

‘Altreier Kaffee’: *Lupinus pilosus* L. cultivated as coffee substitute in Northern Italy (Alto Adige/Südtirol)

Andrea Heisteringer · Klaus Pistrick

Received: 24 April 2007 / Accepted: 25 June 2007 / Published online: 14 September 2007
© Springer Science+Business Media B.V. 2007

Abstract The continued cultivation of *Lupinus pilosus* L. as an endemic coffee substitute in the mountain village of Altrei, South Tyrol, located in the Val di Fiemme/Fleimstal valley ca. 24 km south of Bolzano/Bozen, since the middle of the nineteenth century is demonstrable. Former reports of cultivation of *Lupinus cosentinii* Guss. and *L. varius* auct., non L. for this purpose in Tyrol could refer to *L. pilosus* as well. The cultural history of the rare crop is summarized up to its recent revival.

Keywords Coffee substitute · Cultivated plants · History of cultivated plants · Italy · *Lupinus pilosus* · Neglected and underutilized crops · Plant genetic resources

Introduction

Of the 12 Old World *Lupinus* species (Gladstones 1974, 1998; Clements et al. 2005) mainly *L. albus* L. has been cultivated since the last millennium BC. in

Greece and Italy and somewhat later in Egypt and Cyprus (Hanelt 1960, 2001; Majsurjan and Atabekova 1974). *Lupinus pilosus* L. and *L. micranthus* Guss. have possibly also been cultivated since ancient times, but, if so, then in much smaller scale (Hondelmann 1996, 2002). Bitter seeded races of *L. albus* have remained a crop in Mediterranean agriculture as fodder, green manure crop and food plant (Lehmann and Hammer 1979; Hammer et al. 1999). The seeds are soaked to diminish alkaloid content before using them as grain forage or cooked and salted as snacks (Cowling et al. 1998a). Analogically, *Lupinus mutabilis* Sweet has been domesticated and traditionally used as a food plant in the Andes since the second millennium BC. It has also been used as a medicinal plant, in a similar way as *L. albus* in the Old World. Because of the large plasticity in many morphological characters and the difficult nomenclature in the genus *Lupinus* L. (Hanelt 1960, 2001; Gladstones 1974) many older reports of the cultivation of minor *Lupinus* crops are rather difficult to interpret. The inclusion of *L. albus* L., *L. angustifolius* L. and *L. luteus* L. as medicinal plants in Renaissance herbals (e.g. Tabernaemontanus 1591) does not mean that they were widely grown, because these reports are mostly based on older recordings about the Mediterranean wild or cultivated flora dating from antiquity (Hanelt 1960). However, it is certain that *L. angustifolius* and *L. luteus* were grown as ornamental plants in Central European Renaissance gardens (*L. angustifolius* also as green manure

A. Heisteringer (✉)
Untere Straße 5, Schiltern 3553, Austria
e-mail: andrea@heisteringer.at

K. Pistrick
Department of Genebank, Leibniz Institute of Plant
Genetics and Crop Plant Research (IPK), Corrensstr. 3,
06466 Gatersleben, Germany
e-mail: pistrick@ipk-gatersleben.de

1682) and became agriculturally important as green and grain fodder crops and for green manure in the middle of the nineteenth century in Central and Eastern Europe (Gams 1924; Hondelmann 1996). The selection of sweet, alkaloid poor cultivars of *L. luteus*, *L. angustifolius* and *L. albus* in Germany at the beginning of the twentieth century became the foundation of modern lupin breeding (Hackbarth and Troll 1959; Hondelmann 1996; Cowling et al. 1998b; Clements et al. 2005). The New World species *L. polyphyllus* Lindl. has gained some importance as a frost resistant wildlife forage and soil improvement crop in pine and spruce plantations in Northeastern and Central Europe since the first decades of twentieth century. It had been introduced as an ornamental and green manure plant from North America to Europe in the nineteenth century (Sneyd 1995; Hanelt 2001; Krausch 2003).

The closely related *L. perennis* L. became important as a forage and green manure crop in the nineteenth century on gravel deposits of the Danube and Tisza rivers in Hungary (Hanelt 1960, 2001). Although *Lupinus* species did not become staple foods, they are of special interest as alternative crops for sustainable agriculture and for improvement of low-fertility soils in many countries of the temperate regions (Sneyd 1995; Cowling et al. 1998a; Clements et al. 2005).

