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Food plants in home gardens of the Middle Magdalena basin of Colombia

Plantas alimenticias en huertas familiares del Magdalena Medio de Colombia

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ABSTRACT Home gardens are important reservoirs of agricultural diversity essential to support food security in rural communities. In this paper, we describe the richness and composition of species and varieties of plants used for food in home gardens of the municipality of San Pablo in the Middle Magdalena Basin of Colombia, and discuss its possible relations with a set of socio-economic and structural variables. A survey was conducted in 20 home gardens where semi structured questionnaires were administered to the head of each household, and all plants used as food were recorded. The physical characteristics of the home gardens varied widely. Farmers' ages varied between 28-90 years and the most frequent level of schooling was primary education. In total, 75 species represented by 162 varieties were found. Plantains (*Musa* x *paradisiaca*), mangos (*Mangifera indica*), guavas (*Psidium guajava*) and cassavas (*Manihot esculenta*) were the most diverse and frequent crops across gardens. The mean number of species per home garden was 17.5 (SD = 7.1), ranging from 6 to 33. On average 48% of the species recorded were fruits, followed by spices (17%), roots and tubers (12%) and vegetables (9%). Significant correlations were found between food plant richness and farmers' ages (r_s = 0.461, p = 0.04) and food plant richness and number of family members (r_s = -0.487, p = 0.03). Home gardens of San Pablo are important regional agrobiodiversity reservoirs that support families' nutrition.

Key words. Agrobiodiversity, family farming, food security, ethnobotany.

RESUMEN
Las huertas familiares son importantes reservorios de diversidad agrícola esenciales para sostener la seguridad alimentaria de las comunidades rurales. En este artículo se describe la riqueza y la composición de especies y variedades de plantas usadas para alimentación en huertas familiares del municipio de San Pablo, Magdalena Medio de Colombia; y se discuten sus posibles relaciones con un grupo de variables socioeconómicas y estructurales. El estudio se llevó a cabo en 20 huertas, donde se aplicaron entrevistas semiestructuradas a las personas cabeza de familia y se registraron todas las plantas alimenticias. Las características físicas de las huertas variaron ampliamente. La edad de los propietarios varió entre 28-90 años y el nivel de educación más frecuente fue la primaria. En total se encontraron 75 especies representadas en 162 variedades. Los cultivos más diversos y frecuentes en las huertas fueron plátanos (*Musa* x *paradisiaca*), mangos (*Mangifera indica*), guayabas (*Psidium guajava*) y yucas (*Manihot esculenta*). El número promedio de especies por huerta fue de 17,5 (DE = 7,1), con un intervalo entre 6 y 33. En promedio el 48% de las especies fueron frutas, seguidas por raíces y tubérculos (16%), verduras (11%) y especias (9%). Por otro lado, se encontró una correlación significativa entre la riqueza de plantas alimenticias y la edad del agricultor (r_s = 0,461, p = 0,04) y el número de miembros de la familia (r_s = -0,487, p = 0,03). Las huertas familiares de San Pablo son un importante reservorio regional de agrobiodiversidad que sustentan la nutrición de las familias.

Palabras clave. Agrobiodiversidad, agricultura familiar, seguridad alimentaria, etnobotánica.

INTRODUCTION

Home gardens are systems of subsistence agriculture that can be very diverse and complex; they are usually located close to the homestead where a great variety of annual and perennial plants are cultivated, and often integrate livestock husbandry (Pulido *et al.* 2008). Their structure and diversity are determined by the agroecological and socioeconomic conditions of each region (Galluzzi *et al.* 2010). In Latin America, home gardens vary widely: on overage the area oscillates between 0.1 and 0.25 ha, although some may reach up to 2.5 ha and the number of plant species cultivated varies from 27 to 405 (Pulido *et al.* 2008). In spite of this diversity, the basic composition of species found in Latin American home gardens is consistent in that food plants predominate, contributing a significant part of the food supply (Pulido *et al.* 2008). Throughout the region it is common to find exotic species such as *Manguifera indica* L., *Coffea arabica* L., *Citrus* spp., *Musa* spp., *Dioscorea* spp., or *Saccharum officinale* L. cultivated in complex arrangements together with native species such as *Carica papaya* L., *Psidium guajava* L. or *Manihot sculenta* Crantz (Castiñeiras *et al.* 2002, Pulido *et al.* 2008). Home gardens are also known to be important reserves of genetic diversity, as they are spaces for the introduction of and experimentation with genetic material. This diversity exists both at the species and interspecific, or varietal, levels (Engels 2002).

