



Wild food and medicinal plant knowledge in the Ligurian Alps (NW Italy): comparison with neighbouring Occitan valleys

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Abstract Foraging in European uplands is often framed either as a declining relic or as a contemporary revival. We document an intermediate condition: persistent wild-plant gathering in a strongly depopulated, but not abandoned, Alpine landscape. Interviews with 34 participants in the Ligurian Alps of north-western Italy (14 in the upper Valle Arroscia in 2019 and 20 in the Valle Argentina in 2023) recorded 81 taxa in 31 families, together with gathered parts, food and medicinal uses, and voucher information where available. Query The upper-valley repertoire is embedded in the pastoral *Cucina bianca*, whereas the lower valley links gathering to household medicine, former distilling activities and tourism. Published inventories from neighbouring Occitan valleys (2008 onwards) were standardized to wild-gathered food and medicinal plants at genus level. The pooled Ligurian and Occitan sets shared 48

of 116 genera (Jaccard similarity 0.41). Across five standardized inventories, 14 of 118 genera occurred in all five and 49 occurred in only one. Between this study and Brigasc, Sørensen dissimilarity (0.451) comprised turnover of 0.200 and a nestedness component of 0.251, whereas contrasts with upper Varaita and Gesso–Grana were turnover-dominated. In Valle Argentina, medicinal use was more frequent among participants aged ≥ 70 years than among younger participants (5/5 vs 3/15; two-sided Fisher's exact $P = 0.0036$), as was oral transmission (5/5 vs 5/15; $P = 0.0325$). The inventory provides a time-sensitive baseline for biocultural and plant-resource conservation in the south-western Alps.

Keywords Plant genetic resources · Ethnobotany · Local plant knowledge · Liguria · Brigasc · *Cucina bianca*

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Introduction

The south-western Alps have long been recognised as one of Europe's richest ethnobotanical arenas. The Occitan-, Franco-Provençal-, and Ligurian-speaking valleys of Piedmont and western Liguria combine a steep altitudinal gradient, a mosaic of pastoral and arable land uses, and linguistic minorities whose plant vocabularies preserve distinctions that Italian has lost. Successive surveys have documented the food and medicinal flora of the upper Varaita Valley (Pieroni

and Giusti 2009), of the Brigasc, Kyé and Provençal communities straddling the Ligurian–Piedmontese watershed (Mattalia et al. 2013), and of the Waldensian valleys of Germanasca and Chisone (Bellia and Pieroni 2015). Comparable work on the Swiss side of the range (Abbet et al. 2014), in other Alpine valleys (Cornara et al. 2014; Grasser et al. 2012; Vitalini et al. 2013), among Ligurian-speaking communities elsewhere (Maxia et al. 2008) and in comparative Italy-wide and European syntheses and in other Mediterranean and mountain areas of Europe (Bonet and Vallès 2002; Ghirardini et al. 2007; Guarrera and Savo 2013; Hadjichambis et al. 2008; Menéndez-Baceta et al. 2012; Pardo-de-Santayana et al. 2007; Signorini et al. 2009) have placed these local repertoires in a wider frame. Wild-harvested plants are also increasingly treated as plant genetic resources in conservation prioritization, alongside crop wild relatives and other useful floras (Labrihli et al. 2025).

Two competing narratives dominate the literature. The first is erosion: depopulation, the collapse of subsistence agriculture and the standardisation of diet are held to have severed the transmission of plant knowledge within a single generation (Kalle and Sõukand 2012; Łuczaj et al. 2012). The second is revival: wild greens re-enter the diet through restaurants, agritourism and urban foraging courses, in forms that owe more to gastronomy than to household provisioning (Quave and Pieroni 2015; Serrasolses et al. 2016; Stryamets et al. 2015; Turner et al. 2011). Both narratives describe real processes, but both tend to overlook the intermediate condition many Alpine communes actually find themselves in.

We call this condition interstitial. An interstitial Alpine landscape is neither wilderness nor productive countryside. It is depopulated but not empty; its terraces are no longer cropped but are still walked across; its summer farms are reduced in number but still operating; its meadows are still mown, though by fewer people and with machines. Plant knowledge in such places is not extinct, and it is not being reinvented it is being carried, in attenuated but continuous form, by a small resident population that is itself of mixed origin. This paper addresses the empirical problem of documenting what survives in these interstices, and how it differs from both the pre-war repertoire and the urban revivalist one.

We take as our case the Ligurian Alps, the south-easternmost sector of the Alpine arc, where the

watershed between the Tanaro and the Argentina carries its own linguistic frontier. It is a useful case for three reasons. It is not Occitan: Brigasc, spoken at the head of the valleys, is an Alpine Ligurian variety transitional to Occitan, and Ligurian is spoken below, so the area tests whether the Occitan record of the neighbouring valleys describes this flora as well. It is the only sector of the western Alps with a southern, sub-Mediterranean exposure, so its gathered flora can contain elements that the inner valleys cannot. It is also home to the *Cucina bianca*, a summer-farm cuisine consciously constituted as local heritage, which allows the botanical and cultural sides of the same repertoire to be examined together.

The specific objectives were: (i) to compile a nomenclaturally standardized inventory of wild plants gathered and used as food, condiment, beverage and domestic remedy, documenting voucher support where available; (ii) to compare that inventory with the recent published ethnobotanical record of neighbouring Occitan valleys and identify elements particular to the Ligurian Alps; (iii) to describe how this knowledge is currently transmitted; and (iv) to identify taxa and harvesting practices that warrant particular conservation or identification attention.

Materials and methods

Study area

The study area lies in the Ligurian Alps, the short south-western tail of the Alpine chain where Piedmont, Liguria and France meet and where the watershed drops from just over 2200 m to the Ligurian Sea in barely thirty kilometres. Two sectors were surveyed, and they are contiguous rather than merely neighbouring (Fig. 1).

The first sector is the high country around Monte Saccarello (2201 m) and Monte Fronte (2153 m). It comprises the Brigasc settlements – Upega, Carnino and Viozene on the Piedmontese slope, Realdo and Verdeggia on the Ligurian one – together with the communes of Mendatica and Cosio d’Arroscia in the upper Valle Arroscia, at about 700 m. The people of the Brigasc hamlets speak Brigasc, a Royasque variety transitional between Occitan and Ligurian; Mendatica is Ligurian-speaking. Mendatica had 180 registered inhabitants in 2019 with a mean age above fifty,

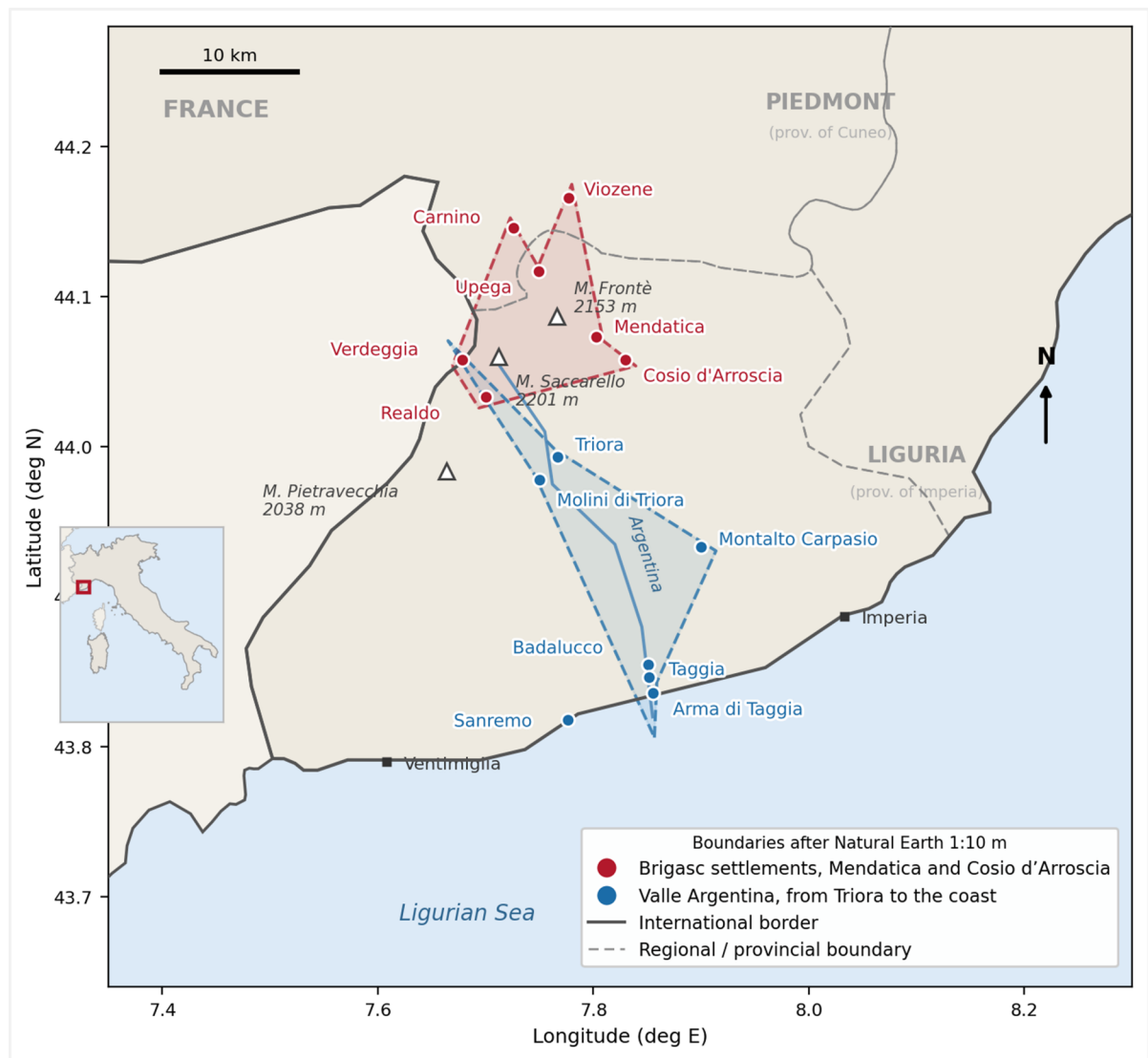


Fig. 1 The two study sectors of the studied Ligurian Alps: **a** (red): the Brigasc settlements around Monte Saccarello – Upega, Carnino and Viozene on the Piedmontese slope, Realdo and Verdeggia on the Ligurian one – together with Mendatica and Cosio d'Arroscia in the upper Valle Arroscia. **b** (blue): the Valle Argentina, from Triora down to Taggia and Arma di Taggia on the coast. Realdo and Verdeggia

are administratively hamlets of Triora, and the river Argentina rises on Monte Saccarello, so they are contiguous. Boundaries and coastline are drawn from Natural Earth 1:10 m vector data; the international boundary between France and Italy and the regional boundary between Piedmont and Liguria are distinguished in the legend

and its name derives from the Ligurian Mendega, "able to give water". The traditional economy rested on short-range transhumance, with herds summering at 600–800 m and wintering in *Vandia*, in the olive belt of the immediate hinterland, and on the salt road that carried salt from the western riviera towards Piedmont over mule tracks converging on the Colle

di Tenda. Out of this grew the *Civiltà delle Malghe*, a summer-farm society whose cuisine, the *Cucina bianca*, is described in Sect. 3.4.

