cucurbitaceae); *Erodium cicutarium* (Geraniaceae); *Jurinea consanguinea, Tragopogon porrifolius* ssp. *longirostris* (Asteraceae); *Phacelia tanacetifolia* (Boraginaceae); *Polygonum aviculare* (Polygonaceae); *Portulaca oleracea* (Portulacaceae); *Quercus coccifera, Quercus ithaburensis* ssp. *macrolepis* (Fagaceae); *Sesamum indicum* (Pedaliaceae); *Tribulus terrestris* (Zygophyllaceae).

Category 2 - ornamentals

The reasons for using plants can differ between urban and rural areas, depending upon the impact of human activity, which holds an important place in their culture. The area's socioeconomic structure, geographical location, land use, and personal preferences of the area also play a significant role in this connection [21, 22]. A total of 16 ornamental plants were identified here. The dried above-ground parts of *Alopecurus myosuroides, Bromus tectorum*, and *Phleum pratense* (Poaceae) are dyed and used by local people to decorate their homes; at the same time, small-beautiful plants are also collected, either for their appearance or their fragrance, and placed in vases at home. These include: *Anagallis arvensis* ssp. *foemina* (Primulaceae), *Doronicum orientale* and *Matricaria chamomilla* (Asteraceae), *Neotinea tridentata* and *Orchis pallens* (Orchidaceae), *Trifolium campestre* (Fabaceae), *Tulipa orphanidea* (Liliaceae), and *Valeriana officinalis* (Caprifoliaceae). These plants are also cultivated as ornamentals in private gardens, and bouquets of the flowering parts are collected and placed in vases at home, generally including *Cercis siliquastrum* (Fabaceae), *Iris germanica* (Iridaceae), and *Rosa* spp. (Rosaceae) and *Saponaria officinalis* (Caryophyllaceae). Noteworthy among these is *Myrtus communis* (Myrtaceae), which is cultivated and preferred as an ornamental plant during cemetery visits [23].

Category 3 - cosmetics

The ease with which herbal cosmetics can be prepared by local people, coupled with their affordability within traditional folk practices, has led to their widespread use. Indeed, these cosmetics remain popular in rural areas of many countries today [24]. In this study, we identified four plants that are used for cosmetic purposes. To make the henna color last longer, walnut shells (*Juglans regia* - Juglandaceae) are boiled in a small amount of water, left to cool, and then mixed with the henna. Women apply this mixture to their hands and/or hair and leave it overnight. The next day, their hair is washed, leaving behind a dyed color.

Another cosmetic use involves boiling the dried aerial parts of the *Matricaria chamomilla* (Asteraceae) in approximately one liter of water. This is left to cool until lukewarm and then used to wash the hair. The resulting chamomile water is used to lighten hair. Alternatively, a handful of dried nettles (*Urtica urens* - Urticaceae) is added to boiling water. Once cooled slightly, this mixture can be used to rinse the hair and make it shine. It was noted that the local women used the flowering parts of the *Poa bulbosa* (Poaceae family) to dye their eyebrows, but this practice has now ceased.

Category 4 - paint

Improvements in environmental quality within the textile and food industries, alongside criteria such as the absence of toxic substances, have led to the widespread use of natural, plant-based dyes

[25]. Of all the plants in the study area, only one is considered a dye plant. The roots of *Cistus salviifolius* (Cistaceae) are used by locals for dyeing. Natural dyes derived from these roots are favored, particularly for dyeing yarns used in carpet weaving, as they are believed to be more durable. This traditional practice has now been largely replaced by synthetic dyes.

Category 5 - soap

Using plants in the production of natural, handmade soap is economically viable. Such soaps generally have certain physicochemical properties, such as moisturizing and nourishing the skin [26]. In the study area, the local population uses one such plant for cleansing purposes: *Saponaria officinalis* (Caryophyllaceae). This plant can be made into a lather by firmly rubbing its flowering parts between the hands. This lather is then rinsed off.

Category 6 - handicrafts

These are important cultural elements because they have historical and touristic value and are traditionally crafted, reflecting a person's taste, emotions, and thoughts [27]. This traditional practice is also significant because it reflects the language, beliefs, customs, philosophy, and social structure of the local population, as well as their deep-rooted artistic tradition [3, 28]. Four plants are used for handicrafts in the research area. Information about these plants is presented below:

Local people used to make bowls by carving the rounded surface of ripening *Lagenaria siceraria* fruits (Cucurbitaceae) and drying them. These bowls were often used in funeral rituals. Unfortunately, this traditional practice has now been abandoned. The woody trunk of the *Populus alba* tree (Salicaceae) is used by local women to make 3 to 5 compartment wooden bread baskets, known as 'binet' or 'bineyt'. These baskets are used to transport leavened dough to the oven easily and cleanly. This traditional craft is still practiced today. The wood from this tree is also used to make hand tools for use in some sorts of agricultural practices. Many large and small agricultural hand tools are produced using the woody parts of *Quercus ithaburensis* ssp. *macrolepis* (Fagaceae). The branches of *Vitex agnus-castus* (Lamiaceae) are used to make baskets and bird cages for small birds.