Genetic diversity in home gardens is explained by a complex interaction among home garden structure, agro-ecological conditions, and socio-economic factors (Kehlenbeck *et al.* 2007). The most studied variable associated with species diversity has been the distance between home gardens and markets. In some regions, the proximity of markets appears to encourage conservation and is correlated with an increase in the number of varieties found in home gardens, while in other areas proximity seems to limit the diversity of species, and only those that have a high commercial value are conserved (Abdoellah *et al.* 2006, Kehlenbeck and Maass 2006, Kabir and Webb 2009, Galluzzi *et al.* 2010, Poot-Pool *et al.* 2015). Another important structural feature is the area of the garden. Some researchers report a positive correlation between area and species richness (Quiroz *et al.* 2002, Lin *et al.* 2017), while other studies show a negative correlation due to the homogenization of crops as land area increases (Peyre *et al.* 2006).

Among socio-economic factors, the farmers' ages seem to be the one with the greatest positive impact on species diversity in home gardens. It could be explained because older people harbor broader knowledge of the varieties and their management; they implement new species while retaining those with proven efficiency (Quiroz *et al.* 2002, Ban and Coomes 2004, Perrault-Archambault and Coomes 2008, Gbedomon *et al.* 2015). Moreover, gender of the owner can influence species diversity; women tend to retain a greater number of varieties, while men diversify their activities in other areas such as hunting, fishing or livestock husbandry (Trinh *et al.* 2003, Ban and Coomes 2004, Howard 2006). The level of education of the farmer does not seem to be strongly correlated with the number of species cultivated in home gardens (Gbedomon *et al.* 2015); nevertheless, some studies suggest there may be a tendency towards increased species richness given a higher level of schooling (Castiñeiras *et al.* 2002, Kehlenbeck and Maass 2006).

Another important aspect that influence species diversity in home gardens are the income generated from the sale of commercial products. Homestead income has been positively correlated with species richness, due to the capacity of the owners to hire laborers who contribute to the care and maintenance of a greater variety of species (Abdoellah *et al*. 2006, Kabir and Webb 2009).

As mentioned, conservation of home gardens supports the maintenance of local agrobiodiversity, and can be considered a strategy to assure the continuity of species and varieties important for local communities (Altieri 1999, Trinh *et al*. 2003, Thrupp 2000). Studies worldwide show that home gardens contribute to the nutrition and food security of rural communities (Kehlenbeck *et al*. 2007). Because of their species richness and diversity of cultivated varieties, these agroecosystems offer families an assortment of essential nutrients, which contribute to the prevention of micronutrient deficiencies, especially in early childhood (Arimond and Ruel 2004, Frison *et al*. 2011).

However, in response to a series of dynamics associated with productivity chains, globalized markets, and industrialized agriculture, new generations of farmers have introduced intensive agricultural systems in which large areas of one or few crops are handled. This results in the loss of traditional local varieties, to the detriment of the local rural economy, and deterioration of food security. This situation, coupled with factors triggered by the armed conflict in Colombia, has led to a related deterioration of ecosystems, damage to associated cultural traditions and increased local food insecurity, conditions that occur in the Middle Magdalena Basin of Colombia (Molano 2009, Mesa Intersectorial Alimentaria del Magdalena Medio 2012). In this region, home gardens could play a key role, not only as agrobiodiversity reservoirs, but also to provide food security. In this paper, we describe the richness and composition of species and varieties used for food in home gardens in the municipality of San Pablo in the Middle Magdalena Basin, and discuss the possible relationships of these variables with a set of socio-economic and structural variables. The following questions were investigated: What are the food plants present in the home gardens of San Pablo? How does species richness and composition vary among gardens? What socio-economic traits of the families and physical aspects of the home gardens are correlated with species richness? How are species represented in the gardens in terms of their varieties?