Sweet lupin industries developed in Poland and Australia and a recent Australian lupin breeding programme included additional species, such as *L. cosentinii* Guss., *L. pilosus* L. and *L. atlanticus*

Gladst. (Cowling et al. 1998a; Buirchell 1999; Clements et al. 2005). *Lupinus* cultivation for the use of seeds as a coffee surrogate has been of minor importance since the middle of the nineteenth century. Although nearly extinguished 100 years later, it has the potential to develop into a local speciality for dietary beverage production.

Materials and methods

The village of Altrei is located in the Val di Fiemme/Fleimstal in South Tyrol, Northern Italy in the political district (comprendorio/Bezirksgemeinschaft) Oltradige-Bassa Atesina/Überetsch-Unterland ca. 24 km south of Bolzano/Bozen (Fig. 1).

Geologically the Altrei area belongs to the Athesian Volcanic Group. The parent rock is porphyry here, in contrast to the neighbouring Dolomites, built up by calcareous deposits. The lightly acidic, sandy soils have only low fertility. Natural conditions and the specific history of Altrei were prerequisites for cultivation of relic lupin *L. pilosus* in Altrei as coffee-substitute and as medicinal plant for cows by most farmers in the village till the 1960s. Altrei is located at 1,200 m. The solitary village is located on an old, already in prehistoric time important mule and cart track that connected the southern Venice via the valley of the river Etsch to the Brenner Pass in the north. This path was a very important trade connection (especially for flour) and essential to the village until the year 1865, when the road network reached

Fig. 1 Large-scale cultivation of the traditional crop plant *Lupinus pilosus* after its rediscovery at Altrei in 2006



Altrei (Abram 2006). It can be assumed that the crop *L. pilosus* has been brought to Altrei via this connection. The oldest written record for the cultivation dates back to the year 1897, also giving evidence of the vernacular term ‘Altreier Kaffee’ and of the merchandising of the coffee substitute: “*Wenngleich der Humusboden über dem Porphyrgestein nicht gar stark ist, gedeihen doch alle Getreidearten, Kartoffeln und der weithin gesuchte Kopfkohl; auch eine blaublühende Bohnenfrucht, eine Lupinenart, welche als ‘Altreier Kaffee’ in der Umgebung bekannt ist, wird gebaut und bringt selbst den Ärmsten der Armen ein kleines Verdienst ein*” (Oer 1897).

The surface of the community of Altrei is 11.04 km². Altrei is located on a southern, sun-exposed slope. The agriculture in Altrei is characterized by small-scale farming with most of the farmers being part-time farmers. The fields are small and steep. Since the 1950s and 1960s most of the fields were altered into grassland. This change marks the conversion from predominant subsistence-farming to predominant market-oriented agriculture with milk being the most important commodity. The total arable land in Altrei was in the year 2000 according to the census 2 ha, compared to permanent pasture measuring 155 ha. In the same year 38 of 67 farms in Altrei cultivated fields, with potato and vegetable crops being the most important crops (ASTAT 2002). Till the middle of the twentieth century the percentage of arable land was much higher and most of the farms cultivated grain as food and fodder plant for their own use. The coffee-lupin was cultivated in a few rows attached to grain or potato fields.

In the year 1927 the lawyer and hobby-botanist Wilhelm Pfaff compiled a list of cultivated plants in South Tyrolian home gardens. He listed various lupin-species as coffee-substitutes and wrote that in higher altitudes especially *L. hirsutus*, *L. varius* and *L. angustifolius* were grown and that the lupines were called ‘Bauernkaffee’. For the Puster valley he reported *L. albus* as being cultivated. From the species names mentioned by Pfaff, *Lupinus hirsutus* or *L. varius* could correspond to *L. pilosus* from Altrei (cp. Discussion).

