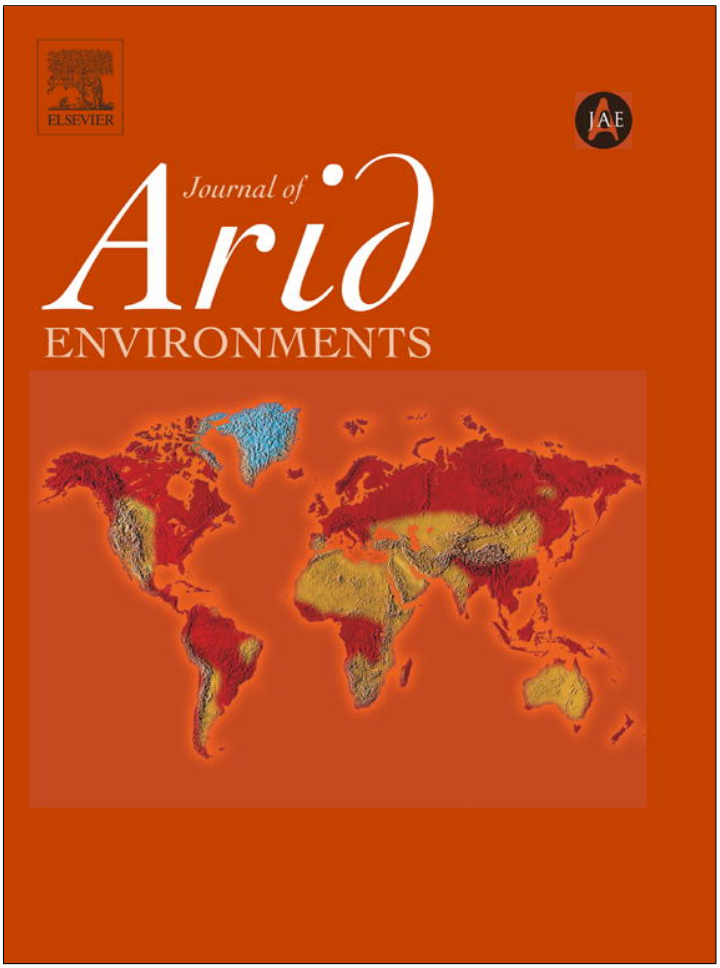

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Traditional horticultural and gathering practices in two semi-rural populations of Northwestern Patagonia

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ABSTRACT

Horticultural and gathering practices were studied in Comallo and Pilcaniyeu, two semi-rural communities which share a common Mapuche ancestry and occupy similar arid environments in Northwest Patagonia, Argentina. We analyzed cultivation and wild plant gathering using semi-structured interviews. We hypothesized that these activities will be conditioned by access to market economy. Results showed differences in horticultural and gathering patterns in both populations: the community with less access to market economy presented greater richness of cultivated and gathered species and collected more seeds from their own harvests, thus promoting germplasm conservation and higher levels of seed exchange than the community that had more contact with urban centers. In these populations the integration of ancestral and novel knowledge seems to favor flexibility and autonomy, which might help locals deal with change. This could foster greater individual and collective wellbeing, as well as socio-ecological diversity.

1. Introduction

Horticultural and gathering practices form part of traditional ecological knowledge, which has been described as a cumulative body of knowledge, practices and beliefs (Berkes et al., 2000). This know-how, handed down over generations by cultural transmission, is conditioned by historical, ecological and socio-cultural contexts. In Northwestern Patagonia, horticultural and gathering know-how has been influenced by certain socio-historical conditions, which had an impact on the traditional ecological knowledge transmitted to younger generations (Ladio and Lozada, 2008, 2009; Lozada et al., 2006). Traditional customs in rural populations of this Patagonian region are suffering from diverse processes of erosion (Ladio and Lozada, 2000). For example, it has been found that locals have practically abandoned the tradition of collecting their own seeds, showing a high dependence on external agent seed supply (Eyssartier et al., 2011a,b). Several studies have proposed that exchanging seeds and collecting seeds from previous harvests encourages the conservation of local germplasm, fostering crop diversity (Badstue et al., 2006; Bellon, 2004).

Since ancient times, horticulture and wild plant gathering has been carried out in rural communities of Mapuche ancestry in Northwestern Patagonia (Bandieri, 2005; Citarella et al., 1995). The arrival of the Spanish, followed by Argentinean national policies such as the "Desert campaign" (a violent military offensive that occurred at the end of the 19th century) imposed a model of cultural domination such that local knowledge was ignored or rejected (Bandieri, 2005). Significant changes were introduced into people's traditional knowledge, including their health system, diet, cosmology, etc. (Torrejón and Cisternas, 2002). Historically, horticulture, wild plant gathering and hunting have constituted sustainable sources of subsistence in most aboriginal communities in Patagonia. Although these populations have suffered severe ecological and cultural transformations, they still cultivate land and gather wild plants today in spite of having been forced to settle in arid environments (Ladio and Lozada, 2003, 2004). The wild plants gathered are used mainly for healing purposes, as the tradition of gathering edible species has decreased, replaced largely by cultivation in vegetable-gardens and greenhouses (Eyssartier et al., 2011a). Therefore, in these communities it could be interesting to evaluate present horticultural and gathering know-how, which might reflect diverse but concurrent levels of experience in terms of, for example, western influence, environmental changes and the current state of cultural transmission of traditional ecological know-how.

In this work, our aim was to study and compare horticultural and gathering know-how in two communities settled in the Patagonian steppe which share the same Mapuche ancestry and traditions. To this end, we analyzed the dynamic interplay between old and new practices in these populations that inhabit similar

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ecological environments and have similar life-styles. However, their access to the main urban center, and therefore to a market economy, is markedly different. This leads to a notable difference in the level of western influence experienced by these communities.

