

*Full Length Research Paper*

# Collecting crop genetic resources in two Italian linguistic (Occitan and Ladin) islands and West Liguria with historical and ethnobotanical notes

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A research on exploration, collecting and safeguarding plant genetic resources in Italian linguistic islands by Institute of Plant Genetics of the National Research Council of Bari (Italy) and the Institute of Crop Science of Kassel University (Germany) started in 1996. In 2010 two other linguistic areas (Occitan and Ladin) were visited with the same aim. In addition, west Liguria was covered to complete a previous exploration in that region. In all 99 accessions belonging to 51 *taxa* were sampled from 29 collecting sites. Rare crops for Italy were found for example Citron melon [*Citrullus lanatus* (Thunb.) Matsum. et Nakai subsp. *lanatus* var. *citroides* (Bailey) Mansf. ex Greb.], old landraces of root chicory (*Cichorium intybus* L.), *Artemisia umbelliformis* Lam. cultivated, ancient populations of rye selected for straw, rutabaga [*Brassica napus* L. var. *napobrassica* (L.) Rchb.], 'bleu potatoes' (*Solanum* sp.), etc. In conclusion the Occitan and Ladin linguistic islands still conserve worthy crop genetic resources but similar to other Italian regions inhabited by ethnic minorities, the traditional customs and language are losing importance. This phenomenon also negatively affects the cultivation of landraces causing their genetic erosion and, in many cases, extinction. A greater attention by the local government departments is desirable and necessary.

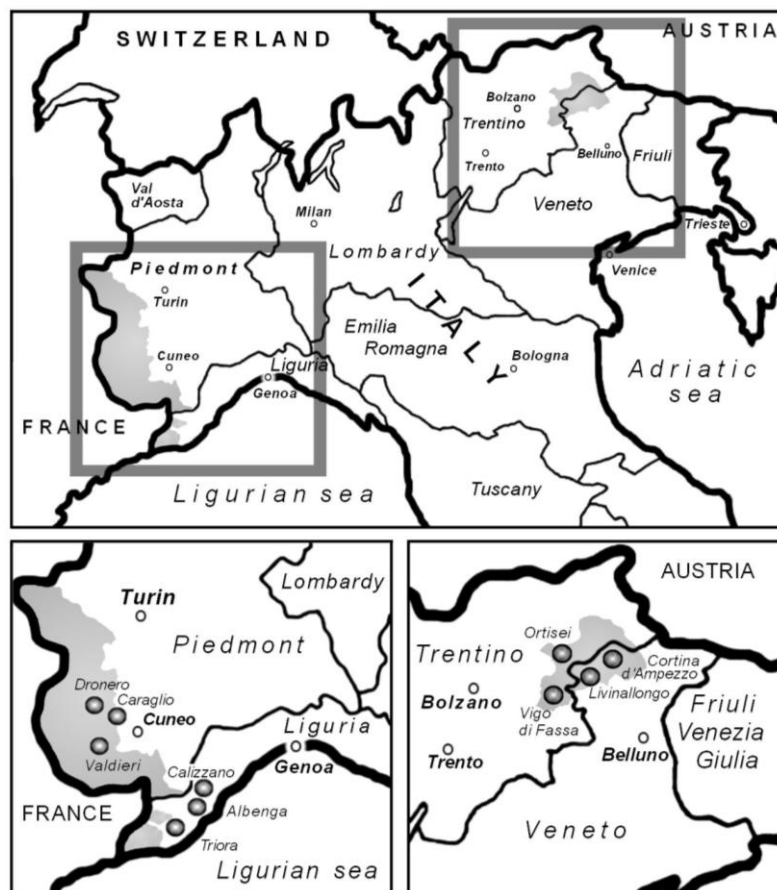
**Key words:** Agricultural biodiversity, occitans, ladins, genetic erosion, Italy, linguistic islands.

## INTRODUCTION

At Institute of Plant Genetics (IGV) of the National Research Council (CNR) of Bari (Italy), several strategies are studied and tested to find out and safeguard the increasingly rare autochthonous crop genetic resources (CGR). According to the characteristics (for example history, economy, people, tradition, eco-geography) of the study area, specific survey tools have been used as the 'crop indicator method' (Hammer et al., 1991), investigations in 'special habitat' like 'oceanic islands',

'continental shelf islands', 'non-marine islands' (Hammer and Laghetti, 2006) and 'ethnic/linguistic islands'. A research about the collecting and characterisation of CGR in Italian linguistic islands by IGV and the Institute of Crop Science of Kassel University (Germany) started in 1996. In all five missions were carried out: in Italian towns of Albanian origin (Hammer-Spahillari et al., 2007; Hammer et al., 2011; Laghetti et al., 1998, 2011), in the German-speaking areas of northern Italy (Hammer et al., 2007a, b; Laghetti et al., 2003, 2007), in a Slavic Community in the Italian Alps (Miceli et al., 2007), in Grecia (Apulia region) and Bovesia (Calabria region), two Griko-speaking areas in southern Italy (Laghetti et al.,

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**Figure 1.** Map of Western Liguria, Occitan and Ladin areas explored during the mission.

2008). The results of these explorations in Italian linguistic islands stressed a strong genetic erosion of autochthonous crops and the urgent need of their safeguarding. For these reasons in 2010 a collecting mission was carried out in the Occitan and Ladin linguistic areas sited in Italy.

## METHODOLOGY

In October 2010, the agricultural areas of the most important towns of Occitan and Ladin origin situated in Italy were investigated (Figure 1). In addition, west Liguria was covered to complete a previous exploration in that region (Laghetti et al., 2003). The main goals of this research were to collect accessions of autochthonous CGR together with data about the local agriculture, history, ethnobotany, genetic and phenotypic variation, degree of crop genetic erosion. The sampling and collecting strategies followed were the same as those used during previous similar explorations (Hammer et al., 1991; Laghetti et al., 1998; Perrino et al., 1981).