MATERIAL AND METHODS

Study area

The study was conducted during 2014 in the town of San Pablo (Bolívar) in the Middle Magdalena Basin of Colombia (7º 0’ 03” – 10º 48’ 37” North, 73º 45’ 15” – 75º 42’ 18” West). Most of the area is dominated by a riverine landscape contiguous with a montane system. Although the elevation varies significantly, the study was carried out between 100 and 400 m. The region is characterized by a tropical humid climate. Average temperature is 28–30°C, and annual average rainfall is 2780 mm. The driest period occurs between December and March, whereas the rainy season spans May to October.

The rural territory of San Pablo is divided into 11 corregimientos-villages, whose economy is based on agriculture, cattle ranching, fishing and mining. It has a population of ca. 30,000 inhabitants, of whom 22% live in rural areas, while the remaining 78% live in town (DANE 2005). The entire region of the Middle Magdalena, including San Pablo, has worrisome social, economic and environmental problems. It is estimated that 60% of its inhabitants live in poverty (Molano 2009) and most of them suffer from food insecurity (Mesa Intersectorial Alimentaria del Magdalena

Medio 2012). Virtually the entire indigenous population has disappeared (Molano 2009), and the current inhabitants are a mixture of people from the slopes of the Andes, the Caribbean coast and other parts of the country. Many of those who have come to the region were displaced by the armed conflict or attracted by the intermittent economic booms linked to the exploitation of natural resources. Due to this, in San Pablo, home gardens have been appearing as people have colonized the territory over the last four or five decades, which means that most gardens are young and are not derived from ancestral agricultural systems. Since the mid-1980s, agriculture has been influenced by dynamics associated with the armed conflict, illicit crops and change in land use, as well as government programs. The boom of the African oil palm (*Elaeis guineensis* Jacq.) has reduced the areas for food production, increasing dependency on food produced in other regions of Colombia (Gutierrez 2004, Sabogal 2013). In addition, during the period between 1998–2010, when violence was at peak intensity of, thousands of rural inhabitants had to move to the urban area of San Pablo (Prieto 2016).

Data collection

Households were selected at a workshop during which 20 families agreed to participate in the survey. Five home gardens were sampled in the village Pozo Azul, four in Vallecito, six in Cerro Azul, four in Isla Medellín and one in El Socorro. The survey consisted of two sections: in the first one we administered a semi-structured questionnaire to the heads of household in order to characterize socioeconomic traits of the families, physical aspects of the home gardens and management practices; questions were selected based on the variables frequently reported in the literature as related to species richness in home gardens: age and schooling, number of family members, and home garden age, area, and distance to the urban center – of San Pablo – (Quiroz *et al*. 2002, Kehlenbeck *et al*. 2007, Perrault-Archambault and Coomes 2008, Galluzzi *et al*. 2010, Gbedomon *et al*. 2015). In addition, we inquired about the relative amount of time dedicated to work in the garden (part or full time), as well as origin of the seeds, that is, if the seeds came from the region or if they came from donations from humanitarian programs. We also asked about the role of the home garden in the food supply, in other words, if the home garden was considered to be the main source of food for the home or a complementary source.

In the second section, all plant species and varieties used as food in the home garden were recorded using a questionnaire. Food category (cereal, spice, fruit, seed, vegetable, legume, sugar, root-tuber and infusion) and management category (cultivated or wild) were registered for each plant, as well as the purpose of use of the product (domestic or commercial purpose). The food categories used here were created by the authors based on Hernández and León (1992) and an unpublished review of food plants used in Colombia (García, unpublished). Most of the species were collected in the field and the voucher specimens were deposited at the Pontificia Universidad Javeriana Herbarium (HPUJ), Bogotá. Species were determined using taxonomic keys and herbarium specimens, as well as consulting with specialists. Varieties by species were registered following the method "farmers' perceptions and folk classification" which is an indication of the variability within a crop as seen through the eyes of the farmer (Hoogendijk and Williams 2002).