We hypothesize that deeper know-how, constructed through experience in a dynamic way, will make greater behavioral plasticity possible in terms of subsistence related to land use. We expect to find that the community with less access to market economy will display:

1. Greater richness of cultivated and gathered plant species (given that locals make use of greater know-how related to horticultural and traditional gathering knowledge).
2. A higher proportion of seeds from their own production (as they can make use of their own resources, adapted to local conditions since ancestral times).
3. A higher level of seed exchange between community members.

2. Methods

2.1. Study site

Pilcaniyeu and Comallo are semi-rural populations located in Northwestern Patagonia, Rio Negro, Argentina. Pilcaniyeu lies 75 km from the city of San Carlos de Bariloche, whilst Comallo is located at a distance of 110 km (Fig. 1). Moreover, the extremely poor condition of the gravel roads to Comallo affects access and reduces the frequency of visits to the urban centre.

This area has a mean annual temperature of between 8 and 10 °C and a mean annual rainfall of between 150 and 300 mm. It is characterized by the Patagonian steppe ecosystem, where vegetation cover is mostly composed of shrubs and herbs, e.g. neneo (*Mulinum spinosum*), charcao (*Senecio filaginoides*), romerillo (*Senecio subulatus*), coirón amargo (*Stipa humilis*, *Stipa speciosa*) and *Poa huecu*, *Bromus macranthus*, *Poa ligularis*, *Festuca argentina* and other herbs (Cabrera, 1976).

Pilcaniyeu is inhabited by approximately 350 families, whereas approximately 250 families live in Comallo. In both communities, most inhabitants work in public institutions and some raise cattle. Some Comallo and Pilcaniyeu dwellers are direct descendants of the Mapuche people of ancient origin, while others are of more recent mixed ancestry. Both populations are similar in terms of social and political organization. There are several communal structures such as primary and secondary schools, a Town Hall, a local Hospital, and other facilities related to cultural, social and recreational development. Most inhabitants of these communities have street lighting and are connected to the gas mains. They also have access to running water in their homes and Internet services.

Public and non-governmental institutions, such as the National Institute of Agricultural Technology (INTA), the Undersecretary for Family Agriculture and the Institute of Human Studies and Promotion (Iceph), frequently visit both populations in order to improve the people's quality of life, encouraging the use of vegetable-gardens and greenhouses through financial and technical assistance.

The INTA institution has visited the Pilcaniyeu community more frequently than Comallo, whereas more frequent visits to the

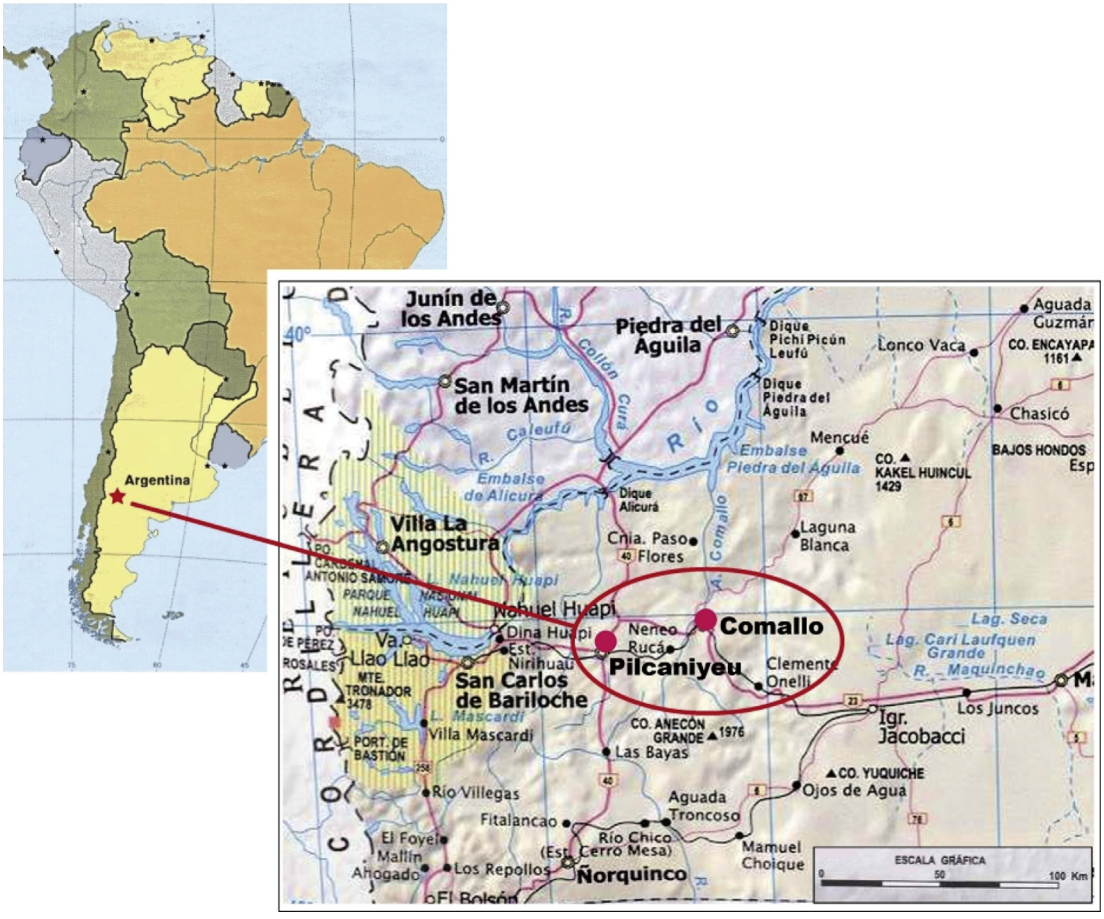

Fig. 1. Location map showing the Comallo and Pilcaniyeu communities.