## RESULTS AND DISCUSSION

In total, 99 accessions belonging to 51 taxa were

sampled from 29 collecting sites. The detailed list of the collected material is reported in Table 1.

### Occitan area

'Occitania' (traditional areas where Occitans live) includes the following regions (ca. 196,000 km<sup>2</sup> with 12,000,000 population in total):

- Provence, Drôme-Vivarais, Auvergne, Limousin, Guyenne, Gascony, southern Dauphiné and Languedoc in the southern France (ca. 191,000 km<sup>2</sup> with 11,700,000 population).
- The Aran valley, in the Pyrenees, in Catalonia (Spain); (ca. 450 km<sup>2</sup> with 10,000 population).
- The principality of Monaco (where Occitan is traditionally spoken besides Monégasque language); (ca. 1.5 km<sup>2</sup> with 30,000 population).
- Fourteen Alpine valleys in Piedmont (provinces of Cuneo and Torino), as well as in scattered mountain communities of the Liguria (province of Imperia with 'Olivetta San Michele' town and a part of territory of

**Table 1.** Number and status of accessions collected.

Species	Status <sup>s</sup>	Ladin area	Occitan area	Western Liguria	Total
<i>Fagopyrum esculentum</i>	r	1	1	1	3
<i>Hordeum vulgare</i>	R	4	-	-	4
<i>Secale cereale</i>	R	-	8	-	8
<i>Zea mays</i>	C	1	3	2	6
Cereals		6	12	3	21
<i>Phaseolus coccineus</i>	C	1	-	-	1
<i>Phaseolus vulgaris</i>	C	-	-	7	7
<i>Pisum sativum</i>	C	2	-	-	2
<i>Vicia faba</i>	C	3	-	-	3
<i>Vigna unguiculata</i>	C	-	-	1	1
Pulses		6	-	8	14
<i>Allium cepa</i>	C	2	-	1	3
<i>Allium proliferum</i>	r	1	-	-	1
<i>Allium sativum</i>	r	1	-	1	2
<i>Allium schoenoprasum</i> subsp. <i>sibiricum</i>	R	-	-	1	1
<i>Atriplex hortensis</i>	r	2	-	2	4
<i>Beta vulgaris</i> var. <i>vulgaris</i>	C	1	-	-	1
<i>Beta vulgaris</i> var. <i>cicla</i>	C	1	-	-	1
<i>Brassica oleracea</i> var. <i>capitata</i>	r	2	-	-	2
<i>Brassica napus</i> subsp. <i>napobrassica</i>	r	1	-	4	5
<i>Brassica rapa</i> subsp. <i>rapa</i>	r	-	-	1	1
<i>Brassica rapa</i> var. <i>sylvestris</i>	r	1	-	-	1
<i>Cichorium intybus</i>	C	-	-	1	1
<i>Citrullus lanatus</i>	C	-	-	1	1
<i>Citrullus lanatus</i> subsp. <i>citroides</i>	r	-	-	4	4
<i>Cucurbita maxima</i>	C	-	-	4	4
<i>Cucurbita moschata</i>	C	-	-	1	1
<i>Cucurbita pepo</i>	C	-	-	4	4
<i>Cynara cardunculus</i>	r	-	1	-	1
<i>Foeniculum vulgare</i>	C	-	-	1	1
<i>Lagenaria siceraria</i>	r	-	-	1	1
<i>Raphanus sativus</i> convar. <i>oleifer</i>	r	1	-	-	1
<i>Petroselinum crispum</i>	C	-	-	1	1
<i>Tragopogon porrifolius</i>	r	-	-	1	1
Vegetables		13	1	29	43
<i>Alcea rosea</i>	r	-	-	1	1
<i>Anacyclus</i> sp.	r	1	-	-	1
<i>Bituminaria bituminosa</i>	r	-	-	1	1
<i>Carum carvi</i>	r	1	-	-	1
<i>Lepidium sativum</i>	r	1	-	-	1
<i>Linum usitatissimum</i>	R	2	-	-	2
<i>Helianthus annuus</i>	C	1	-	-	1
<i>Nepeta cataria</i>	r	1	-	-	1
<i>Papaver somniferum</i>	r	3	-	-	3
<i>Rheum officinale</i>	R	-	1	-	1
<i>Rheum palmatum</i>	R	-	2	-	2
<i>Nepeta cataria</i>	r	1	-	-	1

Table 1. Contnd

<i>Papaver somniferum</i>	r	3	-	-	3
<i>Rheum officinale</i>	R	-	1	-	1
<i>Rheum palmatum</i>	R	-	2	-	2
<i>Rumex alpinus</i>	r	1	-	-	1
<i>Ruta graveolens</i>	r	-	1	-	1
<i>Saponaria officinalis</i>	r	-	-	1	1
<i>Sinapis alba</i>	C	-	-	1	1
<i>Solanum luteum</i>	r	-	1	-	1
<i>Vicia sp.</i>	r	1	-	-	1
Other species		12	5	4	21
Total		37	18	44	99

<sup>§</sup>Status of accessions in the collecting areas: C (common); r (rare, not threatened by genetic erosion); R (rare, threatened by genetic erosion).

Triora), and in one community (Guardia Piemontese) in Calabria (province of Cosenza); (ca. 21 km<sup>2</sup>, population ca. 1,500).