Data analysis

Correlations between plant species richness (the number of different species used as food in the home garden) and owner's age and schooling (from the most basic to the most advanced, primary, secondary and technical), household members, and home garden age (owner tenure time), area and distance to the urban center were assessed using Spearman's rank correlation coefficient.

RESULTS

Structure of households and home gardens studied

The physical characteristics of the home gardens displayed wide variation. While farm size ranged from 0.2–35 ha (X = 16.9; SD = 11.6), estimated area dedicated to home gardens was only 0.2–3 ha (X = 2.2; SD = 0.82). Home garden age ranged from 1-51 years (X = 12.2; SD = 10.8). Distance to the urban center oscillated between 4.2 and 27 linear km (X = 19.2; SD = 8.6), according to the relative location of each village to San Pablo (Table 1). Only 12 home gardens were established around the homestead, while the others were at different distances from the homestead. There is a unique situation in Isla Medellín, where due to flood risk, the owners currently live in San Pablo and travel every day by boat on the Magdalena River to work in their home gardens.

Families were comprised of 1–12 members (X = 5.3; SD = 2.6), however only 1-5 people per family worked in the gardens. Farmers' ages varied between 28–90 years (X = 49.1; SD = 13.9), and the most frequent level of schooling was primary education (Table 1). Only 35% of the owners worked exclusively in the home gardens, and the others reported carrying out complementary economic activities. Likewise, the income and food supply of only 30% of the families were primarily derived from their home gardens (Table 1).

Seeds used in home gardens of San Pablo mostly came from the same region; in some cases, the farmers bought the seeds in town or, more frequently, they exchanged or shared the seeds with their neighbors. Another recent source of seeds has been the humanitarian and alimentary programs, such as Red de Seguridad Alimentaria (ReSA), Colombia Humanitaria or a food program of the Servicio Jesuita de Refugiados (SJR). Together these programs have introduced about 12 varieties in the region; some of these plant materials were found in nine of the gardens surveyed, in Isla Medellín, Pozo Azul and Cerro Azul (Appendix 1).

Plant richness and composition

In total 75 species in 32 families were recorded (Appendix 1). Of these, 69 were cultivated, five were wild and one (*Inga spectabilis* (Vahl) Willd.) was found wild and cultivated. The richest families were Fabaceae and Solanaceae (8% of the total number of species each one), followed by Cucurbitaceae (6.7%) as well as Annonaceae, Apiaceae, Dioscoreaceae, Lamiaceae, Myrtaceae and Rutaceae (5.3% each one).

Regarding the frequency of occurrence, only 11 species were registered in ten or more home gardens (Appendix 1). Plantains (*Musa* x *paradisiaca* L.) and mangos (*Mangifera indica*) were registered in 18 home gardens, guavas (*Psidium guajava*) and oranges (*Citrus* × *aurantium* L.) in 15, soursop (*Annona muricata* L.) in 14, avocado (*Persea americana* Mill.) in 13, and papaya (*Carica papaya*) and cassava (*Manihot esculenta*) in 12 home gardens. Eleven species were registered in only two home gardens and twenty species in only one home garden (Appendix 1).

Table 1. Characteristics of households and home gardens surveyed in San Pablo, Bolívar, Colombia.