The second sector is the Valle Argentina, the valley of the river that rises on Monte Saccarello and reaches the sea at Arma di Taggia. It was surveyed from Triora, whose centre stands at 780 m and which

had 373 inhabitants at the most recent count, down through Molini di Triora, Montalto Carpasio and Badalucco to Taggia and Arma di Taggia on the coast. Triora has a long history – Neolithic occupation is attested at the Tana della Volpe and the Arma della Gastea, and the town was a Genoese podesteria – but it is known today as the *Paese delle streghe*, the witches' town, after the trials of 1587–1589. That reputation now carries most of its tourism. Road access is poor, and the valley is comparatively isolated.

The decisive point for this study is that the locations are not separate places. Realdo and Verdeggia, Brigasc-speaking and at the head of the valley, are administratively hamlets of Triora; the Argentina rises on the same massif that the Brigasc settlements sit around. Their geographic continuity reduces some environmental heterogeneity, while language, altitude and distance from the coast still differ substantially; the comparison is therefore observational rather than controlled.

Briga Alta, the commune that holds Upega, Carnino and Piaggia, had 41 residents at the most recent count and is among the smallest communes in Italy; its hamlets are separated by passes that close in winter. Triora, which is the administrative seat for Realdo and Verdeggia as well as for its own centre, had 373. These communities have undergone severe long-term depopulation. The census series makes the trajectory exact. Farina (2002), analysing the fourteen mountain communes of the upper Nervia, Argentina and Arroscia valleys, records a fall from 24,665 residents in 1861 to 6637 in 1999, a loss of 73%. Within our study area, the figures are even starker: Triora fell from 3306 residents in 1861 to 425 in 1999, retaining 13% of its nineteenth-century population; Molini di Triora fell from 3032 to 725; Mendatica fell from 715 to 252, then to 180 by 2019; and Cosio d'Arroscia fell from 875 to 298. Montalto Carpasio, then Carpasio, fell from 950 to 183. The decisive phases were the collapse of specialised olive cultivation after 1875, the agricultural crisis of the late 1920s, and the exodus of the 1960s to 1980s, when several communes lost close to a third of their people in a single intercensal period.

The economy that shaped the flora described in this paper has gone with the people. Short-range transhumance between the coastal olive belt and the summer pastures, which moved flocks twice a year through these same valleys, has effectively ceased;

the summer farms that gave the *Cucina bianca* its name stand mostly unroofed; and the terraces that carried the rye, the potatoes and the vegetable plots are under scrub or young woodland. Our own study participants counted the people still mowing hay in the upper valley on the fingers of one hand. Woodland has advanced across abandoned meadows, path margins and manured resting places, which is precisely where most of the plants in Table 1 grow.

Study participants, source datasets and ethics

We conducted interviews in two campaigns and two groups of locations: 14 participants at Mendatica and Cosio d'Arroscia in spring 2019 and 20 participants in the Valle Argentina in spring 2023. The Valle Argentina participants were aged 20–90 years (mean 49.9) and were resident at Triora (6), Taggia (6), Molini di Triora (2), Montalto Carpasio (2), Sanremo (2), Arma di Taggia (1) and Badalucco (1). The combined sample therefore comprised 34 participants. Participants are identified in the field records and in the manuscript only by initials, approximate age and place of residence.

Verbal prior informed consent was obtained from every participant before the interview after the study aims and intended research outputs had been explained. Fieldwork followed the Code of Ethics of the International Society of Ethnobiology (ISE 2006).

Data collection

Both campaigns used free interviews rather than a fixed schedule. At Mendatica, a team of four divided the labour: one member conducted each interview while the others took simultaneous notes, made voice recordings and photographed the plants; gathered plants were dried, and an herbarium was compiled. In the Valle Argentina, the interviews turned on six questions covering the plants the participant knows and gathers, their culinary and medicinal uses, how that knowledge was acquired, whether it has been passed on, and what alternative channels of transmission the participant could imagine; participants also named and, in several cases, showed the plants they were describing. For every plant cited, the vernacular name, the part gathered, the preparation, and any therapeutic rationale were recorded.

Table 1 Wild plants gathered and used in the Ligurian Alps study area for food and medicine, in alphabetical order of accepted Latin name. Voucher accession numbers are shown where a matching UNISG specimen was available; records without a voucher should be regarded as provisional ethnobotanical determinations, and records that could not be resolved to a single taxon are reported at the highest taxonomic level supported by the field information. A dash in the local-name column means that no vernacular name was recorded

Taxon, family and voucher	Sector	Local name(s)	Plant part(s) used	Local recorded use
<i>Achillea ligustica</i> All. (Asteraceae)	Brigasc-Arroscia	Erba besa; Camomilla selvatica	Leaves, shoots	Food: Broth known as Broddu d'ovu or Broddu d'Erba besa, made with finely chopped young shoots, egg and cheese; formerly given to children at breakfast in place of milk and to men working long hours in the fields, and considered both purifying and strengthening
<i>Achillea millefolium</i> L. (Asteraceae) UNISGBR1011	Brigasc-Arroscia	Erba bésa/ Erba amara	Aerial parts, fruits, leaves	Food: <i>Ravioli</i> filling; soup
<i>Aegopodium podagraria</i> L. (Apiaceae)	Valle Argentina	Podagraria / Erba dei gottosi	Leaves	Food: Leaves as a cooked green and in salads
<i>Alliaria petiolata</i> (M.Bieb.) Cavara & Grande (Brassicaceae)	Valle Argentina	Alliaria / Erba pepe	Leaves	Food: Seasoning for salads, soups and sauces; taste likened to garlic and pepper
<i>Allium ampeloprasum</i> L. (Amaryllidaceae)	Brigasc-Arroscia	–	Bulbs	Food: Seasoning
<i>Allium ursinum</i> L. (Amaryllidaceae) UNISGBR1003	Brigasc-Arroscia	Aglio dell'orso	Bulbs	Food: Seasoning
<i>Amelanchier ovalis</i> Medik. (Rosaceae) UNISGBR1054	Brigasc-Arroscia	Ruccalin	Fruits	Food: Fresh; juices
<i>Anthriscus cerefolium</i> (L.) Hoffm. (Apiaceae) UNISGBR1061	Brigasc-Arroscia	–	Leaves, stems	Food: Omelettes; soups
<i>Arctium lappa</i> L. (Asteraceae) UNISGBR1002	Brigasc-Arroscia	Lapurna; Gette; Lapaso	Fruits, leaves	Food: Formerly pressed for oil
<i>Arnica montana</i> L. (Asteraceae)	Brigasc-Arroscia	Arnica	Flowers, leaves	Food: <i>Grappa</i> (pomace brandy); tobacco substitute
<i>Artemisia absinthium</i> L. (Asteraceae) UNISGBR1006	Both	Bù mèig (=buon dottore); Assenzio	Whole plant	Food: Omelettes and digestive liqueurs. Herbal teas. Gathered communally in large seasonal harvests and sold to the surrounding distilleries
<i>Medicinal:</i> Formerly given to children, together with chicory, as an anthelmintic.				
<i>Artemisia umbelliformis</i> Lam. (Asteraceae)	Brigasc-Arroscia	Genepi	Aerial parts, stems	Food: Liqueur; sugar
<i>Asparagus acutifolius</i> L. (Asparagaceae)	Brigasc-Arroscia	–	Shoots, stems	Food: Boiled and eaten in salads
<i>Bellis perennis</i> L. (Asteraceae)	Valle Argentina	Pratolina	Flowers, leaves	Food: Young leaves in salads; petals as an edible decoration

Table 1 (continued)

Taxon, family and voucher	Sector	Local name(s)	Plant part(s) used	Local recorded use
<i>Blitum bonus-henricus</i> (L.) Rchb. (Amaranthaceae) UNISGBR1002	Both	Ingrì/ Engari / Buon Enrico; Buonerrico / Buon Enrico	Leaves, shoots	Food: <i>Ravioli</i> and green-pie filling; omelettes. Eaten raw or cooked, in soups; described as rich in iron and bitter principles and gathered only in a restricted high-altitude spot above the pastures, before June
<i>Borago officinalis</i> L. (Boraginaceae) UNISGBR1015	Both	Pampipphì; Borrachine	Flowers, leaves	Food: <i>Ravioli</i> and green-pie filling; omelettes; green noodles. The most common filling for local stuffed <i>Ravioli</i> ; also in soups; flowers used to decorate
<i>Calendula officinalis</i> L. (Asteraceae) <i>Medicinal</i> : Medicinal use as an emollient.	Brigasc-Arroschia	Calendula	Flowers	Food : Soups
<i>Capsella bursa-pastoris</i> (L.) Medik. (Brassicaceae) UNISGBR1017	Brigasc-Arroschia	Bourse a pasteur	Leaves, shoots	Food: Fresh
<i>Carum carvi</i> L. (Apiaceae)	Brigasc-Arroschia	Carvi	Aerial parts, fruits	Food: Seasoning
<i>Cirsium arvense</i> (L.) Scop. (Asteraceae)	Brigasc-Arroschia	Cardo campestre; Stoppione; Scardacione	Leaves	Food: Young, still unarmed rosette leaves cooked as a <i>Ravioli</i> filling, in vegetable-pie fillings and in the local Rajore; also in soups, or boiled and pan-fried as a side dish. The water in which the leaves were boiled was given to cows as a feed supplement
<i>Clematis vitalba</i> L. (Ranunculaceae)	Brigasc-Arroschia	Viarbura / Vierbura	Leaves	Food: <i>Ravioli</i> filling; omelettes
<i>Clinopodium nepeta</i> (L.) Kuntze (Lamiaceae) UNISGBR1028	Brigasc-Arroschia	Nepitella	Leaves	Food: Infusions.
<i>Crepis</i> sp. (Asteraceae)	Brigasc-Arroschia	Cicoria comune; Radicchio selvatico	Leaves, roots	Food : Young leaves in salads; older leaves blanched and pan-fried as a side dish
<i>Medicinal</i> : Decoction of root and leaves taken as a depurative for the intestine, liver and kidneys, and for its digestive, hypoglycaemic, laxative and cholagogue properties.				
<i>Equisetum arvense</i> L. (Equisetaceae) UNISGBR1022	Both	Coda cavallina / Cuad cavà; Coda di cavallo	Shoots, stems	Food: Salads. Soup. Young shoots in salads or cooked as a vegetable; participants distinguish two kinds, one of which they consider indigestible
<i>Foeniculum vulgare</i> Mill. (Apiaceae) UNISGBR1004	Brigasc-Arroschia	Canisceli	Fruits, leaves	Food: Seasoning; boiled; chestnuts
<i>Fragaria vesca</i> L. (Rosaceae) UNISGBR1055	Brigasc-Arroschia	Maratùn	Fruits	Food: Jams; boiled; sugar