Category 7 - jewelry

Throughout history, humans have easily produced attractive and natural materials from plant matter obtained from nature with little or no additional processing required. These traditional practices were often inspired by observation and curiosity [29]. Only 2 plants are used for jewelry making in the research area. The flowering parts of *Matricaria chamomilla* (Asteraceae) are usually collected in spring and braided together to make crowns and bracelets. The small, round, woody fruits of the *Paliurus spina-christi* (Rhamnaceae) were traditionally used by girls to make earrings and necklaces by threading them onto a string. Unfortunately, this traditional practice has now been abandoned.

Category 8 - toys

Plant-based play materials designed for children's recreation are an important natural resource in outdoor learning environments. Playing with these materials is crucial for behaviors related to curiosity, imagination, exploration, and thinking, which are important for children's play and learning [30]. Five plants are used as toys in the study area.

A large, ripening leaf is selected from an *Allium cepa* (Amaryllidaceae) bulb and broken off. A section of the leaf is then cut vertically and thinned. This thinning section is then placed in the mouth to produce a whistling sound. Two branches

of the *Asphodelus aestivus* (Asphodelaceae) are intertwined to create a hook. Children would then try to break it. Whoever succeeded first was the winner. Unfortunately, this traditional game is no longer played today.

Two flowering branches of *Centaurea solstitialis* ssp. *solstitialis* (Asteraceae) are broken and intertwined. The flowers are then pulled firmly off the stem and thrown away. Unfortunately, this traditional game is no longer played today. Children used to play with wishbones made from the fruits of *Coronilla parviflora* (Fabaceae), which they strung together. Unfortunately, this traditional game too has fallen out of favor. Games such as marbles were played using cones from the *Cupressus sempervirens* (family: Cupressaceae). Unfortunately, this traditional game has also fallen out of favor.

Category 9 - beliefs

Throughout history, humans have used certain plants in traditional religious rituals, reflecting cultural practices inherited from their ancestors. Indeed, the traditional use of herbs for religious purposes is still common in many societies today [31]. In the study area traditional religious use of 5 plants was recorded. *Allium sativum* (Amaryllidaceae) and *Peganum harmala* (Zygophyllaceae) are used to make incense that is believed to ward off the evil eye. Local people traditionally plant *Myrtus communis* (Myrtaceae) seedlings or branches on graves during visits to cemeteries, believing that this will bring good for the deceased. *Triticum aestivum* (Poaceae) seeds are also scattered for this purpose. Children are also known to use the hairy pappus of *Tragopogon porrifolius* ssp. *longirostris* (Asteraceae) to make wishes and blow them away.

Category 10 - fuel

In many areas, local people use traditional, renewable, and low-cost woody plant fuels. These fuels are favored as a primary energy source. Ease of access, low cost, high calorific value, and low moisture content make them highly usable [32, 33]. Three woody plants are used as fuel in the study area. Kindlings obtained from the cones and wood parts of *Pinus brutia* (Pinaceae) are widely used as fuel in the region during winter. The woody parts of *Quercus coccifera* and *Quercus ithaburensis* ssp. *macrolepis* (Fagaceae) is also used for this purpose.

Category 11 - brooms

Historically, brooms made from natural plant materials have been widely used by local people for cleaning homes, ovens, fireplaces, gardens, and streets [34]. In the study area, 2 such plants are used for broom making. After drying the aerial parts of *Osyris alba* (Santalaceae), the central parts are tied together to make brooms. Locals also use the branches of *Vitex agnus-castus* (Lamiaceae) for this purpose.

Category 12 - fencing

Traditionally, local people have access to natural materials suitable for making fences around their farms. These plants have many uses, such as marking boundaries between farms or along roads, separating fields used for different purposes, and preventing livestock from wandering into crop fields [35]. In the study area, 2 such plants are used for fencing; *Paliurus spina-christi* shrub (Rhamnaceae) is used as a hedge around livestock pens to prevent them from leaving the pasture in spring; *Quercus coccifera* (Fagaceae) is also used as a garden hedge to keep out certain animals.

Category 13 - wood products

The woody trunks of trees make up the bulk of the natural biomass materials used in forestry. Humans have historically used them to manufacture a variety of traditional structures and products. Trees are therefore

a valuable resource for indigenous people in many regions, providing food, medicine, fuel, and wooden tools, among other economically and ecologically important products [3, 36]. In the study area, 2 wood plants are used for wood products.

The wood of *Pinus brutia* (Pinaceae) has reportedly been used for various purposes, including the construction of wooden houses, particularly for ceilings and carvings. The tree trunks are also used to make wooden tools known as "duven", which are used for separating grain from stalks during threshing. Local people also make handicrafts from the woody parts of this plant, known as "ellik". An "Ellik" is a small, functional tool that protects the hands and facilitates the harvesting of certain cereal crops. Unfortunately, such traditional uses have been abandoned due to the widespread use of technological devices. Another tree, *Populus alba* (Salicaceae), has been used to construct wooden house ceilings from its woody trunk.

Conclusions

Local and regional field research is crucial for preserving traditional cultural practices and passing them on to future generations. It is therefore essential to document traditional products derived from commercial plants and integrate them into modern production processes, to promote social change and safeguard our natural cultural heritages. Coordinated efforts from institutions, organizations, and local governments, particularly universities well as the development of substantial projects, are required to achieve sustainable ecological and economic development. The positive contributions of all those involved will also be crucial [3]. Collaborating with local communities through informative activities is also important for sustainable development. Furthermore, the urgent need to protect our natural genetic resources, particularly those with economic potential distributed locally, regionally, and nationally, needs to be highlighted in the present case.

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