In the year 2004 A. H. conducted some research in Altrei to document the local knowledge connected with cultivation, usage and merchandising of *L. pilosus* under the local vernacular name ‘Altreier

Kaffee’ (Italian: ‘Caffè di Anterivo’). Eleven people born and raised in Altrei were interviewed in dialogues following a standard set of questions. The two oldest interview partners were 93 years old. The interviews were documented on audio tapes. Additional information was generated via telephone-interviews. In the years 2004 and 2005 A. H. was in charge of the recultivation of the lupin species in cooperation with a working group of local farmers. In the years 2003 and 2004 the available seeds had been multiplied on two farms in Altrei, in order to make seeds available for all interested farmers for the recultivation. Most of the farmers had ceased to plant the coffee-lupin; either, because they had given up their arable fields or because they replaced the self-grown coffee substitute by purchased coffee substitutes (mainly barley and figs) or the imported ‘true’ coffee *Coffea* spp., which were especially in the 1960s a symbol of economic wealth and development.

The coffee-lupin ‘Altreier Kaffee’ is part of the collective memory of the village. All interviewed persons knew about the plant, had either themselves planted and used it or remembered, that their mothers and fathers or grandmothers had cultivated and merchandised it. The interviews provide evidence of the cultivation of *L. pilosus* in Altrei from the middle of the nineteenth century to the middle of the twentieth century in a larger scale. Only very little of this tradition had survived. In the year 2003, only two persons in Altrei cultivated some plants to multiply and maintain the variety. Reports or written documents when and how the plant arrived in Altrei could not be found during the research. The most important results of the oral history research of the local cultivation, usage and marketing are summarized.

Results

Cultivation history

The historically most important fields for cereal cultivation – and also for the lupin-cultivation were situated below the centre of the village at 950–1,100 a.s.l. The lupin was also cultivated on fields at higher altitudes, the highest ones situated in 1,300 m a.s.l. The interviewed persons affirmed, that the lower situated fields were better suitable for the cultivation of the coffee-lupin, because the plants matured

earlier. In higher fields, the plant ripened later and in many years the seeds could not ripen before the first frosts arrived in autumn so that the plants had to be pulled out and lent against stone or house walls to make the pods ripening.

According to the local memory the coffee-lupin was grown in rows at the bottom end of the grain or potato fields. Only one woman reported, that her grandfather cultivated a separated ‘Kaffee-Ackerle’ (coffee-field). The field name ‘Kaffee-Ackerle’ does not exist in the historic land register. These names document for example the importance and the separate cultivation of hemp (*Cannabis sativa* L.): ‘Hanifacker’ or cabbage (*Brassica oleracea* L. var. *capitata* L.) ‘Kabesacker’ at the end of the eighteenth century (Abram 2006).

Only in the last years the lupin was cultivated in the home gardens by elderly farming women, to maintain the variety as a cultural heritage of their village (*‘das war immer unser Kaffee’*) and as ornamental plant.

The lupin was sown from middle of March to middle of April. Dialogue partners reported that the plants are not damaged by minor frost. One dialogue partner reported that the seeds were sown at the end of April/beginning of May together with the potatoes. One woman reported that the seeds of the ‘Altreier Kaffee’ remain germinable for 10 years, but as she said they would only remain ‘ertragsfähig’ for 5 years, meaning that the yields decline in relation to the age of the seeds. She narrated that her ancestors emphasized that seeds, that have lost their germination capacity, ‘do not have a soul anymore’ (*‘Die Alten haben gesagt, wenn der Samen nicht mehr keimt, hat er keine Seele mehr’*, Heisting, in press).

The most time-intensive part of the lupin cultivation was the harvest: First, because the pods are dehiscent, dispersing the seeds as soon as they are ripe. Thus the seeds had to be collected shortly before the pods opened. The collected pods were then stored in open baskets to allow the seeds to ripen and to dry. Second, because the pods ripen during a long period of time, the pods had to be collected in warm weather periods every few days over a period of time. The plants in the lower situated fields ripened from the middle of August, the higher ones beginning by the end of September. One woman reported that they removed the later inflorescences or young pods so that the first pods could ripen earlier. This cultivation method is called ‘schabigen’ in the local dialect.

Uses and marketing

The lupin was roasted in special pots (Fig. 2) on wood-fired stoves. Lupin-coffee was not drunk pure, but the roasted and hand mill (Fig. 2) grinded powder was blended with rye and/or barley or wheat and later with sugar beets (cultivated at Altrei) and figs (bought). The pure coffee was reported tasting bitter. Another beverage-use was the mixture of cold coffee with wine, which was used as refreshing beverage during field works on hot summer days.