Comallo population were carried out by the Iceph institution. For example, since 1992, extension agents from INTA have been in charge of programs to promote the implementation of community and family home-gardens in Pilcaniyeu. They have provided technical assistance such as the materials to build greenhouses and tools necessary for horticultural practice. Furthermore, they periodically distribute exotic plant seeds, i.e. lettuce (*Lactuca sativa*), chard (*Beta vulgaris* var. *cicla*), beans (*Vicia faba*), carrot (*Daucus carota*), etc., and visit the people to provide aid according to their needs (Eyssartier et al., 2010).

On the other hand, since 1986, Iceph has been developing diverse projects related to popular education, communication and rural development, promoting the strengthening of local organizations. Their methodology is based on workshops of intensive practice and experimentation, favoring productive activities, such as horticulture, that help to encourage food sovereignty in the region. The principal aim is to re-instate local traditions, thus, a central requirement is the sharing of simple technologies, making gradual changes so that villagers can incorporate them into their daily lives. Iceph promotes ecological horticultural practice, highlighting the importance of local diversity and sustainable local practices.

2.2. Data collection

A total of 30 individuals (20 women and 10 men) were interviewed in Pilcaniyeu (Eyssartier et al., 2011b), while 17 villagers (15 women and 2 men) were interviewed in Comallo, during the summer and fall of 2007 and 2008 respectively. Domestic units were selected at random. In each home we asked to speak to the person in charge of horticultural practice, in order to choose the interviewee. Ethnobotanical fieldwork was conducted by means of semi-structured interviews with the prior consent of informants (see Appended interview) (Alexiades, 1996; Tuxill and Nabhan, 2001). We gathered personal information (i.e. interviewee's age, gender, educational level, occupation) and aspects related to cultivation in vegetable-gardens, greenhouses and gardens, and gathering practices (see appended interview). The cultivated areas were measured to quantify the surface area destined for cultivation. In the present study we considered vegetable-gardens as fenced-in open areas; gardens as green areas surrounding their dwellings, usually covered by grass, and greenhouses as buildings with sides and roof of plastic cover used for growing plants that need protection from the weather (Eyssartier et al., 2011a,b).

We asked the local inhabitants about plants used for cultivation and species gathered in wild areas, their local names and common uses (use-categories); biogeographic origin and seed origin were recorded systematically for each species. For the cultivated species, we visited the cultivation areas. Further exploration of the historical customs of Comallo and Pilcaniyeu was carried out by means of open and in-depth interviews. The collection of wild and cultivated species from vegetable-gardens, greenhouses, and gardens was performed with the assistance of the dwellers, in order to make field herbariums. The latter were deposited in the Herbarium of Centro Regional Universitario Bariloche (BCRU), following the nomenclature of Correa (1969, 1971, 1978, 1984, 1988, 1998, 1999), Marticorena and Quezada (1985), and Ezcurra and Brion (2005). All collected and cultivated species were categorized as "native" or "exotic" according to their biogeographic origin. We considered as native species those plants which grow in central and/or southern Argentina and Chile, below 35° Lat. S. This categorization is based on the scientific judgment of the above-mentioned authors. This classification acknowledges the relative importance of cosmopolitan species and their interplay with native resource with regard to the horticultural and gathering practices in this region. Previous studies have shown that cultivated species are mainly exotic, while gathered plants are mainly native (Eyssartier et al., 2011a,b).

2.3. Data analysis

Species richness was calculated considering the total number of plants cultivated and gathered. To determine similarity between different cultivated areas (vegetable-gardens, greenhouses and gardens) we used the Jaccard similarity index (Höft et al., 1999). This index is based on plant presence or absence while taking the number of species in common as a proportion of the total number of species present, expressed as $JI = (c/(a + b + c)) \times 100$, where c is the number of species in common, a is the number of unique species in a given cultivated area, and b is the number of species unique to the other area.

Non-parametric tests were used to analyze non-normally distributed data (Höft et al., 1999). Cochran's Q test was used to compare total richness of cultivated and gathered plants, species richness in vegetable-gardens, gardens and greenhouses, cultivated plant use-categories within each community and differences in the proportion of use of cultivated areas (vegetable-gardens and greenhouses) between populations. Chi-square tests ($p < 0.05$) were used to evaluate the proportion of native and exotic gathered species, differences in use categories of cultivated plants between communities, and seed origin. The Mann Whitney test was applied to compare mean size of each cultivated area. Data was analyzed with SPSS 10.0 for Windows.

3. Results

The comparison of total plant richness between communities showed a higher number of cultivated and gathered species in Comallo than in Pilcaniyeu (147 sp. vs 124 sp., respectively) (Cochran's Q test: 4.921, $p < 0.05$).

In relation to horticulture, 124 species are cultivated in Pilcaniyeu and in Comallo 129 plants were registered (Appendix 1). Both communities cultivated a similar number of species in vegetable-gardens and in gardens (75 sp. vs. 64 sp. for vegetable-gardens and 68 sp. vs. 77 sp. for gardens, in Pilcaniyeu and Comallo respectively). However, in Pilcaniyeu we found a higher number of species in greenhouses (63 sp.) compared to Comallo (43 sp.) (Cochran's Q test: 11.364, $p < 0.05$) (Fig. 2).

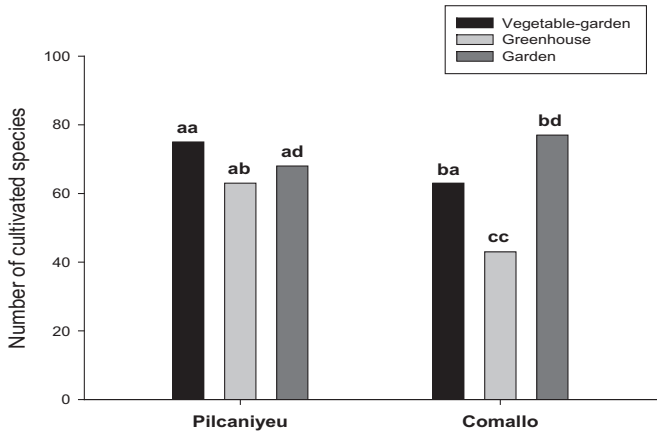

Fig. 2. Comparison of the number of cultivated species in vegetable-gardens, greenhouses and gardens in Pilcaniyeu and Comallo populations. The two letters above bars indicate comparisons within communities (the first letter) and between communities (the second one). The former compares categories of a same community and the latter compares a same category between communities. Different letters indicate significant differences ($p < 0.05$).