Home garden number	Village	Farm* / Home garden area** (ha)	Home garden distance to the urban center (km)	Home garden age (years)	Owner's age (years)	Owner's schooling	House-hold members	Dedication to work in the garden	Origen of seeds	Food supply to the family
1	Isla Medellín	10 / 2	4.8	1	38	Primary	12	Partial	Region / Humanitarian program	Partial
2	Isla Medellín	18 / 2.5	4.7	15	50	Secondary	7	Partial	Region / Humanitarian program	Partial
3	Isla Medellín	8 / 2.5	5.3	15	43	Primary	7	Partial	Region / Humanitarian program	Partial
4	Isla Medellín	30 / 3	4.2	13	45	None	6	Partial	Region / Humanitarian program	Partial
5	Pozo Azul	20 / 1.5	25.0	12	56	Primary	9	Partial	Region / Alimentary program	Partial
6	Pozo Azul	0.2 / 0.2	24.4	2	37	Primary	4	Complete	Region	Main
7	Pozo Azul	5 / 1	24.8	25	50	Secondary	3	Partial	Region / Alimentary program	Partial
8	Pozo Azul	3 / 1	25.3	13	49	Primary	9	Partial	Region / Alimentary program	Partial
9	Pozo Azul	30 / 2	24.3	13	54	Primary	4	Partial	Region / Alimentary program	Partial
10	Vallecito	30 / 3	26.0	15	67	None	3	Complete	Region	Main
11	Vallecito	30 / 2	27.2	8	35	Primary	5	Partial	Region	Partial
12	Vallecito	35 / 3	26.8	8	44	Primary	5	Partial	Region	Partial
13	Vallecito	25 / 3	26.8	7	90	None	1	Complete	Region	Main
14	El Socorro	3 / 2	7.7	51	53	Technical	5	Partial	Region	Partial
15	Cerro Azul	30 / 3	20.4	3	41	Primary	6	Partial	Region	Main
16	Cerro Azul	25 / 2	19.8	16	46	Secondary	4	Complete	Region	Partial
17	Cerro Azul	5 / 3	21.2	4	67	Primary	5	Complete	Region	Main
18	Cerro Azul	7 / 3	20.4	10	35	Primary	5	Complete	Region	Partial
19	Cerro Azul	11 / 2	19.2	6	28	Secondary	4	Complete	Region / Alimentary program	Main
20	Cerro Azul	12 / 3	26.2	6	54	None	2	Partial	Region / Alimentary program	Partial
Mean /Mode		16.9/2.2	19.2	12.2	49.1	Primary	5.3	Partial	Region	Partial
SD		11.6/0.82	8.6	10.8	13.9	-	2.6	-	-	-

* Value reported by the owner ** Value estimated by direct observation

The mean number of species per home garden was 17.5 (SD = 7.1), ranging from a low of six species in home garden 2 (Isla Medellín) to a high of 33 in home garden 15 (Cerro Azul) (Fig. 1). On overage, the home gardens of Cerro Azul had 22 species, followed by gardens of Pozo Azul and Vallecito with 19 and 17 species, respectively, while gardens of Isla Medellín had only 12 species on average, and the single garden of El Socorro had nine species.

Regarding intraspecific diversity, the 75 species were represented by 162 varieties (Appendix 1). The most diverse species was *Musa* x *paradisiaca* with 14 varieties, followed by *Mangifera indica* with nine, *Manihot esculenta* with eight, *Psidium guajava* with seven, and *Citrus limon* (L.) Osbeck, *Dioscorea alata* L. and *Phaseolus vulgaris* L. with five varieties each one. In contrast, 47 species (63%) were represented by only one variety (Appendix 1, Fig. 1). Considering only the 12 most diverse and frequent species, home garden 20 (Cerro Azul) had the highest number of varieties with 22, followed by garden 15 (Cerro Azul) with 16 varieties, garden 13 (Vallecito) with 14 varieties, gardens 1 and 4 (Isla Medellín) with 13 varieties, and garden 17 with 12 varieties (Cerro Azul). On average, the gardens of Cerro Azul were the richest with 13 varieties, while the gardens of Vallecito, Pozo Azul and Isla Medellín had between eight and nine varieties and the single garden of El Socorro had six varieties (Fig. 1).