Most of the Occitan valleys are subject to a process of depopulation, with rates among the highest of all the Western Alps, which already stand out for a particularly negative trend. The valleys located in the province of Turin have a less negative overall situation. The only real anomaly is instead built up from 'Val di Susa', which in a general decrease of just under 40% in the first half of last century, shows a significant increase in the last forty years. This phenomenon is probably due to the strong development of tourist resorts like at Sestrières, Sauze d'Oulx and Bardonecchia, with great facilities for alpine skiing and easy accessibility, increased in recent years from the Frejus motorway. The economy of higher areas is based on high mountain agriculture, summer tourism and cattle breeding, while in lower zones, on handicrafts and agriculture mainly as secondary activity (for example family gardens). The exploration team visited, preliminary, only some towns of the Italian Occitan area (Figure 1), where the Occitan language received legal status in 1999. In the past, very few similar missions have been carried out in Italian Occitan valleys and mainly for ethnobotanical studies (for example Caramiello et al., 1982, 1984; Grabherr, 2009; Luciano and Gatti, 2007; Novaretti and Lemordant, 1990; Pieroni and Giusti, 2009). In these places 18 accessions have been collected of which 12 were of old cereals (Table 1). The most important samples were those of rye from the Valdieri area (Cuneo - Piedmont) where the 'Ecomuseo della segale' ('Ecological Rye Museum') is present. In this museum some researchers are involved in a project on the safeguarding of local rye varieties characterized by a straw of good quality, selected mainly as material for roof building.

In the past rye, very typical in the area (for example at 'Tetti Bartola', 'Tetti Bariau'), has been the crop key to the

local economy, an important source of livelihood but, nowadays, rye is becoming a relic crop. In this interesting area one and three landraces of buck-wheat (already disappeared in upper Varaita valley according to Pieroni and Giusti (2009) and maize, respectively, were sampled. Valuable information was given by the Institute of Occitan Studies 'Espaci Occitan' in Dronero (CN), which has a rich library on the Occitan history and culture. This institution has also a detailed knowledge about local farmers particularly dedicated to the cultivation of Occitan landraces. Following its indications it was possible to find in Caraglio (CN), the ancient variety of garlic 'Agljo caraglio' ('Aj d'caraj' in Occitan), highly threatened with extinction (Figure 2). Today this old crop is cultivated mainly in one farm called 'Fattoria dell'Agljo' ('garlic farm'). At Villar San Costanzo (CN), not far from Dronero, the bakery 'Forneria Cavanna' produces baked products, using flour of old local cereals ground in a traditional water mill, (the famous 'molino della Riviera') whose wheels are moved directly by the river Maira in the centre of Dronero town. Different types of special millstones are adapted to the specific needs of different kinds of seeds. Different engravings in millstones, slow-speed motions and other regulatory devices contribute to reaching the better results that characterize the diverse types of flours. These techniques have been probably evolved over time and also demonstrate the great importance, the cereals formerly had in this area.

## Genepi

Very common in this zone is the production of a typical alcoholic beverage called Genepi, also a generic name for different aromatic plants (*Artemisia* L. spp. - Compositae) typical of the Alps and the Pyrenees (Aeschmann et al., 2004). In particular five main species are used in Occitan area to produce Genepi: *Artemisia*



**Figure 2.** The ancient and rare variety of garlic 'aglio Caraglio' ('Fattoria dell'Aglio' – Caraglio).

*eriantha* Ten. (syn. *Artemisia petrosa* Fritsch) called 'Genepi of rocks' growing on Maritime Alps, Apennines, Balkans and Carpathians; *A. nivalis* Br.-Bl. (named 'Genepi of snow') a very rare species endemic of Swiss Alps; *A. glacialis* L. (called 'Genepi of glaciers') an endemic species of south-west Alps; *A. genipi* Weber (syn. *A. spicata* Wulfen) called 'black Genepi' or 'Genepi male' growing on Italian, French, Swiss and Austrian Alps only between 2600 to 2700 m a.s.l.; *A. umbelliformis* Lam. (syn. *A. mutellina* Vill., *A. laxa* (L.) Fritsch) called 'white Genepi' or 'Genepi female' or 'Genepi fumelo' (folk names) growing in the same area of *A. genipi*. Among these five species only *A. umbelliformis* is cultivated usually growing at lower altitudes than the wild plant (Regione, 2010). Further information and details on ethnobotany, recipes, ecology and legislation of this group of plants are reported by Pieroni and Giusti (2009), Rossi (1904), Volpato (2004) and Soster (2008). During the mission, the very small hamlet of Palent in the higher zone of Maira valley (1600 m asl) was visited to investigate on a locally well-known organic-biodynamic farm by an old (80 years old) farmer (Mr. Matteo) living there with his wife. Genepi (*A. umbelliformis*), rhubarb (*Rheum palmatum* L. and *R. officinale* Baillon, of which three accessions were collected), gentian (*Gentiana lutea* L.), yarrow (*Achillea erba-rota* All. aggr.) and other aromatic plants are here both cultivated and collected from the surrounding woods. A tasty 'amaro' (bitter liqueur) is produced by our farmer with the cold infusion of leaves, roots and fruits of these plants. The experience in the dosage of the ingredients is the result of years of testing and tasting with friends. The result is a bitter

liqueur with excellent digestive qualities, good taste and with a particular color. However, here, the most interesting cultivation is the genepi (Figure 3).