Many farmers used the lupin as medicinal plant for cows having digestive tract-problems (*‘wenn am Magen etwas gefehlt hat’*), the lupin-coffee was known as very effective medicine. Most dialogue partners report that the roasted and brewed lupin-seeds were used. One dialogue partner reported, that she uses the unroasted seeds.

Fig. 2 Traditional hand mill (left) and roasting pot (right) used in the 1960s at Altrei for preparing ‘Altreier Kaffee’ powder



The lupin was mainly cultivated and traded by women farmers in Altrei. The term ‘Altreier Kaffee’ can be interpreted as a brand name for marketing. Vernacular terms, naming a certain village or region not designated products for self-consumption. The ‘Altreier Kaffee’ was sold raw and roasted and was carried on foot to the neighbouring villages Cavalese and Capriana in Trentino and in the other direction to the village Truden and the lowlands of the region ‘Südtiroler Unterland’.

Recent cultivation

In the years 2003 and 2004 the seeds were multiplied in Altrei. In the years 2005 and 2006 members of the working group planted *L. pilosus* in several separated fields and exchanged their experiences in order to optimize the cultivation system (Fig. 1). Even though the interviews on the historic cultivation indicated no diseases and/or pests that had affected the plants, in the first years of the recultivation two pests and one disease appeared: some sowings were affected by *Phorbia platura* Meigen or *Phorbia florilega* Zetterstedt. Especially in the hot summer of the year 2005 several fields were affected during the flowering season by the oil beetle *Mylabris polymorpha* (Pall.). The fungus disease *Fusarium oxysporum* Schlecht. emerged in hot weather periods in June and July. To deal with this most important problem the working group in Altrei plans to work with hot water dressing of the seeds, since chemical dressings had not shown any result.

The working group in Altrei cooperates with coffee-roasters to find out which roasting method and which blends (with rye or barley) are suitable for their ‘new’ product. The roasted and grinded powder of the lupin species is also used as spice for cheese, cakes and desserts.

Alkaloid content

The alkaloid content of the seeds of *L. pilosus* ‘Altreier Kaffee’ was analysed at INRAN (Istituto Nazionale di Ricerca per gli Alimenti e la Nutrizione) in Rome by G. Bonafaccia. The total content of alkaloids varied from 1.85 to 1.90 g/kg (roasted seeds) and 2.10 to 2.30 g/kg (unroasted seeds) (G. Bonafaccia, unpublished). These contents are much

lower than those of seeds reported by Świącicki et al. (1996) (2.20%) or Buirchell and Cowling (1998) (0.41–0.68% from different regions of the Eastern Mediterranean). Nevertheless low alkaloid mutants have been reported in *L. pilosus* (Buirchell 1999). In the future it could be investigated whether additional selection can further reduce alkaloid components in ‘Altreier Kaffee’.

Nomenclature

Lupinus pilosus L., Syst. veget. ed. 13 (1774) 545.

Syn.: *L. hirsutus* L., Sp. Pl. (1753) 721, non L., Sp. Pl. ed. 2 (1763) 1015, nom. rej.; *L. varius* L. subsp. *orientalis* Franco et P. Silva in Feddes Repert. 79 (1968) 52; *L. digitatus* auct. nonnull., non Forssk. (1775).

Short description (see also Hanelt 1960; Zohary 1972; Gladstones 1974; Clements et al. 1996)

Annual, erect, 30–90 cm. Stems sparsely branched, villous with white-rusty 2–4 mm long hairs. Leaves 10–16 cm. Leaflets 7–11, 25–60 × 10–20 mm, villous on both surfaces. Stipules linear-subulate. Inflorescences 10–20 cm long. Bracts lanceolate, caducous. Pedicels about half as long as calyx. Lower lip of calyx entire to very shortly three-dentate, somewhat longer than the deeply two-partite upper lip and much longer than bracteoles, half as long as corolla (15–21 mm). Standard deep blue apart from a central white spot or band which extends nearly the upper margin and becomes purple with age (Fig. 3). Wings deep blue, connate at apex. Keel pointed, white, sometimes with a darker blue tip. Pods 5.5–8.0 × 2.0–2.8 cm, villous, 2–3, rarely four seeded (Fig. 3). Seeds very large (Fig. 4), flattened suborbicular, mottled brownish red with a short broad, darker crescent around the hilum, surface scabrous-tuberculate.