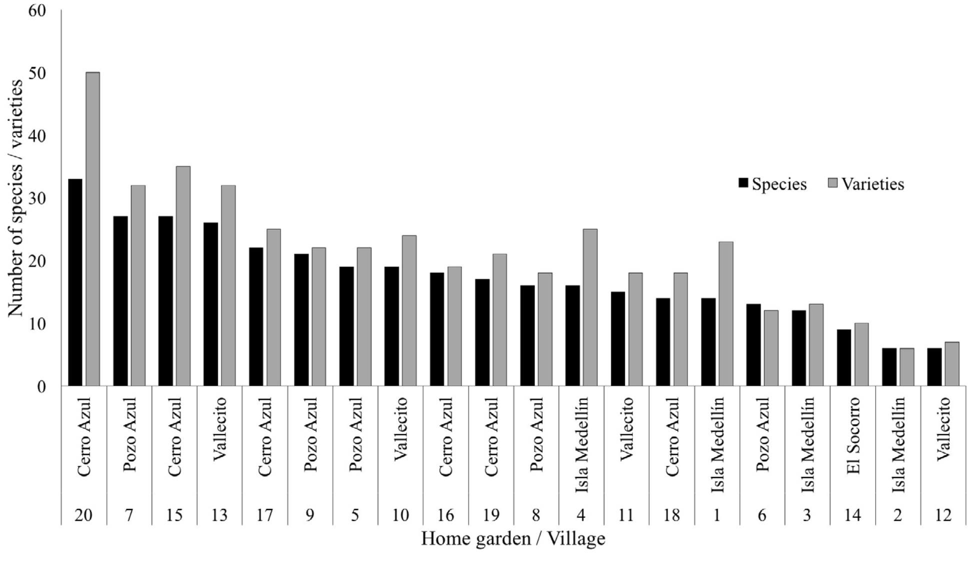

Figure 1. Plant species and varieties richness per home garden in San Pablo, Bolívar, Colombia. Characteristics of home gardens are in Table 1.

Food uses and purpose of use

On average 48% of the plant species recorded were fruits (Fig. 2, Appendix 1). Other frequent food categories included spices and condiments (17%), roots and tubers (12%), and vegetables (9%). Fruits were found in all the home gardens, and their number varied between four and 20 species per garden. Another frequent group in the gardens was roots and tubers, species of which were found in 17 gardens, varying between one and five per garden. Vegetables were found in 15 home gardens, cereals in 13, spices and legumes in 12, plants used for sugar in two home gardens and plants used for infusion in only one home garden.

Most species recorded in the home gardens were grown for domestic purpose (Fig. 3). However, species cultivated only for commercial purpose were found in 11 home gardens and species cultivated for both domestic and commercial purpose were recorded in 13 home gardens. The most frequent commercial species were plantains, cassava, maize, cacao, as well as some fruits.

Figure 2. Proportion of species per food category recorded in home gardens of San Pablo, Bolívar, Colombia. Characteristics of home gardens are given in Table 1.