The plantations are located in small plots, adopting the system of 'mulch' to protect the delicate seedlings against weeds. Nothing is left to chance, even the mulching material used for this purpose is eco-friendly. Genepi can be collected no sooner than 2 to 3 years after planting, that Mr. Matteo does so strictly by hand in small seedbeds in the open field, in order to reproduce as much as possible the natural habitat of this medicinal plant. Crops occupy plots of land with a slope very strong for better exposure and an excellent water drainage. In the period between late May and June, the plants are collected only with the help of a pair of scissors designed for this specific use. Mr. Matteo has built a wood-burning dryer, capable of drying genepi and other medicinal herbs grown by him for maintaining the same aromatic substances. Unfortunately, the risk that after the end of Mr. Matteo's activities also his specific agriculture disappears at Palent is very high! Outside the Occitan area, a sample of the renowned 'Cardo Gobbo di Nizza Monferrato' ('Hunchback Cardoon of Nizza Monferrato') (*Cynara cardunculus* L.) was collected. The name "Hunchback" is derived from the particular agro-technique the crop is subjected to, after which the plant is physically bent, curled in on itself. It belongs to the Spadone variety and is cultivated in the homonymous municipality and surroundings (province of Asti), particularly in sandy soils of the river Belbo. It is very different from the other cultivars, ca. 80 cm high with rather large leaves with white ribs and entire edge. At Nizza Monferrato, this





**Figure 3.** Cultivation of genepi (*Artemisia umbelliformis*) in a high mountain field by a farmer who is a real specialist about the cultivation (organic) of this plant [Palent, an hamlet in Maira valley (CN), ca. 1600 m a.s.l.].

vegetable, to overcome the rigidity of the winter, is partially buried, in this way the plant in an attempt to seek the light, upward curve assuming the characteristic hump shape. This treatment allows the plant to overcome the coldest months and, in particular, makes the stem white, more tender and delicate to eat. At Saluzzo, instead, the plants are bundled with heavy sheets of paper closely tied around so that the plant takes a good look right, white and tender.

The sowing time is late spring while harvest time is between the first week of October and the end of November. The plants acquire their own characteristics after being subjected in September to the bleaching technique already described. They become white for the loss of chlorophyll, their leaf ribs which have the characteristic hump, lose much of fibrosis, making crunchy and sweeter for the reduction of bitter principles.

### Ladin area

In Italy, Ladins form a loose community settled in five valleys that radiate from the massif of the Sella in the Dolomites. Their Rhaeto-Romance languages, the origin of which dates back more than a millennium have been known as such to the linguistic community over a century ago after the pioneering studies of G. I. Ascoli (Haiman and Benincà, 1992). In Italy those minor languages are not only largely spoken at home, but often used in formal occasions, as an effect of the Italian Law n. 482/1999 “rules on protection of historical linguistic minorities”<sup>1</sup>. There are little differences among the idioms spoken at

Gardena, Badia, Fassa, Livinallongo and Ampezzo (in fact not always they are mutually intelligible), all being local variations of the same language, the 'Ladin', that has an autonomous position in Romance or neo-Latin languages. Even larger differences (in terms of mutual understanding) can be found between the Dolomitic Ladin and the Eastern Ladin idioms. Indeed, the Dolomitic (or Central) Ladin with ca. 30,000 speakers, occupies a baricentric position within a larger linguistic system which also includes part of the Grigioni canton (Switzerland) where they speak Romansh (or West Ladin: ca. 40,000 speakers), and the Friuli Venezia Giulia region where Friulian (or Eastern Ladin) is spoken by more than 600,000 people. The three areas represent the remaining part of a larger Romance territory that once stretched from the springs of the river Rhine to the Adriatic, then reduced and fragmented due to the migration of peoples and linguistic influence from the Po-Veneto Valley (Richebuono, 1992). At territorial level, the Central Ladins are traditionally organized on the 'maso' ('màs' in local dialect) that is a typical country cottage of Trentino Alto Adige region (Figure 4) consisting usually of a barn, a stable and a small room used for cooking food and making cheese (Wopfner, 1995 to 1997). 'Maso' does not have a uniform style of construction that, indeed, varies depending on the different zones, so even the use of their building materials (usually woods from local forests). The 'maso', then, as ancient home of the family farm in South Tyrol/Alto Adige and Trentino, surrounded by meadows is destined for mowing or grazing. The 'maso' was mainly inhabited by the late autumn until late spring that is when the farmer's family, together with livestock, usually came back from the Alpine houses and barns.

<sup>1</sup> <http://www.camera.it/parlam/leggi/994821.htm>



**Figure 4.** Traditional 'maso', a typical country cottage of Trentino Alto Adige region [Larzinei di Livinallongo del Col di Lana (BL) ].

Grasslands and meadows of the 'maso' were usually grazed before animals go up to the pastures and also mown in the summer with the hay brought back to the valley in winter using the sleds. Traditional practices to manage animals and exploit grasslands and pastures at different altitudes are well documented for Italian Alps (Gusmeroli et al., 2005; Corti, 2008). To ensure the daily supply of milk and eggs in the summer, in the 'maso' were still kept goats and chickens, sometimes one or two cows. The garden is an indispensable component of the agricultural complex that leads from the 'maso'. Another typical Central Ladin custom was the 'maso chiuso'<sup>2</sup> (closed 'maso'). It was the practice for which the farm itself cannot be divided among several heirs, but assigned to one of them. These measures were planned in the past centuries to avoid the splitting of the territory which would lead to an impoverishment of the economy of the region, mainly based on agriculture and livestock. The 'maso chiuso' was abolished in Italy under fascism and then reinstated in the fifties (Stampfer, 1990 to 2010). Among others, a full picture on the 'maso chiuso' system and its impact in Central Alps can be accessed from a Master Thesis (Faccin, 2008). Indeed, differences between Central and Eastern Ladins in managing property do exist: for example, the 'maso chiuso' system

has never been in place in Friuli. As a consequence, land property has been progressively fragmented; at present, even the list of landowners is hardly available for large land portion of Friuli, with negative impacts on the agricultural development and sustainability of those Alpine areas. During the mission the whole area of the Dolomite Ladin was explored, completing two previous preliminary collections carried out mainly in Carnia (Hammer et al., 2007a; Laghetti et al., 2007). In all, 37 accessions were gathered (Table 1): 6 cereals (barley, maize and buck-wheat), 6 pulses (pea, broad bean and runner bean), 13 vegetables and 12 other crops (Spanish chamomile, caraway, common cress, flax, sunflower, catmint, opium poppy, alpine dock or monk's rhubarb).