Discussion

Quite different plant materials have been used as coffee surrogates, as roasted or burnt seeds, fruits, roots or others (Täufel et al. 1979; Heisteringer 2005;



Fig. 3 The flower colour of *Lupinus pilosus* is highly variable, including pink, white and various shades of purple in ornamental types (Clements et al. 1996; Majsurjan and Atabekova 1974), but rather uniform deep blue with a central

white spot or band on the standard, becoming purple with age, in the ‘Altreier Kaffee’ crop (left). The villous, dehiscent legumes with 2–3, rarely four seeds still immature in July at Altrei (ca. 1,200 m a.s.l.) (right)

Fig. 4 Seeds of *Lupinus pilosus* (upper row, 12.0–14.9 × 10.8–13.3 × 5.4–7.8 mm) from 2002 cultivation in Altrei, Italy and *L. cosentinii* (lower row, 8.3–10.7 × 7.2–9.7 × 3.6–4.8 mm) from the Gatersleben Genebank, LUP 92, ‘Hanos Llenos’ near Pilas, Sevilla, Spain (Foto H. Ernst)



Gladis 2006). Peas, beans, rye and wheat were already in 1705 mentioned to be used for this purpose (cp. Ciupka 1949). Most important became *Secale cereale* L., *Hordeum vulgare* L., *Ficus carica* L. and *Cichorium intybus* L. var. *sativum* Lam. et DC. Several Leguminosae, e.g. *Glycine max* (L.) Merr. and *Vicia faba* L. var. *minor* Peterm. and var. *equina* (Medik.) Pers. are reported as coffee substitutes from Georgia (both) or the Alps (*G. max*) in the twentieth century (Beridze et al. 1986; Heisteringer 2005).

Lupinus species became favourite coffee substitutes in some regions of Europe. *Lupinus angustifolius* has been widely cultivated in Russia for this purpose at the end of the nineteenth century (Hundrieser 1892). Since 1850 the same species has mainly been grown as a coffee surrogate in Central Europe and Italy, therefore called ‘Kaffee’, ‘Schwäbischer Kaffee’, ‘Gartenkaffee’ or ‘Bauernkaffee’. Other ‘coffee crops’ of the genus *Lupinus* are

L. luteus, *L. albus*, *L. varius* L., *L. polyphyllus* and *L. reticulatus* Desv. (Gams 1924; Becker-Dillingen 1929). In German language they are collectively called ‘Kaffee-Bohnen’ (coffee beans). Their cultivation is well known for some Alp valleys in Tyrol and the upper Rhine valley of St. Gallen and Vorarlberg (Fiori 1923–1925; Gams 1924). Cultivation of lupins as a coffee substitute was thought to have been abandoned by the middle of the twentieth century.

Former cultivation has recently been mentioned for *L. varius*, *L. luteus*, *L. angustifolius* and *L. polyphyllus* (Hanelt 1960), *L. varius* (Täufel et al. 1979), *L. angustifolius* (Central and North Italy; Hammer et al. 1999) and *L. cosentinii* (Tyrol; Hanelt 2001). Therefore, the rediscovery of relic coffee lupins (*L. albus*, *L. pilosus* and *L. angustifolius*) in the last years (Heisteringer 2005) is rather astonishing. It verifies older reports of coffee lupins in Tyrol.

Surprising was the determination of *L. pilosus* L. as ‘Altreier Kaffee’ [voucher specimens at the Herbarium of the IPK Gatersleben: GAT 5532–5533 and the Herbarium Bozen (BOZ) of the Naturmuseum Südtirol: PVASC 8328(1)–(3)]. Neither this species, nor the closely related *L. micranthus* Guss., formerly known as *L. hirsutus* L., Sp. Pl. ed. 2 (1763) 1015, non Sp. Pl. (1753) 721, nom. rej., are commonly mentioned as coffee lupins in the literature. Only Pfaff (1927) reported *L. hirsutus* in South Tyrolian home gardens. The rare use of *L. pilosus* as coffee substitute was mentioned by Majsurjan and Atabekova (1974) and they report that it is cultivated in France and Germany as a decorative plant (p. 84).

Lupinus cosentinii Guss., misnamed for a long time as *L. varius* auct. non L.: Caruel in Parl., Fl. it. 10 (1894) 113, clearly differs by the shallowly three-toothed, not entire, lower lip of calyx and smaller seeds (Fig. 4). Both names have been often used for Tyrol coffee lupins (see above) and could refer therefore at least in some cases to *L. pilosus*, as it has been reported for the ‘Altreier Kaffee’ here. However, this could be verified only by future determination of authentic seed accessions or herbarium specimens collected from cultivation.