Table 1 (continued)

Taxon, family and voucher	Sector	Local name(s)	Plant part(s) used	Local recorded use
<i>Fumaria capreolata</i> L. (Papaveraceae) UNISGBR1025	Brigasc-Arroscia	Cantagalletto	Leaves	Food: <i>Ravioli</i> filling
<i>Galium verum</i> L. (Rubiaceae) UNISGBR1058	Brigasc-Arroscia	–	Whole plant	Food: Infusions
<i>Gentiana acaulis</i> L. (Gentianaceae) UNISGBR1026	Brigasc-Arroscia	Gensianna	Flowers	Food: Liqueur; sugar
<i>Gentiana lutea</i> L. (Gentianaceae)	Brigasc-Arroscia	Gensàna	Flowers, roots	Food: Grazed by cows, said to make the milk more bitter; roots used for bitter liqueurs
<i>Humulus lupulus</i> L. (Cannabaceae) UNISGBR1018	Both	Ambutrigghi; Luppulo	Cones, shoots	Food: <i>Ravioli</i> filling; omelettes. Shoots in soups, omelettes and sauces; dried cones in infusions
<i>Juniperus communis</i> L. (Cupressaceae)	Brigasc-Arroscia	Jenevr	Fruits, roots	Food: <i>Grappa</i> ; meat
<i>Lamium purpureum</i> L. (Lamiaceae) UNISGBR1030	Brigasc-Arroscia	–	Whole plant	Food: Salads
<i>Lapsana communis</i> L. (Asteraceae) UNISGBR1009	Brigasc-Arroscia	Muletta / Monletta	Leaves	Food: Salads
<i>Lathyrus tuberosus</i> L. (Fabaceae)	Brigasc-Arroscia	Gasce	Leaves, tubers	Food: Omelettes; salads; <i>Panissa</i> (a polenta-like gruel); <i>Polenta</i> (maize or chestnut porridge)
<i>Laurus nobilis</i> L. (Lauraceae)	Valle Argentina	Alloro	Leaves	Food: Sauces, stocks and soups; leaves also preserved in olive oil for year-round use.
<i>Lavandula angustifolia</i> Mill. (Lamiaceae) UNISGBR1032	Both	San Juan; Lavanda	Flowers	Food: Flavouring for pies, bread, biscuits and jelly. Gathered communally in large seasonal harvests, under a regulated regime, and sold to distilleries; also infused
<i>Malva sylvestris</i> L. (Malvaceae) UNISGBR1042	Both	Marva; Malva	Flowers, leaves, roots	Food: Leaves in salads and soups; infusion of the flowers, and a diuretic decoction combined with cherry stalks and dried pear or apple slices
<i>Matricaria chamomilla</i> L. (Asteraceae) UNISGBR1008	Brigasc-Arroscia	Camamila	Flowers	Food: Liqueur; sugar
<i>Medicago</i> sp. (Fabaceae) UNISGBR1024	Brigasc-Arroscia	Medicago	Leaves, shoots	Food: Salads
<i>Melilotus officinalis</i> (L.) Pall. (Fabaceae)	Brigasc-Arroscia	–	Flowers	Food: Vanilla-like flavour

Table 1 (continued)

Taxon, family and voucher	Sector	Local name(s)	Plant part(s) used	Local recorded use
<i>Melissa officinalis</i> L. (Lamiaceae) UNISGBR1034	Both	Melissa	Leaves	Food: Used to give a characteristic flavour to salads. Infusions and syrups; taken as a calming and digestive tea Food: Jams; seasoning
<i>Mentha arvensis</i> L. (Lamiaceae) UNIS-GBR1035	Brigasc-Arroscia	Menta	Leaves	
<i>Origanum vulgare</i> L. (Lamiaceae) UNISGBR1037	Brigasc-Arroscia	Cornabuggia	Leaves	Food: Seasoning; cheeses; cheese
<i>Oxalis acetosella</i> L. (Oxalidaceae)	Brigasc-Arroscia	Acetosella dei boschi; Erba brusca; Trifoglio acetoso	Leaves, roots, seeds	Food: Soups and salads. Formerly eaten freely; cited by a participant as now appearing as a single garnish leaf on a restaurant plate in Milan while whole meadows of it grow unused in the valley
Medicinal: Taken as an astringent and a diuretic and for digestive complaints; roots and seeds against diarrhoea, abdominal pain and colic.				
<i>Papaver rhoeas</i> L. (Papaveraceae) UNISGBR1045	Brigasc-Arroscia	Papavero	Flowers, fruits, leaves	Food: Green-pie filling; also eaten in salads.
<i>Parietaria officinalis</i> L. (Urticaceae) UNISGBR1063	Both	Erba cavallina; Parietaria	Leaves, stems	Food: Salads, soups, omelettes and pie fillings.
Medicinal: The juice used as a diuretic and to flush the urinary tract; decoction of the stems drunk as a diuretic for kidney gravel.				
Pinaceae indet. (reported as <i>Pinus/Abies</i> ; provisional identification)	Both	Pin	Buds, cones, resin	Medicinal: Decoction of dried buds taken for coughs, sore throat and influenza; fresh resinous cones macerated with sugar in the sun for some months to give a syrup used against catarrh; resin used for colds, wounds, plasters and fumigations.
<i>Plantago lanceolata</i> L. (Plantaginaceae) UNISGBR1048	Both	Piantaggine	Leaves	Food: Leaves in salads and soups; applied to skin irritations and wounds.
<i>Plantago major</i> L. (Plantaginaceae) UNISGBR1047	Both	Stalassangu/ Centifolia/ Millefoglie	Flowers, leaves	Food: Infusions.
<i>Polypodium vulgare</i> L. (Polypodiaceae)	Brigasc-Arroscia	Erba d'ursa	Leaves, rhizomes	Food: Liquorice-like flavour; chewed.
<i>Primula vulgaris</i> Huds. (Primulaceae)	Valle Argentina	Pamparà; Primula	Flowers, leaves	Food: <i>Ravioli</i> filling; omelettes; soup. Flowers as an edible decoration; young leaves in salads.
<i>Prunella vulgaris</i> L. (Lamiaceae)	Brigasc-Arroscia	–	Whole plant	Food: Infusions; liqueurs.
<i>Prunus avium</i> (L.) L. (Rosaceae) UNIS-GBR1034	Both	Strege; Ciliegio	Stalks	Food: Jams; boiled; sugar. Keep the stalks and make a strongly diuretic decoction with mallow and dried pear or apple slices.

Table 1 (continued)

Taxon, family and voucher	Sector	Local name(s)	Plant part(s) used	Local recorded use
<i>Prunus spinosa</i> L. (Rosaceae)	Brigasc–Arroscia	Bossau	Fruits	Food: Jams.
<i>Pulmonaria officinalis</i> L. (Boraginaceae)	Both	Campanula / Pan-e-vin; Polmonaria	Flowers, leaves, stems	Food: Ravioli and pie filling; young leaves in salads.
Medicinal: Taken for catarrhal cough, and cited by participants as the textbook case of the doctrine of signatures; its white-spotted leaves read as a sign of the lungs it is used to treat.				
<i>Rosa canina</i> L. (Rosaceae) UNISGBR1057	Both	Pibura/ Rasacù/ Cyrorrhodon; Rosa canina	Flowers, fruits, leaves	Food: Soup; jams. Hips made into jams, syrups and infusions; leaves infused.
<i>Rubus idaeus</i> L. (Rosaceae) UNISGBR1036	Brigasc–Arroscia	Empre	Fruits	Food: Jams; dried for storage; boiled.
<i>Rubus ulmifolius</i> Schott (Rosaceae) UNISGBR1056	Brigasc–Arroscia	Amòre	Fruits, shoots	Food: Savoury-pie filling; jams; boiled with sugar.
<i>Salvia pratensis</i> L. (Lamiaceae) UNISGBR1038	Brigasc–Arroscia	–	Leaves	Food: Green pie filling, with or without rice, dressed with butter, cheese, and eggs; a festive dish.
<i>Salvia rosmarinus</i> Spenn. (Lamiaceae)	Brigasc–Arroscia	Rosmarino	Leaves	Food: Gathered wild for the stuffed onions of the feast of St John, with thyme, savoury and bay.
<i>Sambucus nigra</i> L. (Viburnaceae) UNISGBR1001	Both	Sambùch/ Sambugu; Sambuco nero	Flowers, fruits, leaves, stems	Food: Infusions; decoctions; jams. Flow-ers macerated to make the traditional summer acqua di sambuco; fruits cooked into syrups and jams.
<i>Satureja montana</i> L. (Lamiaceae) UNISGBR1039	Both	Perizo; Santoreggia	Aerial parts, leaves	Food: Seasoning for soups and pulse dishes, sauces, roast meat and vegeta-bles.
<i>Silene vulgaris</i> (Moench) Garcke (Caryophyllaceae) UNISGBR1020	Brigasc–Arroscia	Erba gianca	Flowers, leaves	Food: Pie filling; omelettes.
<i>Silybum marianum</i> (L.) Gaertn. (Asteraceae)	Valle Argentina	Cardo mariano	Flowers, leaves	Food: Young leaves as a cooked green; mainly medicinal.
<i>Sonchus oleraceus</i> L. (Asteraceae) UNISGBR1013	Brigasc–Arroscia	Laciuni	Leaves	Food: Salads; raw.
<i>Sonchus</i> sp. (Asteraceae)	Brigasc–Arroscia	Laciussi	Leaves	Food: <i>Ravioli</i> filling.
<i>Stellaria media</i> (L.) Vill. (Caryophyl-laceae) UNISGBR1019	Brigasc–Arroscia	Brutta	Aerial parts, leaves	Food: <i>Ravioli</i> and pie filling.
<i>Tanacetum balsamita</i> L. (Asteraceae) UNISGBR1012	Both	Erba Pera; Strigonella / Erba della Madonna	Leaves	Food: Seasoning, and added to goat cheese.
Medicinal: Named by the oldest study participants as a panacea under the name Erba della Madonna.				