When comparing species richness in cultivated areas with the Jaccard index, we found a low similarity between communities: 34.2% for total species, 37.3% for vegetable-gardens, 33.7% for greenhouses and 27.7% for gardens.

Exotic plant species were cultivated in a high proportion in both communities (91% in Pilcaniyeu and 88% in Comallo). In Comallo only three native species were found in cultivation for ornamental purposes: *Austrocedrus chilensis*, *Araucaria araucana* and *Schinus patagonica*, in gardens and vegetable-gardens (Appendix 1). In contrast, in Pilcaniyeu we found 11 native plant species, also in vegetable-gardens and gardens, with mainly ornamental and medicinal uses. Some of the main exotic medicinal species mentioned were: *Tanacetum balsamita*, *Mentha spicata*, *Mentha pulegium*, *Rosmarinus officinalis*, *Thymus vulgaris* and *Melissa officinalis*, among others, and the main native species were *Buddleja araucana*, *Chenopodium ambrosioides* and *Adesmia boronioides*.

Regarding gathered species, the Comallo population collected more native plants than exotic ones: 13 native plants (72.2%) and 5 exotic species (27.8%) (X_1^2: 3.556, $p = 0.05$) (Appendix 2) which are mainly used for medicinal purposes (e.g. *Fabiana imbricata*, *Buddleja araucana*, *Adesmia boronioides*, *Acantholippia seriphioides*). In contrast, in Pilcaniyeu neither native nor exotic plants were collected.

When comparing the richness of use categories, in Comallo we observed that ornamental plants were cultivated in the highest proportion (64 sp., 50%), followed by edible plants (56 sp., 43.75%), hedges (20 sp., 15.6%), medicinal plants (15 sp., 11.72%), and lastly, fodder (1 sp., 0.8%) and other uses (e.g. herbicides) (2 sp., 1.5%) (Cochran's Q test: 152.11, $p < 0.001$). In Pilcaniyeu on the other hand, the cultivated areas were mainly used for food production (59 species, 47.5%); followed by ornamental (43 species, 35%) and medicinal plant use (27 sp., 22%) (Eyssartier et al., 2010). When we compared use categories between communities we found that Comallo dwellers cultivated a significantly higher proportion of ornamental species (X_1^2: 5.548, $p < 0.05$) and a lower number of medicinal plants (X_1^2: 9.045, $p < 0.05$) than in Pilcaniyeu (Fig. 3).

In both communities, vegetable-gardens and greenhouses were commonly rectangular, and of similar extent; vegetable-garden mean area in Comallo was 37.02 m^2, while in Pilcaniyeu it was 35.5 m^2. Greenhouse mean area tended to be smaller in Comallo than in Pilcaniyeu (11.58 m^2 vs. 23.01 m^2, respectively), though these differences were not significant. Moreover, vegetable-gardens and greenhouses were used in similar proportions (63.3% vs 76.5% for the former; 68.8% vs. 64.7% for the latter, in Pilcaniyeu and Comallo respectively) (Cochran's Q test: 0.702, $p > 0.05$). In the open interviews, dwellers mentioned that they had built their greenhouses with the help of family and friends (45.5% in Comallo and 40% in Pilcaniyeu) and with assistance from external institutions, for greenhouse construction in particular (54.4% vs. 60%, respectively).

The tradition of seed collecting from previous harvests was significantly higher among inhabitants of Comallo than in Pilcaniyeu (70.6% vs 46.7%, respectively) (X_1^2: 2.171, $p = 0.05$). People in the latter community obtained their seeds principally from exogenous sources (e.g. provided by INTA extension agents etc.) (Eyssartier et al., 2010). In addition, the proportion of seed exchange between neighbors, relatives and friends was significantly higher in Comallo (41.2% vs. 10% in Pilcaniyeu) (X_1^2: 5.988, $p < 0.01$) (Fig. 4).

4. Discussion

The present work illustrates how horticultural and gathering know-how is undergoing processes of transformation in Comallo and Pilcaniyeu communities, probably due to the dynamic interplay between local traditional knowledge and current living conditions. These semi-rural populations are settled in similar arid environments, but exhibit different patterns of horticultural and gathering practice. The community with less access to market economy, Comallo, seems to preserve traditional customs, integrating them with new technologies and practices. This community presented higher levels of seed exchange and collection of own seeds from previous harvests, and a higher number of both cultivated and gathered species than in Pilcaniyeu.

Comallo inhabitants use higher plant richness, i.e. a higher proportion of plant species diversity, and show greater maintenance of the gathering practice (hypothesis 1). Moreover, people from this community gather more medicinal than edible plants. This result is in accordance with a general pattern found in many populations of Northwest Patagonia (e.g. Estomba et al., 2005; Ladio and Lozada, 2008). Wild plant gathering is an ancestral

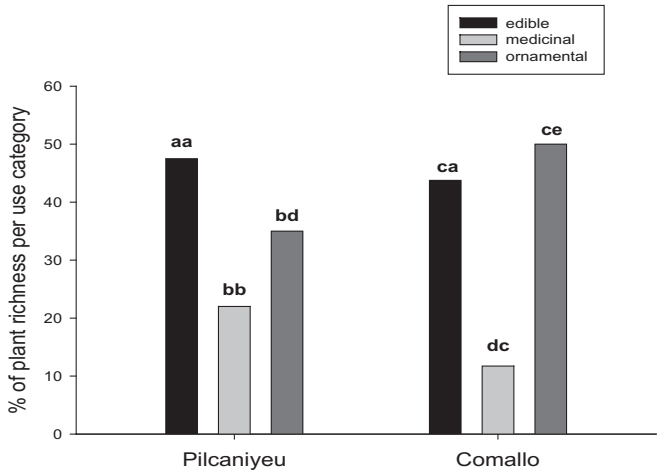

Fig. 3. Proportion of plant richness per use category in Pilcaniyeu and Comallo communities. The two letters above bars indicate comparisons within communities (the first letter) and between communities (the second one). The former compares categories of a same community and the latter compares a same category between communities. Different letters indicate significant differences ($p < 0.05$).