Acknowledgements The oral history research on the local knowledge was conducted and financed by the Interreg III-B project ‘NeProValter’, contracting body: Autonome Provinz Bozen Südtirol/Italy, Abteilung 22 für Land-, forst- und hauswirtschaftliche Berufsbildung. The seeds of the ‘Altreier Kaffee’ were multiplied for the recultivation project by Theresia Werth and Wolfgang Lochmann in Altrei. Many thanks to G. Bonafaccia (Rome, INRAN) for his unpublished alkaloid contents in *L. pilosus* ‘Altreier Kaffee’, to G. Peratoner (Research Center for Agriculture and Forestry Laimburg) for translations, to the curator of the Herbarium Bozen (BOZ) for the loan from the collection of the Naturmuseum Südtirol as well as to Th. Gladis, Sangerhausen, and P. Hanelt, Gatersleben, for valuable advices and A. Diederichsen, Saskatoon, for language check.

References

- Abram H (2006) Heimatbuch Altrei. Altrei
 ASTAT (Autonome Provinz Bozen-Südtirol. Landesinstitut für Statistik) (2002) 5. Landwirtschaftszählung 2000. Bozen
 Becker-Dillingen J (1929) Handbuch des Hülsenfruchterbaues und Futterbaues. P. Parey, Berlin
 Beridze RK, Fritsch R, Kandelaki VN, Mandžgaladze D, Pistrick K, Taralašvili N (1986) Collection of indigenous taxa of cultivated plants in the Georgian SSR. Kulturpflanze 34:305–316
 Buirchell BJ (1999) Genetic diversity in rough-seeded lupins. In: Hill GD (ed) Towards the 21st century. Proceedings of the 8th Int. Lupin Conf. 1996, Asilomar, California. Int. Lupin Assoc., Canterbury, New Zealand, pp 290–303
 Buirchell BJ, Cowling WA (1998) Genetic resources in lupins. In: Gladstones JS, Atkins CA, Hamblin J (eds) Lupins as crop plants. Biology, production and utilization. CAB International, Wallingford, New York, pp 41–66
 Clements JC, Buirchell BJ, Cowling WA (1996) Relationships between morphological variation and geographical origin on selection history in *Lupinus pilosus*. Plant Breed 115:16–22
 Clements JC, Buirchell BJ, Yang H, Smith PMC, Sweetingham MW, Smith CG (2005) Lupins. In: Singh RJ, Jauhar PP (eds) Genetic resources, chromosome engineering, and crop improvement. Grain Legumes. Taylor and Francis, Boca Raton, London, New York, Singapore, pp 231–323
 Ciupka P (1949) Kaffee-Ersatz und Kaffee-Zusatz. Otto Meissner, Hamburg-Blankenese
 Cowling WA, Buirchell BJ, Tapia ME (1998a) Lupin – *Lupinus* L. Intern. Plant Genet. Resour. Inst., Rome and Institut für Pflanzengenetik u. Kulturpflanzenforschung, Gatersleben. Promot Conserv Underutilized Neglected Crops 23:1–105
 Cowling WA, Huyghe C, Świącicki W (1998b) Lupin breeding. In: Gladstones JS, Atkins CA, Hamblin J (eds) Lupins as crop plants. Biology, production and utilization. CAB International, Wallingford, New York, pp 53–120
 Fiori A (1923–1925) Nuova Flora Analitica d Italia, vol 1. M. Ricci, Firenze, VII+944 pp
 Gams H (1924) Leguminosae. In: Hegi G (ed) Illustrierte Flora von Mitteleuropa, Bd. 4, Teil 3, J.F. Lehmanns Verlag, München, pp 1113–1644
 Gladis T (2006) Einige Kaffee-Ersatzpflanzen aus botanischer und kulturgeschichtlicher Sicht. Samensurium (Lenne-stadt) 16:47–53
 Gladstones JS (1974) Lupins of the Mediterranean region and Africa. Technol Bull Dept Agric Western Australia 26:3–48
 Gladstones JS (1998) Distribution, origin, taxonomy, history and importance. In: Gladstones JS, Atkins CA, Hamblin J (eds) Lupin as crop plants. Biology, production and utilization. CAB International, Wallingford, New York, pp 1–39
 Hackbarth J, Troll H-J (1959) Lupinen als Körnerleguminosen und Futterpflanzen. In: Kappert H, Rudolf W (Hrsg.), Züchtung der Futterpflanzen. Handb. d. Pflanzenzüchtg, Bd. 4, P. Parey, Berlin, Hamburg, pp 1–51
 Hammer K, Knüppfer H, Laghetti G, Perrino P (1999) Seeds from the past – a catalogue of crop germplasm in Central and North Italy. Istituto del Germoplasma del Consiglio Nazionale delle Ricerche, Bari and Institut für Pflanzen-genetik und Kulturpflanzenforschung, Gatersleben
 Hanelt P (1960) Die Lupinen. A. Ziemsen, Wittenberg
 Hanelt P (2001) Papilionoideae. In: Hanelt P and Institute of Plant Genetics and Crop Plant Research (eds) Mansfeld’s encyclopedia of agricultural and horticultural crops. Springer, Berlin, pp 635–928
 Heisteringer A (2005) Altrei und sein Kaffee. Geschichte und Geschichten des Altreier Kaffees, der Kaffee-Surrogate und des Bohnenkaffees (Anterivo e il suo caffè. Storia e