Table 1 (continued)

Taxon, family and voucher	Sector	Local name(s)	Plant part(s) used	Local recorded use
<i>Tanacetum vulgare</i> L. (Asteraceae) UNISGBRI005	Brigasc-Arroscia	Archibùs	Flowers, leaves, roots	Food: Liqueur.
<i>Taraxacum officinale</i> F.H.Wigg. agg. (Asteraceae) UNISGBRI014	Both	Tariccia / Radicéta; Tarassaco	Leaves, roots	Food: Salads; boiled; raw; green noodles. Leaves in salads or cooked; roasted roots as a coffee substitute; taken as a digestive and liver depurative.
<i>Thymus serpyllum</i> L. (Lamiaceae) UNISGBRI041	Brigasc-Arroscia	Tumao/ Timo savergu	Leaves	Food: Seasoning; cheeses; cheese; rabbit.
<i>Thymus vulgaris</i> L. (Lamiaceae) UNIS-GBRI040	Both	Timo	Leaves	Food: Seasoning for soups, sauces and meat; gathered wild for the stuffed onions of the feast of St John.
<i>Tilia cordata</i> Mill. (Malvaceae)	Brigasc-Arroscia	Tiglio	Flowers	Food: Infusion; named as one of the teas now bought in supermarket sachets but formerly gathered in the garden.
<i>Trifolium repens</i> L. (Fabaceae)	Valle Argentina	Trifoglio	Leaves	Food: Young leaves in salads and as a decoration.
<i>Umbilicus rupestris</i> (Salisb.) Dandy (Crassulaceae) UNISGBRI021	Brigasc-Arroscia	Campanella	Leaves	Food: <i>Ravioli</i> filling.
<i>Urtica dioica</i> L. (Urticaceae)	Valle Argentina	Ortiche	Leaves, shoots	Food: Boiled as a green; <i>Ravioli</i> and green-pie filling; soups; the first plant of the spring round.
<i>Urtica urens</i> L. (Urticaceae) UNISGBRI062	Brigasc-Arroscia	Urtiga	Leaves	Food: <i>Ravioli</i> filling; omelettes; boiled; green noodles.
<i>Vaccinium myrtillus</i> L. (Ericaceae) UNISGBRI017	Brigasc-Arroscia	Bugnùn	Fruits	Food: Jams; dried for storage; boiled.
<i>Verbascum thapsus</i> L. (Scrophulariaceae) UNISGBRI060	Brigasc-Arroscia	Leventun	Flowers	Food: Infusions; liqueurs.
<i>Viola odorata</i> L. (Violaceae) UNISGBRI065	Brigasc-Arroscia	Violetta	Flowers, leaves	Food: <i>Ravioli</i> filling; soup.

Plant identification

Plants were identified in the field using *Flora d'Italia* (Pignatti 1982; Pignatti et al. 2017); the spring 2019 team also used a regional guide to edible wild plants (Luciano and Gatti 2014). Gathered material was dried and pressed, and determinations were checked against vouchers previously collected in the same valleys and held in the UNISG herbarium of the University of Gastronomic Sciences, Pollenzo, from the earlier survey of Brigasc, Kyé and Provençal communities (Mattalia et al. 2013). Table 1 reports the corresponding voucher accession number when a matching specimen was available. Records without a matching voucher were identified from participant descriptions, the part gathered and the vernacular name; these entries should therefore be regarded as provisional ethnobotanical determinations rather than fully voucher-verified records. Accepted names were standardized against Plants of the World Online (POWO 2026). Family circumscription follows APG IV (Angiosperm Phylogeny Group 2016), and full botanical author citations are reported only in Table 1. (Fig. 2)

Data analysis

Records from the two field campaigns were merged on the accepted taxon name, and each taxon was scored as present or absent in each sector. Uses were assigned to food and medicinal classes, with a taxon permitted to occur in both. Citation-frequency indices were not calculated because participant-level counts were available for only a subset of taxa and were not collected comparably in the two campaigns (see Tardío and Pardo-de-Santayana 2008). Frequencies are therefore reported only where the underlying participant counts are complete and directly interpretable.

For the comparison with the Occitan valleys, each source was reduced to a genus-by-location presence/absence matrix including only wild-gathered plants with food or medicinal use. For the pooled Ligurian-versus-Occitan comparison, Jaccard similarity was calculated as $J = a/(a + b + c)$, where a is the number of shared genera and b and c are genera unique to either set. For the five-location comparison we calculated Jaccard dissimilarity, Sørensen dissimilarity ($\beta_{sor} = (b + c)/(2a + b + c)$), Simpson turnover ($\beta_{sim} = \min(b, c)/(a + \min(b, c))$) and



Fig. 2 Preliminary herbarium sheet of *Achillea ligustica* (Asteraceae), gathered at about 700 m in the upper Valle Arroscia and pressed on site during the spring 2019 campaign. Photograph © A. Pieroni

the nestedness-resultant component ($\beta_{sne} = \beta_{sor} - \beta_{sim}$), following Baselga (2010). We summarized the matrix using correspondence analysis and principal coordinates analysis (PCoA) on Jaccard distances. Genus occupancy was also counted across the five inventories; genera present in all five were treated operationally as the shared regional core, whereas genera present in only one inventory were classified as inventory-specific. Because the comparison contains only five source inventories collected by different teams and instruments, ordinations and beta-diversity partitions are interpreted descriptively rather than as causal tests. The complete matrix, occupancy summary and pairwise distance partitions are provided in Online Resource 1.

Within the Valle Argentina sample, two exploratory 2×2 comparisons tested whether age group (≥ 70 years vs < 70 years) was associated with (i) medicinal plant use and (ii) oral transmission.

Oral transmission included participants reporting oral learning alone or in combination with written sources. Because of the small cell counts, two-sided Fisher's exact tests were used. Exact P values are reported; these tests quantify associations within the interviewed sample and are not treated as estimates of population prevalence.

Sources used for the cultivated landraces

Section 4.3 places the wild-plant inventory alongside cultivated landraces documented in adjacent valleys. No field data on landraces were collected in either campaign, and no accessions, seed samples or morphological descriptors were obtained. That subsection therefore relies entirely on published and registry sources and is presented as contextual interpretation and a research agenda, not as a result of the present field survey.

Results

Composition of the pooled inventory

Study participants reported 81 plant taxa across 31 families. The Brigasc and Arroscia locations account for 73 of them, the Valle Argentina for 28, and 20 taxa were reported in both. Table 1 provides the complete inventory, including the sector of record, vernacular names, parts gathered, recorded uses, and voucher numbers.

Asteraceae and Lamiaceae dominate the family spectrum, followed by Rosaceae, Apiaceae, Brassicaceae and Plantaginaceae, a pattern commonly reported in European wild-food inventories (Hadjichambis et al. 2008; Łuczaj et al. 2012; Pardo-de-Santayana et al. 2007). The southern exposure of the study area is represented by sub-Mediterranean elements such as *Asparagus acutifolius*, *Umbilicus rupestris* and *Laurus nobilis*, while the high Brigasc pastures contribute an Alpine component that does not occur in the lower Argentina sector.

Plant parts, uses and the most frequently cited taxa

Leaves and young shoots dominate the whole inventory, followed by flowers, fruits and, in the Brigasc and Arroscia locations only, underground organs.

Food uses outnumber medicinal ones roughly three to one, but the two are not separable in the accounts of the oldest study participants, for whom a plant that feeds and a plant that cures are the same kind of thing.

In the Valle Argentina, the three most frequently named taxa were, in order, *Pulmonaria officinalis*, *Borago officinalis* and *Plantago lanceolata*. Borage was the most common filling reported for local stuffed *Ravioli* and green pies and was cited across age groups. Lungwort was cited as an example of the doctrine of signatures, its white-spotted leaves being associated by participants with the lungs. In the Brigasc and Arroscia locations, the most prominent taxa included *Urtica*, *Blitum bonus-henricus*, *Achillea* and *Taraxacum*, all used in *Ravioli* or green-pie preparations.

Two practices recorded in the Valle Argentina deserve separate notice because they are not simple gathering. The first is the diuretic decoction made from cherry stalks kept after the fruit is eaten, boiled with mallow and dried slices of pear or apple – a use of what is normally discarded. The second is the harvest of lavender and wormwood, which was the only gathering the whole community undertook together, in large seasonal expeditions, to sell the raw material to the surrounding distilleries; ordinary gathering was done alone or with a relative or friend. The oldest participant attributed the disappearance of this practice to the arrival of synthetic medicines, suggesting that he valued these plants for their curative rather than culinary role.

The Ligurian Alps against the published Occitan record

The locations set against one another in this comparison are mapped in Fig. 3. To establish what is particular to the Ligurian Alps, the inventory was set against the published ethnobotanical record of the neighbouring Occitan valleys from 2008 onwards: the Kyé of the Ellero valley and the Provençal communities of the Gesso and Grana valleys (Mattalia et al. 2013), the Grana campaign of 2011 compiled in Alrhoun et al. (2025), and the upper Varaita valley (Pieroni and Giusti 2009). The Brigasc of Briga Alta (Mattalia et al. 2013) enters the ordination as a location in its own right but not the Occitan set, since Brigasc is an Alpine Ligurian variety and not an Occitan one.