Many interviews to local people permitted to know that, in spite of the high altitude of the land and the particularly cold winters, the agricultural practices were considered once very important. Barley and rye were spread everywhere and used to make bread; this one was stored for a long time and was more common than that made of wheat.

This crop was cultivated only in the lower elevation fields and is called "slin" in Ladin language. Details of passport data, notes and local names (Pedrotti and Bertoldi, 1930; Miceli and Costantini, 2008) of the accessions collected are reported in the IGV exploration registers.

### Fassa valley

The highest valley of Trentino, with average 1350 to 1400 m asl. Typical of these mountain areas are the steep slopes, so that in April, farmers redistributed the land slip

<sup>2</sup>Ancient form of land tenure prevalent in the eastern alpine areas, particularly in Alto Adige (also present in Tyrol and Carinthia). Under the current law (law of prov. Bolzano 17/2001) it can now be defined as the set of properties, including rights which falls between the minimum and maximum limits set by the legislature and is registered in Section I ('masi chiusi') of the book land. In the distribution of the estate the 'maso', including appliances must be considered an indivisible unity and cannot be assigned to a single heir or legatee. In succession, the anachronistic prevalence of male line than female one has instead been eliminated.

downstream during the thaw, using the 'ceviës' special wooden stretchers carried by two persons. Formerly (approximately up to 1965) the economy relied upon livestock and farming. In the Seventies, skiing practices and touristic resorts boomed, therefore agricultural activities lost momentum. The main cereals were: wheat, barley (heading time July and harvest time the end of August) and rye (used for bread) sown in early September and harvested in mid-August. In the past, in the area of Pera di Fassa there were four mills, mostly used for milling rye and barley, but today only a mill museum is present. Due to low temperature, maize was not cultivated but imported. Hay harvest began in July close to the villages in the valley and in August it continued in the mountains. In September, the second hay called 'lighé' was available. Local agriculture was characterized by very rare fruit trees and small arable plots that do not allow for extensive cultivation, therefore vegetables products [that is kales, leaf-beets ('coste' in Ladin), garden-beets ('caràte' in Ladin) and salad] were grown in small gardens, just enough to family needs. Such vegetable crops were usually sown in April and then transplanted after mid-June. Sauerkrauts were traditionally produced by the fermentation of cabbage and more rarely of turnips. This latter crop (used also as forage) was sown in mid-August and harvested in mid-October. Potatoes were introduced in the area only in the first half of the 1800 and they did ultimately subtract space for the cultivation of wheat and broad beans (Trentini, 1986). Due to low temperature adaptation, the presence of broad bean has been often mentioned in Alpine villages (Cucagna, 1955; Cozzi, 1998), being also a food source suited to the needs of mountain people. Broad bean was sown in spring and weeded three times in June; the importance of the crop was also measured by the local tradition of making bread with wheat-broad bean flour mixtures.

Other crops often cultivated here were: chamomile, mint, mauve, wormwood and wild celery (*Levisticum officinale* Koch), both for medicinal purposes and for food (De Giulio, 2005). Important was also the growing of chives (*Allium schoenoprasum* L.) and poppy the seeds of which were used both as filling the 'ciaronce' (local 'ravioli' or stuffed pasta) and as a sleeping potion (Trentini, 1986). In the past the collection of wild food plants was very common for example wild spinach (*Chenopodium bonus-henricus* L. called in Ladin 'colubrina' or 'giamàita', easy to find in pastures close to animal shelters in the mountain huts), horsetail (*Equisetum arvense* L., 'sposadores' in Ladin), the already mentioned 'mountain celery' (*L. officinale*). More details about the local 'flora' are reported by Moresco (1977). During the mission, we have recorded a decline both of agriculture and the craft of wood carving (for sculptures), both very important in the past. Nowadays only potatoes and vegetables for the local market are still cultivated. In this valley, most of the houses have a small garden for family consumption where the following plants

are mainly grown: several varieties of mint (one of them with a red coloured inflorescence), sage, thymus, lettuce, rocket, several forms of cabbage, *Nepeta cataria* (even if specific information about origin and local use seems to be lost in the people memory), celery (*Apium graveolens*), *L. officinale* locally named 'sedano perenne' ('perennial celery'), *Armoracia rusticana* named 'cren' in Ladin, summer savory (*Satureja hortensis*) probably belonging to the subsp. *illyrian*.

Today livestock farming is also basically superseded by tourism, whose relevance remains at the basis of the local economy.