- memorie del Caffè di Anterivo, dei surrogati del caffè e del caffè in chicchi). Autonome Provinz Bozen Südtirol, Abt. 22 für Land-, forst- und hauswirtschaftl. Berufsbildung (Provincia Autonoma di Bolzano Alto Adige, Ripart. 22 – Formazione professionale, agricola, forestale e di economia domestica), 39 pp
- Heistingner A (in press) „Wenn der Samen nicht mehr keimt, hat er keine Seele mehr“ Fruchtbarkeit von Kulturpflanzen am Beispiel bäuerlicher Pflanzenzüchtung in den Händen Südtiroler Bäuerinnen. In: Gottwald F, Herzog-Schröder G, Walterspiel V (eds) Fruchtbarkeit in der sterilen Gesellschaft. Campus Verlag, Frankfurt a.M., New York
- Hondelmann W (1996) Die Lupine – Geschichte und Evolution einer Kulturpflanze. Wiss. Mitt. Landbauforschung, Völkenrode, Sonderheft 162:1–247
- Hondelmann W (2002) Die Kulturpflanzen der griechisch-römischen Welt. Borntraeger, Berlin, Stuttgart
- Hundrieser R (1892) Die Bestandteile des aus den Samen von *Lupinus angustifolius* L. bereiteten Kaffesurrogates. Acta Horti Petropolitani 12(4):134–148
- Krausch H-D (2003). „Kaiserkrone und Pänien rot...“. Entdeckung und Einführung unserer Gartenblumen. Dölling und Galitz, München, Hamburg
- Lehmann Chr, Hammer K (1979) Bericht über die Reise nach Südwest-Spanien zur Sammlung kultivierter und wild wachsender Leguminosen im Jahre 1978. Kulturpflanze 27:97–108
- Majsurjan NA, Atabekova AI (1974) Ljupin. Kolos, Moskva (in Russ.)
- Oer F Freiherr von (1897) Fürstbischof Johann Baptist Zwinger von Seckau in seinem Leben und Wirken. Graz
- Pfaff W (1927) Unsere heimatlichen Bauergärten, bäuerliche Fensterpflanzen und Dorffriedhöfe. In: Der Schlern (Innsbruck) 8:101–138
- Sneyd J (1995) Alternative Nutzpflanzen. E. Ulmer, Stuttgart
- Świącicki W, Świącicki WK, Wolko B (1996) *Lupinus anatolicus* – a new lupin species of the Old World. Genet Resour Crop Evol 43(2):109–117
- Tabernaemontanus JTh (1591) Neuw und vollkommenlich Kreuterbuch. Das Ander Theyl. ed. N. Braun, Franckfurt am Mayn
- Täufel A, Tunger L, Zobel M (1979) Lebensmittel-Lexikon. Fachbuchverlag, Leipzig
- Zohary M (1972) Flora Palaestina. Part 2, Text. Israel Acad. Sci. and Humanities, Jerusalem, 489 pp