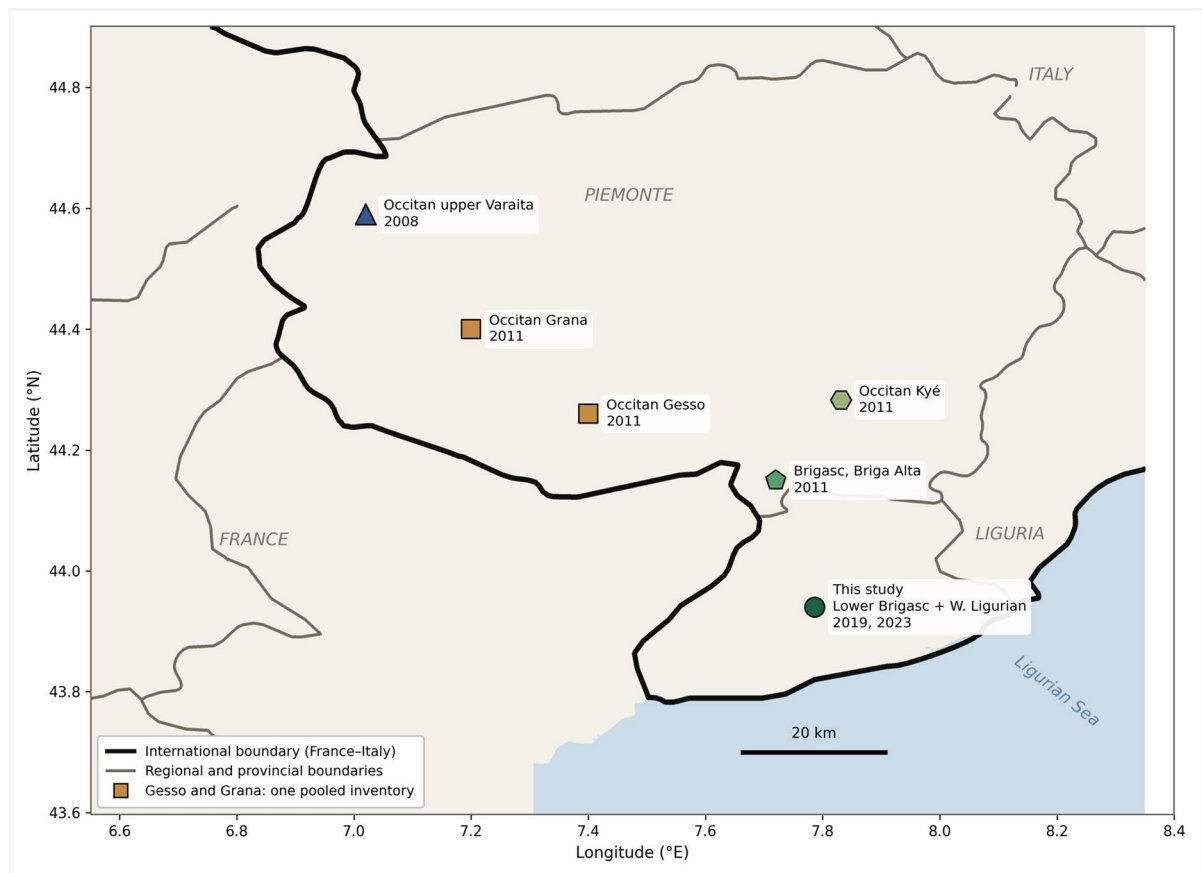


Fig. 3 The five inventories set against one another in the ordination of Fig. 5. Symbols are placed at the approximate centroid of the surveyed municipalities of each area, not of the valley as a whole. Gesso and Grana share the same symbol because Mattalia et al. (2013) report them in a single Provençal column that cannot be split; we combine that column here

with the 2011 Castelmagno survey of the Grana. We include only wild-gathered plants and material from 2008 onwards. We drew boundaries and the coastline from Natural Earth 1:10 m vector data; the legend distinguishes the international boundary between France and Italy and the regional boundary between Piedmont and Liguria

We extracted scientific names from every source and aligned them with POWO before comparison, and we compared only presence and absence, since the research differs in instrument and period. We treat each source area as a location in its own right; none is merged into our inventory.

We reduced both sets to genera before comparison, as described in Methods. Only wild-gathered plants were retained, because the source inventories differed in whether cultivated, garden and purchased plants were also recorded. We also restricted the comparison to material published from 2008 onwards to reduce temporal heterogeneity. Earlier Val Maira (Caramiello Lomagno et al. 1982) and Valle Stura (Musset and Doré 2006) inventories

were therefore excluded. On this basis, the Ligurian-Alpine and Occitan sets shared 48 genera out of a union of 116 (Jaccard similarity = 0.41; Fig. 4). Nineteen genera occurred in the Ligurian-Alpine set but in none of the included Occitan sources. Descriptively, these comprised sub-Mediterranean genera (*Umbilicus*, *Fumaria*, *Laurus*), greens associated with the *Cucina bianca* (*Aegopodium*, *Sonchus*, *Clematis*, *Crepis*, *Alliaria*, *Pulmonaria*, *Silybum*, *Oxalis*), and other meadow, fruit or medicinal genera (*Prunella*, *Bellis*, *Anthriscus*, *Galium*, *Medicago*, *Melilotus*, *Clinopodium*, *Amelanchier*). These patterns are interpreted as inventory-level differences rather than evidence of a discrete ethnobotanical boundary.

Fig. 4 Botanical genera shared between the Ligurian Alps inventory recorded in this study and the published ethnobotanical records of the neighbouring Occitan valleys

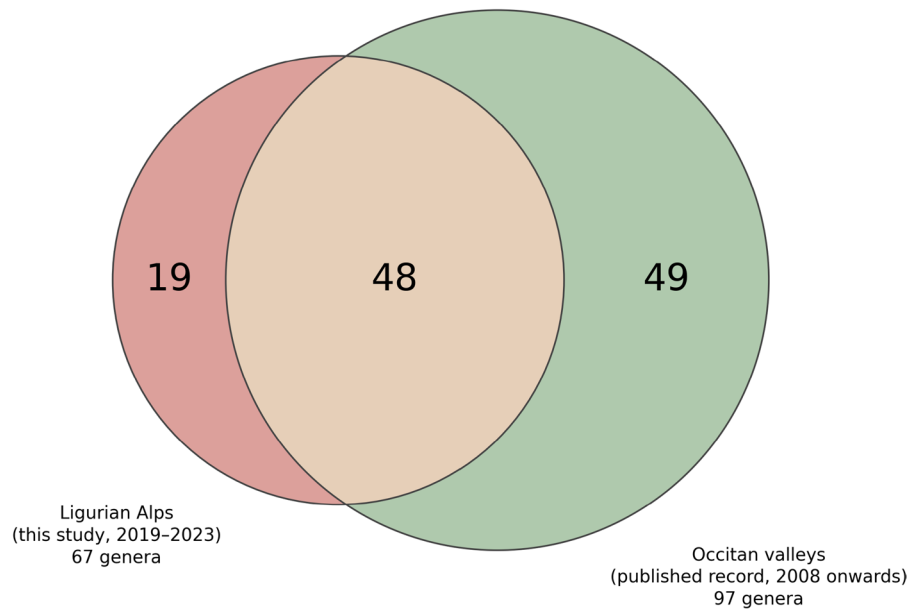


Fig 5 summarizes the ordination of the five standardized inventories defined in Methods. The genus-by-location matrix contained 118 wild genera: 67 in this study, 35 in Brigasc, 40 in Kyé, 53 in upper Varaita, and 68 in Gesso–Grana (Online Resource 1).

The observed similarity pattern did not align with linguistic grouping. On Simpson turnover, the two closest pairs were this study with the Brigasc of Briga Alta (0.20) and the Brigasc with the Provençal Gesso–Grana (0.20), followed by this study with the Kyé (0.25) and the Kyé with Gesso–Grana (0.25). Mean turnover from each inventory to the other four was 0.33 for Gesso–Grana, 0.34 for Brigasc, 0.35 for this study, 0.35 for Kyé and 0.47 for upper Varaita. On Jaccard distance, the closest pair was this study and Gesso–Grana (0.564; 41 shared genera), followed by this study and Kyé (0.610; 30 shared genera). Upper Varaita was the most distinct inventory in both summaries and also represented the highest-elevation area in the comparison. These descriptive results suggest that altitude, inventory richness and shared mobility history are plausible contributors to the observed structure, whereas the five inventories do not form discrete groups by language.

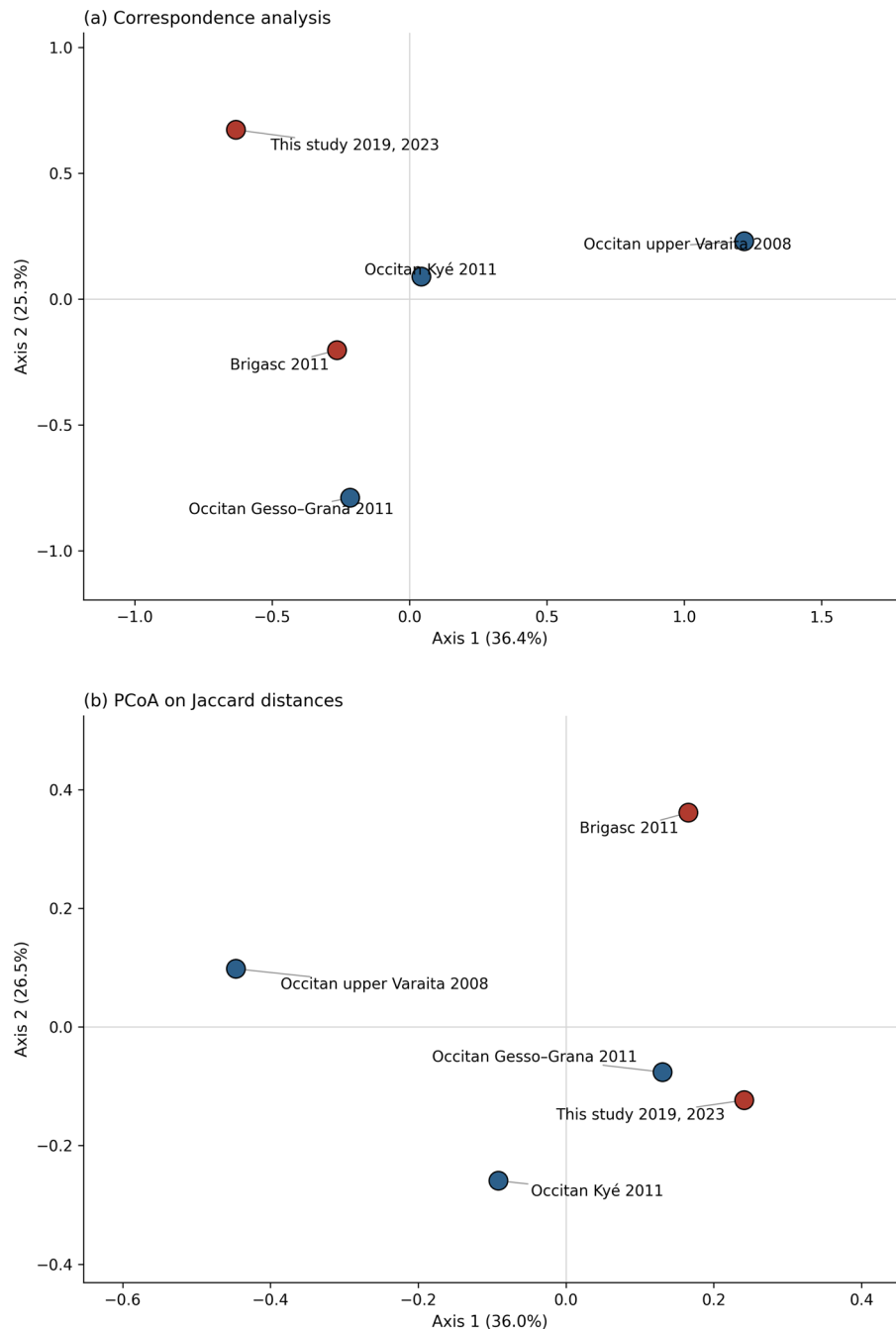
Figure 5 Ordination of the five inventories compared at genus level: (a) correspondence analysis and (b) principal coordinates analysis (PCoA) on Jaccard distances. Both panels are based on the genus-by-location presence/absence matrix in Online Resource