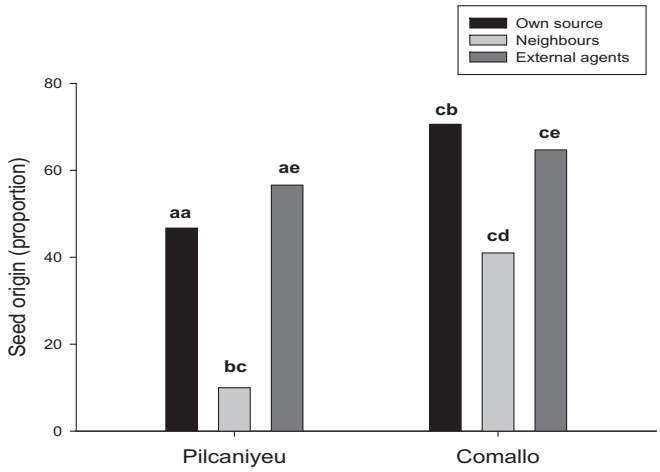

Fig. 4. Proportion of seed origin in Pilcaniyeu and Comallo communities. The two letters above bars indicate comparisons within communities (the first letter) and between communities (the second one). The former compares categories of a same community and the latter compares a same category between communities. Different letters indicate significant differences ($p < 0.05$).

tradition among Mapuche people, who consider that collecting plants from the natural environment has greater spiritual significance than cultivating them (Citarella et al., 1995). It has been extensively documented in both archeological and historical studies that the ancestral inhabitants of this area made long journeys in search of useful plants (Ladio and Lozada, 2000, 2004; Nacuzzi and Pérez de Micou, 1984). The cultivation of edible plants and the collection of medicinal species are complementary to each other. Native plant species are mostly collected, whereas exotic species are mainly cultivated close to dwellings. This pattern, observed in Comallo, is not found in Pilcaniyeu, where locals have largely abandoned the tradition of collecting plants, preferring cultivation, mainly of exotic plant species (Eyssartier et al., 2011b).

As regards edible plants, both communities cultivate a high proportion of exotic species. The introduction of exotic crops, which began with the arrival of the Spanish, still continues, aided, for example, by the intervention of extension agents. As a result, greenhouses have been adopted by over half of both populations. Whereas in Pilcaniyeu the use of greenhouses has virtually replaced vegetable-gardens (Eyssartier et al., 2011b), in Comallo, dwellers still maintain the tradition of cultivation in these areas. Moreover, in the latter community people maintain the tradition of relying on their own resources, either through collecting their own seeds from previous harvests or obtaining them from other members of the population (Hodgkin et al., 2007) (hypotheses 2 and 3). The maintenance of seed-gathering practices might favor exchange within the community. This could promote the conservation of the seed genotypes that pass from one generation to the next, as found in other studies (McGuire, 2008; Stromberg et al., 2010). It has been proposed that seeds are not only the source of future plants or food, but also the reservoir of culture and history (Shiva, 2003). Seed exchange is vital to horticultural knowledge, strengthening connections between people and their wisdom. Furthermore, it has been suggested that settlement patterns may influence seed flow within a community (Stromberg et al., 2010). The proximity of dwellings could contribute to the flow of germplasm and social support (Buchmann, 2009) in Comallo. However, proximity among locals is not sufficient in itself to generate germplasm exchange, given that locals living close to each other in Pilcaniyeu have abandoned this practice (Eyssartier et al., 2011b). Although in both populations a similar proportion of seeds is supplied by extension agents, in Comallo this influence does not seem to affect the collection of seeds from their own production. Moreover, the influence of external institutions in terms of greenhouse support is also similar for both communities. However, in relative terms, Pilcaniyeu inhabitants have abandoned the practice of harvesting their own seeds, reducing the maintenance of local germplasm (Eyssartier et al., 2011b). Paradoxically, Pilcaniyeu community members mentioned being aware of the benefits of collecting their own seeds, despite having practically lost this custom. This could suggest the greater impact of western culture in Pilcaniyeu than in Comallo. In spite of receiving similar external agent influence, Comallo dwellers did not abandon this traditional know-how; integrating old and new practices.

Comallo dwellers have mentioned helping each other in building greenhouses. Those who received technical and financial assistance from extension agents shared surplus materials for the construction of greenhouses, organizing themselves into small work teams, a fact not mentioned among Pilcaniyeu inhabitants. Several studies have demonstrated how cooperative activities can cement strong ties among dwellers (McGuire, 2008; Stromberg et al., 2010). Moreover, other works have shown how social support increases health and wellbeing (Cohen and Janicki-Deverts, 2009). This cooperative predisposition together with the custom of exchanging seeds could contribute to greater interchange of traditional horticultural knowledge among Comallo dwellers (hypothesis 3). In Comallo, then, sharing a diversity of knowledge, practices and plant material may be nurturing confidence and strengthening bonds among locals. This, in turn, could be contributing to the maintenance of horticultural knowledge and could be related to the fact that this community experiences less impact from the market economy. In contrast, we hypothesize that social bonds in Pilcaniyeu might be weaker, and this might hinder the conservation of traditional knowledge, as well as other learning experiences (Bellon, 2004).