### Livinallongo valley

Livinallongo del Col di Lana (1460 m asl, 1500 inhabitants) is the main town of this Ladin valley where in 15 BC Romans subdued local Reti people and the Ladin language was born from Romanization of local language. Local economy has been always based essentially on agriculture, livestock and on the related production of forage. Also in this valley a large part of soil is very steep (Figure 5) and not good for cultivation. Very traditional was the cultivation and working of hemp together with wool working. Potatoes, broad beans and cereals (mainly barley and rye) were the most important crops of the area. Formerly ca. 30 mills (typically they were shared mills) worked to grind cereals. The bread was made primarily from rye while the 'polenta' from imported maize. In this area rich in *Picea* forests it was very difficult to find the last landraces still cultivated; only in countryside of small mountain towns (for example Chertz, Larzoney, Ornella) at ca. 1700 m asl was possible to collect samples of the old local two-row barley still sown in spring, broad bean, pea, opium poppy (still used for local recipes) and some vegetables. The small village of Chertz, very close to Livinallongo (BZ), is one of the rarest areas where some farmers still use some traditional seeds. In particular the barley is still cultivated and seems to be appreciated for the preparation of the typical 'panicia': it is a specific Ladin gastronomic preparation, a barley soup with dried beans, smoked pork, carrot ('rave' and 'ravesale' in Ladin), onion ('cigòle' in Ladin), celery ('sèden' in Ladin), etc. This crop ('ordè' in Ladin language) is sown in half May and harvested in the first days of September. In the surroundings, some small populations of *Brassica rapa* subsp. *sylvestris* grow and a sample of seeds was collected. In the Museum of Livinallongo (Buchenstein) are well described the old traditions of the local population (Deltedesco, 1999).

The current curator is a local expert who guides the visitors across this small but well organized museum. A long interview was useful to describe the social change that occurred in this area, the former name of which was 'Fodom' and comprises an area starting from Pieve to Mulino di Andrass. This last one is a mill and is the only one still in function, moved directly by the energy of





**Figure 5.** Typical steep cultivated field of Ladin valleys (Cherz).

water. The bread was made mostly using barley, with adding little rye flour; it was shaped in a form of thin disk and was stored for a long time. The faba bean was used in different ways: the seeds of this species were entirely cooked, comprised the external husk or without that to make soups or, after drying, and reduced in flour, to add to the bread aiming not to dry out too much. Notable is the singular use of a special device employed to dry the fresh plants of faba bean: it is a wooden vertical frame called 'favè' (Figure 6) in Ladin language. Among the others, the seeds of poppy (and only rarely of hemp) were crushed in a mortar and mixed with sugar, then used in the preparation of 'gnocchi' and 'casuncei' dishes. The small villages explored around Livinallongo (for example Andraz) are still inhabited by farmers that were very kind giving long interviews and some seeds samples of landraces. Among them the barley called 'orde' was sown up to 4 years ago, but now is abandoned because of the increased population of deers. In fact, although the small fields were protected by fences, these animals were able to jump and eat every plant, going so far as to eat even the bark of trees. The small gardens (mostly devoted to horticulture and ornamentals) and rich in agrobiodiversity are still present but are going to follow the same destiny. The other cereals were until few years ago, rye called 'siàla' and wheat; even if the latter grew weak two types were however used: one was sown in autumn and called 'forment ese' and the other in spring and called 'forment a merz' (March wheat).

The tender sprouts of common hop (*Humulus lupulus* L.) are locally employed as condiment in a specific local dish of 'risotto' different than that most common Italian one prepared using rice.

### Gardena valley

About the origin of agriculture and early settlement of farmers in the Gardena valley, a multidisciplinary research on ancient 'Masi and historical rural houses in Gardena valley' is presently being carried out by the University of Innsbruck and Museum Gherdëina. Preliminary results indicate that occupation of rural sites by purported agriculturists can be anticipated to Medieval times, that is approximately 1250 to 1290 AD (Moroder P., pers. comm., Moroder, 2001). Current opinion about the (re)introduction of agriculture into this Ladin valley speaks about the early 19th Century as a result of newcomers from Livinallongo. Nowadays, Gardena valley has a sound economy based on tourism; therefore agriculture has a marginal impact on the economy. In the past two centuries, hemp, wheat, rye, barley ('paniccia' is still the local name of a typical barley bread), broad bean, pea were the most important crops. In the countryside of Ortisei 'scorzonera' (*Scorzonera hispanica* L.) was formerly cultivated for the roots that, after boiling were mainly used as secondary dish. Today even if the cultivation of this crop seems to be completely



**Figure 6.** The 'favè', a special wooden device employed to dry the fresh plants of faba bean (Livinallongo valley).

abandoned, its traditional recipe is still prepared but using the already ready compound sold in local supermarkets called 'scorzonera' but probably a surrogate. In fact, once the work of peasants took place very close to the fields and their typical houses 'masi' permitting them to cultivate also small or semi-wild plants (for example scorzonera, etc.), today all people consider this style of life too hard and quite impossible to do. Nevertheless a certain feeling in favour of the lost cultivated plants is still visible in the small gardens that are well maintained by the owners of many houses in Ortisei. Here the presence of some aromatic and ornamental species together with the cultivation of horticultural plants seems to suggest a certain degree of conservation of these traditional crops.

In general the '60 years of the last century saw the ultimate period in which agriculture was still practised in quite all the Ladin area. Old people remember when many workers were employed in the agricultural activities, especially in the biggest 'maso' of the valley; they produced mostly rye, followed by barley and, only in the lower lands wheat. But in Val Gardena, the crisis of agriculture initiated approximately in the XVIII century, when many farmers decided to transform themselves in artists, specialized in wooden items hand carved, mostly for sacred uses and toys. In addition, the Austro-Hungarian Empire, to which Val Gardena belonged

starting from 1867, encouraged the commerce of sacred sculptures and altars in wooden, inducing a better standard of living of local population. But when the area became Italian, after the 1<sup>st</sup> world war, the competition of sacred sculptures in marble created by other manufacturing produced a decline of wooden statues and altars; so that today only handmade products generally consisting of small statues, toys and other objects are produced mainly for tourists and amateurs. A rich exhibition (items of religious art and wooden toys) is available in the 'Gherdëina' museum at Ortisei. Other economic activities were livestock farming, production of honey and the sale of the resin. The trade of local races of oxen had a certain degree of success, because of the attitude of these particular species to work in areas characterized by steep slopes. Among the textile fibres hemp and flax were the most important crops.