1, restricted to wild-gathered plants with food or medicinal use; cultivated, garden and bought plants were excluded. Sources: this study; Mattalia et al. (2013) for the Brigasc of Briga Alta, the Kyé and the Provençal Gesso; Pieroni and Giusti (2009) for upper Varaita; and Alrhoun et al. (2025) for the Grana 2011 dataset pooled with Gesso

The Brigasc areas and the Occitan Kyé and Gesso–Grana share a montane belt of roughly 600–1600 m and a long history of exchange across the watershed. Taken together with the ordination, this pattern is more consistent with shared altitudinal zones and historical pastoral and trade routes than with a simple linguistic partition. Similar cross-border continuities in ethnobotanical knowledge have been documented in other European mountain regions (Bellia and Pieroni 2015; Söukand and Pieroni 2016).

Partitioning Sørensen dissimilarity sharpened this interpretation by separating genus replacement from richness-related nestedness. Between this study and Brigasc, total Sørensen dissimilarity was 0.451, with turnover of 0.200 and a nestedness-resultant component of 0.251; between this study and Kyé the corresponding values were 0.439, 0.250 and 0.189. In contrast, the comparison with upper Varaita was dominated by turnover ($\beta_{\text{sor}}=0.600$, $\beta_{\text{sim}}=0.547$, $\beta_{\text{sne}}=0.053$), as was the comparison with Gesso–Grana ($\beta_{\text{sor}}=0.393$, $\beta_{\text{sim}}=0.388$, $\beta_{\text{sne}}=0.005$). Thus the relatively small Brigasc

Fig. 5 Shows the relationship between the inventories via ordination



inventory is partly nested within the richer Ligurian repertoire, whereas the contrasts with upper Varaita and Gesso-Grana primarily reflect replacement of genera rather than simple richness differences. Full pairwise partitions are given in Online Resource 1.

Genus occupancy across all five inventories showed a pronounced combination of regional

continuity and local differentiation (Fig. 6). Of 118 genera, 49 (41.5%) occurred in only one inventory, 28 (23.7%) in two, 20 (16.9%) in three, and 7 (5.9%) in four. Fourteen genera (11.9%) occurred in all five inventories and constitute the strict shared core: *Achillea*, *Allium*, *Arnica*, *Artemisia*, *Blitum*, *Gentiana*, *Juniperus*, *Malva*, *Plantago*, *Rosa*, *Taraxacum*,

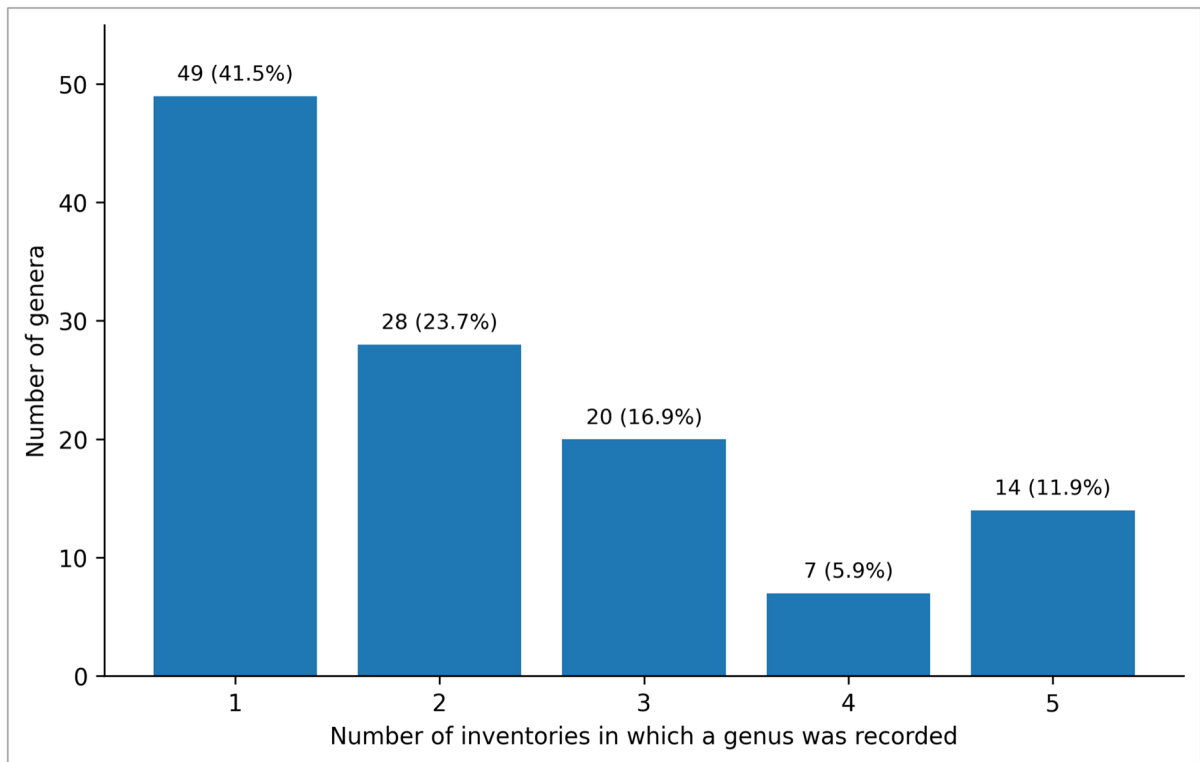


Fig. 6 Genus occupancy across the five standardized ethnobotanical inventories. Bars show the number and percentage of the 118 genera recorded in one through five inventories. Four-

teen genera (11.9%) occurred in all five inventories, whereas 49 (41.5%) occurred in only one

Thymus, *Urtica*, and *Vaccinium*. The large inventory-specific fraction therefore coexists with a small but persistent genus-level core spanning the linguistic and geographic divisions considered here.

The Cucina bianca: wild herbs inside a named regional cuisine

In the Brigasc and Arroscia locations, the gathered flora is embedded in a named cuisine with boundaries and active local politics. The *Cucina bianca* - "white cuisine" - is the food system of the summer farms of the Ligurian Alps, built on what an exposed high-altitude territory could supply: potatoes, garlic, leeks, turnips, cabbages, flour and milk, and above all the fresh cheese called *Brusso*. The name marks a deliberate distinction from the Mediterranean diet of a coast a few dozen kilometres away, and it was coined as part of a heritage-making effort rather than inherited from the pastoral economy itself.

Wild herbs enter almost every dish in this repertoire and supply the green in an otherwise white and pale-yellow cuisine. The emblematic case is *Raviore*, a fresh egg pasta filled with a seasonal mixture of gathered herbs, among them nettle and the plant called *Erbamara* or *Erba besa*, an *Achillea*. The same *Achillea* forms the base of brodo d'Erbamara, a broth thickened with beaten egg and cheese, held to be purifying and strengthening, eaten above all by herders and young people facing heavy work; it appears in Table 1 as *Achillea ligustica*, cited by six of the fourteen Mendatica study participants. Other dishes recorded are *Turle*, potato-and-mint *Ravioli*; *Brussusa*, a flatbread stuffed with garlic and *Brusso*; *Aglie*, a garlic sauce mounted with potato rather than with the oil the community did not have; *Sugeli*, water-and-flour dumplings dressed with *Brusso* and leeks; *Bastardui*, roughly cut pasta with coarsely chopped vegetables; and *Pan fritu*, fried scraps of bread dough.

One distinction a farmer at Mendatica offered bears directly on how gathered plants were used. The

repertoire divides into dishes made by women, with a full kitchen and its techniques, and dishes made by men once they were up at the summer farm with nothing but a fire and a pot. *Streppa e cacia la* belongs to the second kind: a wild-herb broth into which the cook tears pinches of a flour-and-water dough of irregular size, the name recording the gesture. Both men and women, our source insisted, knew the edible plants and the treatment each required; what differed was the equipment, and therefore the dish.

Transmission: a fracture that can be counted

The Valle Argentina dataset records, for all 20 participants, how plant knowledge was acquired and whether plants were used medicinally as well as in cooking. All five participants aged 70 years or older reported medicinal plant use, compared with three of the 15 participants younger than 70 (5/5 vs 3/15); two-sided Fisher's exact $P = 0.0036$. All five older participants also reported oral transmission. Across the full sample, seven participants reported both oral and written transmission, six written transmission only and three oral transmission only; the remaining four reported none. Because 10 participants reported an oral component overall, this corresponds to 5/5 among participants aged ≥ 70 and 5/15 among those aged < 70 , again yielding an exact association with age group (two-sided Fisher's exact $P = 0.0325$). These tests quantify the age pattern within the interviewed sample and do not imply population prevalence.