The study of horticultural and gathering practices might provide a useful tool for the analysis of the integration of ancestral and novel experiences. Horticultural and gathering know-how is a practice that implies cognitive abilities related to perception and action patterns. In accordance with embodied cognition theory, cognition is embodied, lived, enacted and local, intimately interwoven into dynamic contexts (e.g. Glenberg, 2010; Knudsen, 2008; Niedenthal, 2007; Varela, 1999). This theory proposes that people do not receive information passively from their environments, but participate in generating meaning through their actions (Di Paolo et al., 2007). According to this approach, know-how emerges from people's experience in close coupling with socio-ecological environments (Varela, 1999; Varela et al., 1992). According to Toledo and Barreras-Bassols (2008) it is very difficult to achieve a coherent and comprehensive understanding of cognitive systems when they are separated from the activities and specific behaviors and skills of local dwellers. Particularly, it is interesting to note that Comallo inhabitants collect seeds from their own production not only from native species but also from plants of exotic origin. The fact that this custom is prominent in this community might illustrate the integration of old and novel practices.

These local dwellers seem to have developed new ways of adapting to changes over time, which might contribute to building resilience. Resilience refers to the capacity to recover from disturbance, while retaining the basic structure and ways of functioning. It emerges from embodied cognitive processes and combines different kinds of knowledge, promoting renewal and reorganization (Berkes et al., 2000, 2003; Folke, 2006; Folke et al., 2003; Walker et al., 2002). We think that the integration of traditional customs with new technologies and practices could be an indicator of resilient processes. For example, the incorporation of greenhouses or collecting seeds from their own production of exotic crops could foster resilience in these populations which are undergoing profound socio-cultural transformations.

In conclusion, this case study sheds new light on current changes related to horticultural and gathering knowledge in rural communities of Northwestern Patagonia, highlighting the conspicuous influence of market economy access. In these populations the integration of ancestral and novel knowledge seems to favor flexibility and autonomy, which might help locals deal with change. This horticultural and gathering know-how involves self-organization processes at both individual and community levels (Folke, 2006), which tend to promote greater wellbeing and socio-ecological diversity.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at http://dx.doi.org/10.1016/j.jaridenv.2013.05.008.

Appendix 1

Plant species recorded in vegetable-gardens, gardens and greenhouses in the Comallo community. Common uses: e (edible), m (medicinal), o (ornamental), f (fodder), s/lv (shade/living fences), ou (other uses). C.A. (Cultivated area): vg (vegetable-garden), g (garden), gh (green house). C.I. (Consensus index).

Plant species	Local name	Plant family	Origin	Common uses	C.A.	C.I.
Betula pendula Roth.	Abedul	Betulaceae	Exotic	o, s/lv	g	0.12
Acacia sp.	Acacia	Mimosaceae	Exotic	o, s/lv	g	0.12
Robinia pseudoacacia L.	Acacia blanca	Mimosaceae	Exotic	o, s/lv	g	0.06
Beta vulgaris L. var. *cicla* L.	Acelga	Chenopodiaceae	Exotic	e	vg, gh	0.76
Cichorium intybus L.	Achicoria de huerta	Asteraceae	Exotic	e	vg	0.18
Canna glauca L.	Achira	Cannaceae	Exotic	o	g	0.06
Artemisia absinthium L.	Ajenjo	Asteraceae	Exotic	m	vg, g	0.24
Allium sativum L.	Ajo	Liliaceae	Exotic	e	vg, gh	0.12
Allium porrum L.	Ajo puerro	Liliaceae	Exotic	e	gh	0.06
Populus nigra L.	Álamo	Salicaceae	Exotic	o, s/lv	vg	0.12
Populus alba L.	Álamo plateado o blanco	Salicaceae	Exotic	o, s/lv	g	0.12
Ociumum basilicum L.	Albahaca	Lamiaceae	Exotic	e	gh	0.06
Cheirantus cheiri L.	Alelí	Brassicaceae	Exotic	o	g	0.06
Medicago sativa L.	Alfalfa	Fabaceae	Exotic	f	vg	0.06
Aloe sp.	Aloe vera	Liliaceae	Exotic	m	gh	0.06
Apium graveolens L.	Apio	Apiaceae	Exotic	e	vg, gh, g	0.18
Araucaria araucana (Mol.) K. Koch	Araucaria	Araucariaceae	Native	o, s/lv	g	0.06
Acer sp.	Arce	Aceraceae	Exotic	o, s/lv	g	0.06
Aquilegia sp.	Arquilegia	Ranunculaceae	Exotic	o	g	0.06
Pisum sativum L.	Arveja	Fabaceae	Exotic	e	vg, gh	0.12
?	Arvejilla	Fabaceae	?	o	vg, g	0.12
Lilium sp.	azucena	Liliaceae	Exotic	o	g	0.06
Lantana camara L.	Bandera española o fosforito	Verbenaceae	Exotic	o	vg, g	0.18
Solanum melongena L.	Berenjena	Solanaceae	Exotic	e	gh	0.18
Boldea boldus (Mol.) Looser	Boldo	Monimiaceae	Exotic	m	vg	0.06
Muscari sp.	Bracito de muñeca	Liliaceae	Exotic	o	g	0.06
Brassica oleraceae L. var. *italica* Plenck	Brócoli	Brassicaceae	Exotic	e	vg, gh	0.12
Calendula officinalis L.	Caléndula	Asteraceae	Exotic	o, ou	vg, g	0.12
?	Campanola	Campanulaceae	?	o	g	0.06
?	Campanula	Campanulaceae	Exotic	o	gh, g	0.12
Ribes sp.	Casis	Saxifragaceae	Exotic	e	vg	0.18
Allium cepa L.	Cebolla	Liliaceae	Exotic	e	vg, gh	0.12
Allium sp.	Cebollín	Liliaceae	Exotic	e	gh	0.06
Prunus avium L.	Cerezo	Rosaceae	Exotic	e	vg, g	0.12
Coriandrum sativum L.	Cilantro	Apiaceae	Exotic	e	vg, gh	0.18
Austrocedrus chilensis (D.Don) Pic.Serm. & Bizzarri	Ciprés	Cupressaceae	Native	o, s/lv	g	0.12
Prunus domestica L.	Ciruelo	Rosaceae	Exotic	e	g	0.47
Prunus sp.	Ciruelo de jardín	Rosaceae	Exotic	o	g	0.12
Dianthus caryophyllus L.	Clavel	Caryophyllaceae	Exotic	o	g	0.12
Dianthus barbartus L.	Clavelina	Caryophyllaceae	Exotic	o	vg, g	0.18
Antirrhinum majus L.	Conejito	Scrophulariaceae	Exotic	o	g	0.18
Tagetes erecta L.	Copete	Asteraceae	Exotic	o	gh, g	0.18
Bellis perennis L.	Coqueta	Asteraceae	Exotic	o	g	0.06
Ribes aureum Pursh.	Corinto	Saxifragaceae	Exotic	e, s/lv	vg, g	0.47
Ribes sp.	Corinto rojo	Saxifragaceae	Exotic	e, s/lv	vg	0.06
Dahlia juarezii Hort.	Dalia	Asteraceae	Exotic	o	g	0.06
Prunus armeniaca L.	Damasco	Rosaceae	Exotic	e	vg, gh, g	0.18
Prunus persica L. Batsch	Duraznero	Rosaceae	Exotic	e	vg, g	0.18
Prunus persica L. Batsch	Duraznero petrolino	Rosaceae	Exotic	e	g	0.06
Convolvulus arvensis L.	Enredadera	Convolvulaceae	?	o	vg	0.06
Cichorium endivia L.	Escarola	Asteraceae	Exotic	e	gh	0.06
Spinacia oleracea L.	Espinaca	Chenopodiaceae	Exotic	e	vg	0.06
Rubus idaeus L.	Frambuesa	Rosaceae	Exotic	e	vg, gh, g	0.47
Fraxinus sp.	Fresno	Oleaceae	Exotic	o, s/lv	vg, g	0.12
Fragaria vesca L.	Frutilla	Rosaceae	Exotic	e	vg, gh	0.53
Aeonium sp.	Gallinita	Crassulaceae	Exotic	o	g	0.12
Helianthus annus L.	Girasol	Asteraceae	Exotic	e, o	vg	0.06
Gladiolus sp.	Gladiolo	Iridaceae	Exotic	o	g	0.12