### Other areas

Vinigo of Cadore (an hamlet of Vodo di Cadore -BL municipality) is well known for its famous cabbage (*Brassica oleracea* L. var. *capitata* L.) cultivated mainly in Pias locality (1025 m asl) (Figure 7). This unique variety of ancient tradition is larger than the standard, white, flat





**Figure 7.** Vinigo di Cadore is well known for its famous cabbage (*Brassica oleracea* L. var. *capitata* L.) (Pias locality, 1025 m asl).

shape, can be eaten raw, cooked and as sauerkrauts; it is very crisp, has sweet flavor and is less bitter. One accession of this crop was sampled in the area where today farmers cultivated also potatoes, carrots and white turnips. Formerly wheat, rye, barley and maize were grown. Other interesting landraces collected in Ladin areas were: garlic, onion, tree onion [*Allium x proliferum* (Moench) Schrad. ex Willd.], mountain spinach or arrach (*Atriplex hortensis* L.), beet (*Beta vulgaris* var. *vulgaris* and var. *cicla*), rutabaga [*Brassica napus* L. subsp. *napobrassica* (L.) Hanelt], wild turnip [*Brassica rapa* L. spp. *sylvestris* (L.) Janch.], fodder radish [*Raphanus sativus* L. convar. *oleifer* (Stokes) Alef.] (Table 1).

## WEST LIGURIA

In 2001, the east part of Liguria was visited (Laghetti et al., 2003). During that mission, a strong crop genetic erosion was recorded regarding almost all the local varieties, together with a general abandoning of agriculture. The tourism was considered the main responsibility of the decline of local farming. In that mission, 59 accessions were collected. In 2010, the west part (Savona and Imperia provinces) of Liguria was explored (Figure 1) and 44 accessions were sampled of which 2 cereals (maize), 8 pulses (common bean and cowpea), 30 vegetables (17 taxa) and 4 other species (Table 1). Unique in Liguria for expansion is the plain of Albenga which became the highlight of the regional agricultural production. Famous in past centuries for the production of hemp, as we now find more and more local

product like basil, tomato, purple asparagus (called 'asparago violetto'), artichokes and the old typical 'trombetta d'Albenga' (Figure 8), a trumpet shaped pumpkin (*Cucurbita moschata* Duch.) collected during the mission (Table 1). In addition the plain of Albenga produces many aromatic herbs in vase, with floral crops such as cyclamen, poinsettia and daisies. A wild sample of the Arabian pea [*Bituminaria bituminosa* (L.) C.H. Stirton], a rare plant in Liguria, was found in the surroundings of Albenga. This perennial Mediterranean species has several potential uses, for example forage crop, phytostabilization of heavy metal contaminated soils, synthesis of furanocoumarins compounds of pharmaceutical interest. The district of 'Riviera dei fiori' was visited. This area (especially Sanremo town) is famous in the world for its floriculture. The particular climatic conditions of the territory have led to the acclimatization of many exotic species. Many of these plants have become monumental in size and importance and are a great symbolic value.

The public green spaces show elegant palm trees, olive trees and monumental *Ficus* spp. The flower market of Sanremo is the most important marketing floriculture center in Southern Europe and the Mediterranean basin. It offers the full range of cut flowers, branches and leaves, with particular reference to those typical of the Mediterranean. The exploration team interviewed some local entrepreneurs about flowering crops marketed and the conclusions were that the economic crisis was less severe in floriculture than in other crop sectors. The internal hilly area of Calizzano was particularly interesting



**Figure 8.** The typical 'trombetta d'Albenga' a trumpet shaped pumpkin (*Cucurbita moschata*) (Albenga).

for the cultivation of uncommon crops for Italy as:

a) Salsify [it. 'scorzabianca', *Tragopogon porrifolius* L.var. *sativus* (Gaterau) Br.-Bl.] (Figure 9). In addition to landraces (one collected), 'Bianca migliorata' and 'Mammoth' are the cultivars mostly used.

b) Citron melon [*Citrullus lanatus* (Thunb.) Matsum. et Nakai subsp. *lanatus* var. *citroides* (Bailey) Mansf. ex Greb.]. During the many collecting missions carried out in Italy, this is the first time we found this rare race. In 2003 three landraces of citron melon were collected in the northern Corsica (France) by our exploration team (Bullitta et al., 2005). Today in Corsica this old and neglected crop is in decline and risks extinction. Four accessions of citron melon were collected in Liguria (Figure 10) showing a morphologic variability (for example seed and bark color) higher than that observed in Corsica (Laghetti and Hammer, 2007). As in Corsica also in Liguria people does not eat the inedible fruits directly but only use them for making jams and candied fruits. According to information recorded during the mission, Ligurian citron melon very probably comes from Corsica.