The direction of travel is therefore not simply loss but substitution: oral transmission within the family is giving way to written and mediated transmission from outside it. Asked what alternative channels they could imagine, most participants under 60 named social media and Instagram in particular. The one case of young people who had received oral instruction about foraging in the Valle Argentina was a pair of visitors from Milan who a resident had taught – the transmission ran from the valley to the city, not down the generations within it. An elderly German woman who has lived in Triora for some thirty years is among the more active local holders and transmitters of this knowledge.

Two remarks made by the oldest study participants frame the change. One observed that wood sorrel, once eaten freely, now appears as a single garnish leaf on a restaurant plate in Milan while whole meadows

of it grow unused in the valley. The other, closing his interview, observed that the current revival of foraging has turned the old order on its head, and that it is nonetheless a good thing that knowledge and interest should spread even by these means.

The harvested organ as the unit of conservation concern

Conservation assessments of gathered floras are commonly organized at taxon level, whereas the demographic effect of harvesting also depends on the organ removed, phenological stage and regenerative capacity. We therefore classified the 81 taxa by harvested organ and interpreted the likely consequence of removal. This classification is a management-oriented interpretation of plant architecture and harvest practice; it is not a population-demographic experiment and does not quantify local harvest pressure.

Three classes emerge. The first and largest is non-destructive harvest of renewable organs: leaves and young shoots taken before flowering from perennials with a persistent rootstock or from annuals that will still set seed, and fruits taken at maturity, which removes propagules but leaves the individual intact. Most of the inventory falls here, and it includes the entire *Ravioli*-filling and green-pie complex – *Blitum bonus-henricus*, *Urtica*, *Sonchus*, *Pulmonaria officinalis*, *Silene vulgaris*, *Aegopodium podagraria* – together with the Rosaceae fruit set. For these taxa, the low-intensity gathering described by participants is unlikely, by itself, to be the dominant demographic pressure: the plants are ruderal or nitrophilous, they occupy exactly the manured resting places, path margins and hay-meadow edges that local land use maintains, and the practice that harvests them is also the practice that keeps their habitat open.

The second class removes reproductive tissue before it functions. Flowers and flower heads gathered for infusions and liqueurs – *Achillea*, *Artemisia umbelliformis*, *Arnica montana*, *Gentiana acaulis*, *Sambucus nigra*, *Matricaria chamomilla* – are taken at anthesis, so each gathering event subtracts directly from that year's seed production. In long-lived clonal perennials, this is absorbed; in short-lived species and in alpine species with narrow flowering windows and poor seedling establishment, it is not. These taxa require a separate point, because it is not a demographic one. *Arnica montana*, the alpine *Artemisia*

of the *genepi* group, shown in Fig. 7, and *Gentiana* are the subject of specific regional legislation on the gathering of spontaneous flora, which across the Alpine arc either forbids their collection outright or caps it at a few plants per person, with larger quantities only under permit (Pieroni and Giusti 2009). That protection attaches to the taxon by statute and applies whatever organ is taken; it is not a consequence of the organ-based classification set out here, and it holds for the flowers of the *genepi* exactly as it does for the roots of the gentian. The organ-based reading below is therefore an argument about demographic consequence, not a description of the law.

The third class includes records in which bulbs, tubers, rhizomes or roots are harvested: *Allium ampeloprasum*, *Allium ursinum*, *Gentiana lutea*, *Juniperus communis*, *Lathyrus tuberosus*, *Malva sylvestris*, *Oxalis acetosella*, *Polypodium vulgare*, *Tanacetum vulgare* and *Taraxacum officinale*. The likely consequence of harvest differs markedly among these taxa and depends on life history and the organ removed. For example, root harvest of the slow-growing perennial *Gentiana lutea* removes the individual and may therefore have greater demographic consequences than limited harvest from rapidly regenerating ruderal taxa; European trade pressure on medicinal roots has also been documented (Lange 1998).

These are management-oriented interpretations rather than population-level measurements. One additional conifer record was reported as *Pinus/Abies* but could not be resolved confidently to a single genus from the available documentation; it is therefore retained conservatively at family level (Pinaceae) in Table 1 without a voucher accession.

Two features of this particular inventory sharpen the picture. The taxa most demographically exposed are not the ones that carry the cultural weight: the plants that define the *Cucina bianca* are leaf crops of disturbed ground. At the same time, the geophytes and the slow-rooted perennials sit at the margins of the repertoire and are recalled as much as practised. And the sub-Mediterranean element that makes this flora distinctive - *Umbilicus rupestris*, *Fumaria capreolata*, *Salvia rosmarinus* - occupies rock ledges, dry banks and wall crevices. These habitats are neither expanding nor contracting with land abandonment, which is the dominant process everywhere else in the valley.

Land-use change may therefore be at least as important as harvest pressure for much of this repertoire. Many gathered taxa are associated with open, disturbed or nutrient-enriched habitats such as hay meadows, summer-farm resting places, terrace walls and tracks. With the contraction of pastoral

Fig. 7 Flowering aerial parts of *Artemisia umbelliformis*, the *Genepi* of these mountains, gathered in the study area and shown by a participant. Photograph A. Pieroni. No person is identifiable in the image



management, woodland and scrub are advancing over some of these habitats. For widespread plants such as *Blitum bonus-henricus*, *Rumex alpinus*, *Urtica* and meadow *Plantago*, habitat closure may therefore represent a more plausible long-term pressure than the limited household gathering recorded here. Conversely, taxa harvested destructively or before reproduction deserve local population monitoring if gathering is to be promoted.

Discussion

Foraging persists in the interstices

The central finding is that wild-plant gathering persists in a strongly depopulated Ligurian Alpine landscape: the combined inventory comprises 81 taxa across food and medicinal uses. This is neither evidence of an intact pre-industrial subsistence system nor of complete knowledge erosion. Rather, it resembles the attenuated but continuing repertoires described from other European uplands in which gathering has shifted from provisioning toward attachment, heritage and recreation (Serrasolses et al. 2016; Stryamets et al. 2015). The term “interstitial” is useful here because land use itself is intermediate: some meadows are still cut and some summer farms still operate, while terraces and pathways persist within a broader trajectory of abandonment.

Is there a Ligurian ethnobotany distinct from an Occitan one?

The comparison in Sect. 3.3 asks whether a linguistic boundary predicts a botanical-use boundary. In this five-inventory dataset, no clear linguistic partition emerged: the two Brigasc/Ligurian inventories were not separated from the Occitan inventories in either ordination, and the closest Simpson-turnover pairs crossed the language boundary. The beta-diversity partition adds an important qualification. The difference between this study and Brigasc contains a substantial nestedness component, consistent with the smaller Brigasc inventory being partly a subset of the richer Ligurian repertoire, whereas dissimilarity from upper Varaita and Gesso–Grana is predominantly turnover-driven. In other words, some pairwise differences reflect inventory richness, while others reflect genuine replacement of genera. This result remains descriptive because the inventories differ in sampling

design and were standardized at genus level, but it is consistent with Mattalia et al. (2013), who likewise found strong similarity between Brigasc and neighbouring Provençal repertoires and interpreted it in relation to historical transhumance and exchange.

Within these standardized inventories, we found no evidence for a sharply distinct Ligurian flora of use. The 48 genera shared between the pooled Ligurian and Occitan sets indicate broad overlap, while the stricter five-inventory analysis identifies 14 genera present everywhere. Several prominent genera in the present study - *Blitum bonus-henricus*, *Urtica*, *Taraxacum*, *Achillea*, *Artemisia* and *Gentiana* - also occur in inventories from the other side of the watershed. The narrower differences are therefore more appropriately treated as descriptive features of the included inventories. Nineteen genera occurred in no included Occitan source, and these can be grouped descriptively rather than interpreted as statistically distinct clusters.

The first group is ecological and needs no cultural explanation. *Umbilicus*, *Fumaria* and *Laurus* are sub-Mediterranean genera that the southern exposure of these valleys admits and the inner Occitan valleys, closed to the north and higher, do not have. This is a Ligurianness of climate, and it would appear in any inventory made on this slope regardless of who was speaking.

The second group is associated with culinary practice. The filling greens of the *Cucina bianca* - *Aegopodium*, *Sonchus*, *Clematis*, *Crepis*, *Alliaria*, *Pulmonaria* and *Silybum* - include several widespread plants, so their occurrence in the present inventory may reflect culinary selection as well as ecology. The same may apply to the Rosaceae fruit-and-jam complex, including *Amelanchier ovalis* and *Rubus ulmifolius*. A cuisine built on flour, potatoes, milk and *Brusso* requires a green component, a pattern documented across the Apennine and Mediterranean pie-and-filling belt (Biscotti and Pieroni 2015; Nebel et al. 2006; Pieroni 1999; Sansanelli and Tassoni 2014). On the evidence of the published inventories used here, this culinary combination is more prominent on the Ligurian side, but broader standardized sampling would be needed to test that interpretation.

The third group is thinner and consists of vulneraries, meadow herbs and fruit plants - *Prunella*, *Bel-lis*, *Galium*, *Melilotus*, *Medicago*, *Anthriscus* and *Amelanchier* among them - whose absence from the

Occitan lists may reflect nothing more than what the earlier surveys chose to record; several of them are, however, documented on the Ligurian side of the same mountains by Cornara et al. (2014), which is consistent with a Ligurian rather than an Occitan circulation.

Historical mobility offers a plausible explanation for part of the shared regional repertoire, and interviewees repeatedly referred to two movements that crossed the linguistic boundary: the *Via del sale*, linking the western Riviera with Piedmont across the Colle di Tenda, and short-range transhumance between the coastal olive belt and the summer pastures. Neither movement was constrained by the language boundary. These routes may therefore have facilitated circulation of plant knowledge and practices across the watershed, although the present dataset cannot test historical causation directly.

The resulting interpretation is therefore narrower than a claim for a discrete “Ligurian ethnobotany”. The shared genera form a broad south-western Alpine core, while the most distinctive elements of the present inventory are associated with southern exposure and with the culinary selection of greens for the *Cucina bianca*. The analysis thus points to a biocultural gradient shaped jointly by ecology, cuisine and historical mobility rather than to a sharp boundary corresponding to language.