(*continued on next page*)

Appendix 1 (*continued*)

Plant species	Local name	Plant family	Origin	Common uses	C.A.	C.I.
Ribes grossularia L.	Grosella	Saxifragaceae	Exotic	e	vg, gh, g	0.59
Prunus cerasus L.	Guindo	Rosaceae	Exotic	e	vg, g	0.47
Vicia faba L.	Haba	Fabaceae	Exotic	e	vg, gh	0.12
?	Helecho		?	o	gh	0.06
Hedera helix L.	Hiedra	Araliaceae	Exotic	o	g	0.06
Foeniculum vulgare Mill.	Hinojo	Apiaceae	Exotic	e	g	0.06
Schinus patagonica (Phil.) I.M Johnst.	Laura	Anacardiaceae	Native	o	vg	0.06
Lavandula sp.	Lavanda	Lamiaceae	Exotic	o	g	0.12
Lactuca sativa L.	Lechuga	Asteraceae	Exotic	e	vg, gh	0.76
Ligustrum lucidum Ait.	Ligustrina	Oleaceae	Exotic	o, s/lv	g	0.06
Syringa vulgaris L.	Lila	Oleaceae	Exotic	o, s/lv	vg, g	0.12
Plantago lanceolata L.	Llantén	Plantaginaceae	Exotic	m	gh	0.06
Lobelia sp.	Lobelia	Lobeliaceae	Exotic	o	g	0.06
Humulus lupulus L.	Lúpulo	Cannabinaceae	Exotic	o	vg	0.06
Zea mays L.	Maize	Poaceae	Exotic	e	vg, gh	0.47
Malva sylvestris L.	Malva	Malvaceae	Exotic	m	vg	0.12
Althaea rosea L. (Cav)	Malvón	Malvaceae	Exotic	o	vg	0.06
Malus domestica Borkh	Manzano	Rosaceae	Exotic	e	vg, g	0.41
Malus sp.	Manzano (semi-roja)	Rosaceae	Exotic	e	g	0.06
Malus sp.	Manzano (verde)	Rosaceae	Exotic	e	g	0.06
Malus sp.	Manzano silvestre	Rosaceae	Exotic	e	g	0.06
?	Margarita	Asteraceae	Exotic	o	g	0.06
?	Margarita de otoño	Asteraceae	Exotic	o	g	0.06
?	Margaritón	Asteraceae	Exotic	o	g	0.06
Cucumis melo L.	Melón	Cucurbitaceae	Exotic	e	gh	0.06
Cydonia oblonga Mill.	Membrillo	Rosaceae	Exotic	e	vg	0.06
Mentha sp.	Menta	Lamiaceae	Exotic	m	vg, g	0.35
Tanacetum balsamita L.	Menta blanca	Lamiaceae	Exotic	m	vg, gh	0.12
Achillea millefolium L.	Milenrama	Asteraceae	Exotic	m, o	vg	0.06
Capsicum annuum L.	Morrón	Solanaceae	Exotic	e	vg, gh	0.35
Sinapis sp.	Mostaza	Brassicaceae	Exotic	e	gh	0.06
Narcissus sp.	Narcizo	Amarilidaceae	Exotic	o	g	0.06
Elaeagnus angustifolia L.	Olivillo	Elaeagnaceae	Exotic	o, s/lv	vg	0.06
Ulmus sp.	Olmo	Ulmaceae	Exotic	o, s/lv	vg, g	0.29
Origanum vulgare L.	Orégano	Lamiaceae	Exotic	e, m	vg, gh, g	0.29
Tanacetum vulgare L.	Palma	Asteraceae	Exotic	m	g	0.06
Solanum tuberosum L.	Papa	Solanaceae	Exotic	e	vg	0.18
Vitis vinifera L.	Parra	Vitaceae	Exotic	e	gh, g	0.18
Prunus persica (L.) Batsch var. *nectarina* (Ait.) Max.	Pelón	Rosaceae	Exotic	e	g	0.06
Viola tricolor L.	Pensamiento	Violaceae	Exotic	o	g	0.12
Paeonia lactiflora Pall.	Peonia	Ranunculaceae	Exotic	o	g	0.29
Cucumis sativus L.	Pepino	Cucurbitaceae	Exotic	e	gh	0.18
Petroselinum crispum (Mill.) Nym.	Perejil	Apiaceae	Exotic	e	vg, gh	0.29
Symphoricarpos albus Blake	Perla	Caprifoliaceae	Exotic	o	vg	0.06
Petunia hybrida Vilm.	Petunia	Solanaceae	Exotic	o	g	0.12
Capsicum annuum L.	Pimiento (ají)	Solanaceae	Exotic	e	gh	0.06
Pinus sp.	pino	Pinaceae	Exotic	o, s/lv	vg, g	0.29
Pinus sp.	Pino siberiano	Pinaceae	Exotic	o, s/lv	g	0.06