c) Some samples of a rare variety of blue potato (Figure 11) were observed in this area. In Italy there is only a zone where this variety is traditionally cultivated; it is Margone a very small town close to Vezzano (Trentino region). It is also certain who (the sister of the local farmer Mr. Albino Bressan) introduced at the beginnings of 1990's the blue potato from Switzerland where ca. 200 tons/year are produced and the 'blue chips' were invented. At Margone for many years this product has been used mainly for feeding (rabbits, chickens) but

today only for food and many chefs have to book it and are willing to pay a high price to buy it, also because of the low local production. For this reason, nowadays this crop is cultivated also in other small family gardens of Vezzano, Fravegio, Cavedine, Lasino villages and other areas of the 'Valle dei Laghi' (Trentino region). However the 'bleu potatoes' originated in south America and the famous old variety 'cream of the crop' has been introduced into Ireland where it became popular (Mc Cann, 2008). This indigo blue potato makes colourful mash and chips with a deep flavour. According to some authors the blue potatoes have health benefits too and are more resistant to diseases than classical types. The blue colour comes from the presence of the antioxidant anthocyanin after a mutation in the varieties 'P locus' (Jung et al., 2005); for the inheritance of pigmented tuber flesh see De Jong (1987, 1991).

d) This area is rich in vegetables, among them *Cichorium intybus* L. All uses which are reported for chicory can be found here. The roots are also used as a vegetable with an impressively bitter taste. There are several reports about the use of the roots as an adulterant or substitute of coffee. In the past, large fields of this crop have been grown together with accompanying factories in many European countries for this purpose. From the roots also, inulin is extracted for industrial purposes. In some countries chicory extracts are used in alcoholic and non-alcoholic beverages (Simon et al., 1984). In some countries the roots are also processed for saccharide production (Van den Ende et al., 2002). Roots and also the leaves are used as fodder for animals; but there are only few indications about their use as a root vegetable (Kiers, 2000) so that a special paper will be prepared by





**Figure 9.** Plants of salsify (*Tragopogon porrifolius* var. *sativus*) (Calizzano).



**Figure 10.** Fruits and seeds of citron melon (*Citrullus lanatus* subsp. *lanatus* var. *citroides*) probably of Corsican origin (Calizzano).

us. The varieties of chicory cultivated for roots in Liguria called 'radicchio amaro' have generally the roots brownish yellow outside and white inside with a thin bark.

Today the main consumption of the chicory roots is as vegetable: young and tender roots can be boiled then sautéed, dressed (or not) with olive oil and lemon juice,





**Figure 11.** Tubers of blue potato sold in a shop at Calizzano; the shape of these potatoes is more elongated and different from those ones cultivated at Margone that are very similar to the classic yellow/white potato.

and eaten mostly as side dish for roast meat. The most common varieties cultivated for this purpose in Italy are: the famous 'Cicoria di Soncino' characterised by fusiform long narrow roots rather bitter and considered very healthful, 'Magdeburgo' (or 'Cicoria Siciliana'), 'Brunswick', 'Brabante' and 'Pont de Pierre'. More rare is nowadays the old use of the roasted powder as coffee surrogate, but some interviewed old farmers still remember its processing. The most used varieties in Italy as coffee surrogate were: 'Magdeburgo', the 'Cicoria di Chiavari' (or 'Genovese') with conical roots and, most of all, the 'Lunga di Brabante' the most grown on industrial scale characterised by large and vigorous leaves with smooth margins, big and smooth roots 25 to 30 cm long with upper diameter 5 cm wide. A specific paper will be soon published on the agronomic practices followed in Liguria and in other Italian area for the chicory root production.

Four morphologically different accessions of rutabaga (locally called 'navone', 'cavolo navone') [*Brassica napus* L. var. *napobrassica* (L.) Rchb.] were gathered in four farms of the inner hilly areas of Savona. This very rustic crop is today used mainly as forage but the collected types are locally grown for food and sold in a characteristic way (Figure 12). A sample of buck-wheat (*Fagopyrum esculentum*), rare in this area was also collected from the field.

## Conclusions

In Italy, the Occitan and Ladin linguistic islands still

conserve worthy crop genetic resources but similar to other regions inhabited by ethnic minorities, the traditional customs and language are losing importance. This phenomenon also negatively affects the cultivation of landraces causing their genetic erosion and, in many cases, extinction. It is necessary to stop this trend and it is not only important to involve the scientific sector but also the local people, with the younger generation and municipal governments. All these different sectors have to co-operate. The model of tourism development carried out patchy in the Occitan areas is, unfortunately, failed, as a matter of fact it failed to stop (and indeed at times has even accelerated) the severe exodus of the population in almost all the mountain communities. The revival of the Occitan valleys must be built on two basic elements, namely: mountain agriculture and tourism which have to be closely connected. A third element, where possible and convenient, can be made from handicraft and small industrial activities compatible with the environment. The focal point remains the combination of tourism/mountain farming, based on a subsidized farming profitable and therefore independent by the EU quotas. It should be interesting for all countries that share the Alpine regions to encourage the participation and human labor in these mountains, because this is the only way to ensure the environmental stability that is the true bulwark against natural disasters. Funds permitting, in a next collecting mission, the exploration of the Occitan areas will be completed. In Ladin areas, a strong genetic erosion was recorded affecting primarily the old local cereals. Nevertheless, here, in the last years, we are witnessing a growing awareness of the problem of crop



**Figure 12.** Roots of rutabaga (*Brassica napus* var. *napobrassica*) locally called 'cavolo navone'. This ancient crop is today used mainly as forage but the types here shown are locally grown for food and often sold precooked (upper right) (countryside of Savona).

genetic erosion and local museums, volunteers and farmers are trying to reintroduce the cultivation of these old crops. Also some young farmers have started to cultivate Ladin landraces but they seem to be completely alone in this difficult enterprise and ignored by local authorities.

Still, today the inner hilly zones of west Liguria are an agro-biodiversity trove where crop genetic erosion has been much less severe than along the coast.

In conclusion, for all visited zones, a greater attention by the local agriculture government departments is desirable.

### Availability of germplasm

The material collected is being deposited in the gene bank of Bari for further classification and characterisation; after its multiplication, it will be ready for distribution to the scientists.

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