The cultivated base of the *Cucina bianca* and the landraces of the adjacent valleys

The *Cucina bianca* is defined by what an exposed high-altitude territory could grow: potatoes, garlic, leeks, turnips, cabbages, flour and milk (Sect. 3.4). Read as a list of crops rather than dishes, it maps onto documented local varieties maintained in valleys immediately around the study area. This cultivated counterpart is relevant because the present interviews show a marked generational concentration of orally transmitted plant knowledge. Recent work in this journal likewise shows the value of documenting northern Italian plant genetic resources and of combining characterization with local valorization (Canella et al. 2022; Pedrali et al. 2026).

The clearest case is the turnip. Caprauna lies at about 900–1000 m in the Alta Val Tanaro, on the Piedmont–Liguria watershed, and borders Aquila di Arroscia, Armo, Borghetto d’Arroscia and Pieve di

Teco - that is, it borders the Valle Arroscia sector surveyed here. The *Rapa di Caprauna* is a local turnip population with a flattened round root and white to yellowish flesh, traditionally grown on dry-stone terraces between roughly 800 and 1500 m. Its cultivation has been recorded locally for centuries; it entered the Slow Food Presidia in 2003 and is listed among Piedmont’s traditional agri-food products (Fondazione Slow Food per la Biodiversità 2026; Unione Montana Alta Val Tanaro n.d.). Caprauna had 94 residents at the 2021 count, with a mean age above sixty, illustrating the demographic fragility of the surrounding mountain communities.

The second case is garlic, which connects a landrace directly to a dish recorded in our interviews. The garlic of the upper Valle Arroscia, known as *Aglio di Vessalico* after the fair held at Vessalico since at least 1760, is a non-bolting local population grown on the terraces of the upper valley. Cloves are traditionally planted in autumn, lifted in late June, dried in the shade and plaited into *Reste*. Local protection initiatives began in the late 1990s, and the product has subsequently been included in formal valorization schemes (Unione dei Comuni dell’Alta Valle Arroscia 2022). The dish recorded at Mendatica as *Aglio* - a garlic sauce mounted with potato rather than oil (Sect. 3.4) - is closely linked to this local garlic. The *Cucina bianca* is therefore not only a wild-herb cuisine but also incorporates locally maintained crop diversity.

Around these two sit further local crop populations documented by the Alta Val Tanaro consortium, including the white bean of Bagnasco, the chickpea of Nucetto, the *Fagiolo maomese*, a local buckwheat known as *Furmentin*, an eight-row maize, a potato population of the Alta Valle Tanaro, and the dried chestnut of Garessio (Consorzio per la Valorizzazione e la Tutela dei Prodotti Tipici dell’Alta Val Tanaro n.d.). On the Ligurian side, the bean of Badalucco, Conio and Pigna belongs to the same broader cultivated landscape, and Badalucco is one of our survey localities. These examples are presented as contextual plant-genetic-resource information rather than as primary results of the field survey.

Three points follow. First, the demographic argument of Sect. 4.5 applies to both components, but with opposite mechanisms: the wild flora is threatened by the closing of open habitat, whereas the landraces are threatened directly by the loss of the

growers who reproduce the seed, since a landrace not sown in a given year is not a habitat that can regenerate. Second, the erosion is asymmetric in documentation as well: the wild taxa now have the inventory presented here, while for the cultivated populations we found no evidence in the sources consulted of accessions in an ex situ collection, and the recognitions that exist – Presidia, traditional-product lists, consortium labels – are commercial and gastronomic instruments, not genebank ones, as the suspension of the Vessalico Presidium in 2023 illustrates. Third, the same valley system that makes this study a comparative setting for wild plants (Sect. 2.1) would make it one for crops: Caprauna and Vessalico lie within the same cross-watershed setting in which Sect. 3.3 did not reveal a clear linguistic partition in the gathered-flora inventories; whether cultivated diversity shows a different pattern is an open and testable question.

This paper contains no primary landrace data, and the cultivated material discussed above should not be read as part of the field-survey results. It does, however, identify a concrete next step: targeted collection of seed and vegetative material, followed by morphological and, where appropriate, molecular characterization and deposition in accessible collections. Comparable combinations of ethnobotanical interviewing and formal characterization have recently been used successfully for mountain landraces in Europe (Canella et al. 2022; Pedrali et al. 2026).

From oral transmission to the screen

The Valle Argentina data provide a small but explicit cross-tabulation of transmission mode and use. Medicinal use was reported by all five participants aged 70 years or older but by only three of 15 younger participants (two-sided Fisher's exact $P = 0.0036$), while oral transmission was reported by all five older participants and five of 15 younger participants ($P = 0.0325$). These exact tests quantify an age-associated pattern within the interviewed sample. The pattern is consistent with wider European reports of declining vertical transmission and the growing role of written or mediated sources (Grasser et al. 2012; Kalle and Söukand 2012; Schunko and Vogl 2010). Because the age groups were not selected through a stratified probability-sampling design, these proportions should not be interpreted as population prevalence. Participants' references to social media as a plausible

route for future learning suggest a possible change in transmission channels, but this interpretation remains exploratory.

Conservation follows the organ and the habitat, not the species list

The organ-based classification in Sect. 3.6 suggests a practical refinement for conservation assessment. Taxon-level legal protection remains essential, but harvest management can also consider the organ removed and its phenological timing. For example, root harvest of *Gentiana lutea* removes the whole individual, whereas limited leaf harvest has a different demographic consequence. Conversely, repeated flower harvesting may reduce seed production even in taxa not otherwise considered at high risk. The appropriate management unit is therefore not “organ instead of species”, but organ and phenological stage in addition to taxon-level status, abundance and local harvest intensity.

A second implication concerns the conservation target. Many taxa in this inventory occur in open habitats maintained by mowing, grazing and manuring. As those practices contract, habitat closure may become a more important long-term pressure than the low-intensity household gathering described by participants. This is a hypothesis generated by the ethnobotanical observations rather than a measured demographic result. Maintaining hay meadows and summer-farm landscapes may therefore benefit both the continuity of local practices and the open-habitat plant communities on which many of them depend.

Heritage and harvest are in tension

The heritage framing emerged from the communities themselves, particularly around the *Cucina bianca* and the tourism economy of Triora. However, cultural valorization and biological conservation should not be treated as interchangeable goals. The decline of terrace maintenance, mowing and summer-farm activity means that the landscape supporting both the cuisine and many gathered species is changing while cultural promotion is increasing. Any tourism or heritage initiative based on wild plants should therefore be coupled with verified botanical identification, habitat management and explicit harvest guidance.

Documentation and renewed promotion of gathering are not the same intervention. Valorization initiatives should distinguish between common leafy taxa likely to tolerate low-intensity harvest and taxa for which destructive collection, limited reproductive output or legal protection creates greater concern. Equally important, uses based on uncertain identifications should not be circulated as recommendations. This is particularly relevant here because a substantial part of the inventory lacks direct voucher support.

A baseline for whatever comes next

The present inventory provides a baseline for future comparison in these valleys, but its value depends on transparent verification. Voucher-backed determinations can support future ecological or cultural monitoring, whereas non-vouchered records should be treated as hypotheses to be re-collected and confirmed. This distinction is especially important if the inventory is later used in gastronomy, education or tourism, where a mistaken determination can have practical consequences (Bennett and Balick 2014).

More broadly, many European marginal uplands are losing both resident populations and the locally embedded knowledge associated with farming and foraging. In the Valle Argentina sample, the concentration of oral learning and medicinal use among the oldest participants indicates that opportunities for first-hand documentation are narrowing. The appropriate response is not to assume that all knowledge will disappear on a fixed timetable, but to document it rigorously while the relevant practitioners, habitats and practices remain accessible.

Limitations

The sample is small (34 participants), participants were not selected through probability sampling, and the study was not stratified by age; the inventory therefore describes knowledge recorded among interviewees rather than population prevalence. The Fisher exact tests quantify associations within the Valle Argentina interview sample and should not be extrapolated to the valley population without a larger stratified survey. The two field campaigns used different interview instruments, and participant-level citation frequencies are not consistently available, so

sector comparisons are restricted to presence/absence. The five published inventories used for regional comparison were compiled by different teams and at different times. Genus-level standardization and filtering reduce, but do not eliminate, methodological and temporal heterogeneity, and the small number of source inventories precludes inferential attribution of ordination or beta-diversity patterns to language, altitude or mobility history. Finally, after conservative revision of the ambiguous conifer record, 30 taxa in Table 1 lack a direct voucher specimen, and several records are retained only at genus or family level. These determinations should be treated as provisional, which limits the reproducibility of part of the botanical inventory. The organ-based conservation discussion is likewise interpretive: no population-demographic monitoring or quantitative harvest-pressure measurements were conducted.

Conclusion

Wild-plant gathering persists in the Ligurian Alps within a landscape of demographic decline and changing land use. The combined inventory comprises 81 taxa in 31 families and documents a repertoire in which food, household medicine, pastoral cuisine and local heritage remain connected. The five-inventory comparison identifies a small strict regional core (14 of 118 genera present in all five inventories) alongside a large local component (49 genera present in only one), while beta-diversity partitioning shows that pairwise differences arise from different combinations of nestedness and genus replacement. The elements distinctive within the present inventory are associated mainly with southern exposure and the culinary selection of greens for the *Cucina bianca*. Within the interviewed Valle Argentina sample, both medicinal use (5/5 vs 3/15; $P = 0.0036$) and oral transmission (5/5 vs 5/15; $P = 0.0325$) were concentrated among participants aged 70 years or older. The study also identifies two priorities for follow-up: voucher collection and redetermination of the non-vouchered botanical records, and direct collection and characterization of cultivated landraces that are discussed here only from published and registry sources.

Together, these findings support a conservation approach that links knowledge documentation with specimen verification, continued management of

open habitats and, where local crops are concerned, on-farm and ex situ conservation. The dataset should therefore be viewed as a documented baseline for further field verification and longitudinal comparison rather than as a prevalence survey of the wider population.

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Declarations

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Ethical approval The research followed the Code of Ethics of the International Society of Ethnobiology (ISE 2006). Verbal prior informed consent was obtained from each participant before interview after the study aims and intended research outputs had been explained. No directly identifying personal infor-

mation is reported in the manuscript; participants are designated only by initials, approximate age and place of residence.

Consent for publication Verbal prior informed consent covered participation and the use of de-identified interview information in the intended research outputs.

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