Raphanus sativus L.	Rabanito	Chenopodiaceae	Exotic	e	vg	0.06
Cichorium intybus L.	Radicheta	Asteraceae	Exotic	e	vg	0.06
Beta vulgaris var. *rapacea* L.	Remolacha	Chenopodiaceae	Exotic	e	vg, gh	0.35
Brassica oleraceae L. var. *capitata* L.	Repollo	Brassicaceae	Exotic	e	vg, gh	0.35
Cytisus scoparius L. (Link.)	Retama	Fabaceae	Exotic	o, s/lv	vg, g	0.18
Quercus sp.	Roble	Fagaceae	Exotic	o, s/lv	g	0.06
Rosmarinus officinalis L.	Romero	Lamiaceae	Exotic	e	g	0.06
Rosa sp.	Rosa	Rosaceae	Exotic	m, o	vg, g	0.71
Ruta graveolens L.	Ruda	Rutaceae	Exotic	m	gh, g	0.12
Rheum rhabarbarum L.	Ruibarbo	Polygonaceae	Exotic	e, o	vg	0.06
Salvia officinalis L.	Salvia	Lamiaceae	Exotic	e	gh	0.06
Sambucus nigra L.	Sauco	Caprifoliaceae	Exotic	e, m	vg, g	0.12
Tropaeolum majus L.	taco de reina	Tropaeolaceae	Exotic	o, ou	gh, g	0.18
Tamarix sp.	Tamarisco	Tamaricaceae	Exotic	o, s/lv	g	0.06
Lycopersicum esculentum var. *esculentum* Mill.	Tomate	Solanaceae	Exotic	e	vg, gh	0.76
Melissa officinalis L.	Toronjil	Lamiaceae	Exotic	m	g	0.06
Melilotus indicus (L.) All.	Trébol amarillo	Fabaceae	Exotic	o	gh	0.06
Tulipa sp.	Tulipán	Liliaceae	Exotic	o	g	0.24
Thuja orientalis L.	Tuya	Cupressaceae	Exotic	o, s/lv	g	0.06
Vitis vinifera L.	Uva	Vitaceae	Exotic	e, o	gh, g	0.06
Vinca major L.	Vinca	Apocinaceae	Exotic	o	g	0.06
Daucus carota L.subsp. *sativus* (Hoffm.) Schübl. *et* G. Martens	Zanahoria	Apiaceae	Exotic	e	vg, gh	0.41
Cucurbita pepo L.	Zapallo	Cucurbitaceae	Exotic	e	vg, gh	0.35
Gaillardia sp.		Asteraceae	Exotic	o	vg	0.06

Appendix 2

Species gathered by Comallo dwellers. Plant use: dig (digestive), res (respiratory/antitusive), an (analgesic/anti-inflammatory), der (dermatologic), c.a.s (cultural affiliation syndrome: "empacho", heals the body, seven diseases), adi (antidiarrheal), ren (renal), edi (edible). C.I. (Consensus index).

Plant species	Local name	Origin	Plant use
Artemisia absinthium L.	Ajenjo	Exotic	der/res
Erodium cicutarium (L.) ĹHér. ex Aiton	Alfilerillo	Exotic	dig
Baccharis sagittalis (Less.) DC.	Carqueja	Native	dig
Arjona tuberosa Cav.	Chaquil	Native	edi
Senecio bracteolatus Hook. & Arn.	Charcao	Native	dig
Senecio filaginoides De Candolle	Charcao blanco	Native	dig
Plantago sp.	Llantén	Exotic	dig/der
Mentha sp.	Menta blanca o extranjera	Exotic	dig
Valeriana sp.	Ñanco lahuen	Native	res
Urtica sp.	Ortiga	Native	an/adi
Chenopodium ambrosioides L.	Paico	Native	der/c.a.s
Tanacetum balsamita L.	Palma	Native	An
Fabiana imbricata Ruiz & Pav.	Palo piche	Native	ren/res
Buddleja araucana Phil.	Pañil	Native	dig/der/ren
Adesmia boronioides Hook. f.	Paramela	Native	an
Acantholippia seriphioides (A Gray.) Mold.	Tomillo	Native	ren/res
Mentha sp.	Yerba buena	Exotic	dig/edi
Margyricarpus pinnatus (Lam.) O. Kuntze	Yerba de la perdiz	Native	dig

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