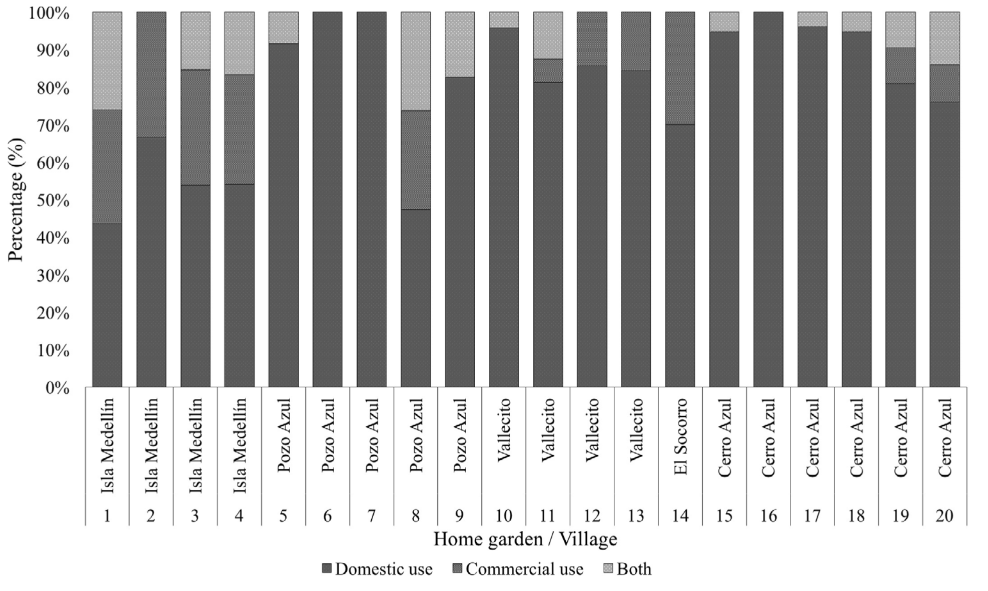

Figure 3. Proportion of species per use purpose recorded in home gardens of San Pablo, Bolívar, Colombia. Characteristics of home gardens are given in Table 1.

Socio-economic and structural factors and species richness

We found a positive correlation between species richness and farmers' ages (r_s = -0.461, p = 0.041) and a negative correlation between species richness and the number of household members (r_s = -0.487, p = 0.029). No other socio-economic and structural factors were correlated with species richness (Appendix 2). Regarding the origin of the families, no trends were observed (Table 1). The three families that came to San Pablo from other regions did not bring seeds with them; in their home gardens six to 27 species were found. Respecting the origin of seeds (Table 1), no variation in species richness was observed among home gardens where the families received support from seed donation programs (X = 17.5; SD = 7.1), versus home gardens that did not (X = 17.9; SD = 6.6).

DISCUSSION

Although size and location of some home gardens in San Pablo differ from those previously reported in other regions, they share everything else: they are subsistence agriculture systems, often associated to households, where a great variety of annual and perennial plants are cultivated; they depend on family labor, provide direct access to fresh food, thus contributing to improve food security, and are source of products that supplement family income. Differences in size and location of some home gardens can be related to the region's socio-economic and environmental conditions; families from Isla Medellín had to abandon their houses in 2011–2012 due to flooding of the Magdalena river whereas families from Cerro Azul and Vallecito have tended to expand their gardens as a strategy to maintain a better food supply.

Plant richness and composition

We found 75 food plant species in the home gardens of San Pablo. In general, this richness is similar with that reported in other studies in Colombia and Latin America. A study performed by Pasquini *et al.* (2014) in three Afro-descendent communities in the department of Bolivar (Colombian Caribbean) recorded 91 species used as food in a study population of 74 people; although they found 16 species more than those listed in San Pablo, this difference could be explained by the different methodological approach, since they reported the species that people remember as part of their traditions, while in our study, we reported the species that people currently have in their gardens. Other studies on home gardens in the Colombian Caribbean have focused on the characterization of woody species (Jiménez-Escobar *et al.* 2011, Jiménez-Escobar and Estupiñán-González 2011). Based on the number of food tree species reported for the Colombian Caribbean by Jiménez-Escobar and Estupiñán-González (2011), the food trees reported in San Pablo represent about 30% of the total species listed for the region, a figure that is quite representative, considering that we studied only 20 gardens. In northeastern of Brazil, Albuquerque *et al.* (2005) found 19 species in the category of nutrition in 31 home gardens, and Nunes Carvalho *et al.* (2013) found 46 food species in 19 home gardens; in the Ecuadorian Amazon, Caballero-Serrano *et al.* (2016) found 138 food species in 138 home gardens; and in Cuba, Buchmann (2009) found 42 food species in 25 home gardens. Even considering the great environmental and socio-economic variation among the regions, we can consider that the number of food species found in San Pablo is within the range reported to home gardens of Latin America.

As previously mentioned, home gardens are reservoirs of agrobiodiversity and spaces for experimentation which leads to domestication of new species and varieties (Castiñeiras *et al.* 2002, Engels 2002). This appears to be the case in the home gardens of San Pablo, since intraspecific richness of some species proved to be high; just in *Musa* x *paradisiaca* we found 14 varieties, and nine varieties of *Mangifera indica*, eight varieties of *Manihot esculenta* and seven varieties of *Psidium guajava* (Appendix 1). Based on these results, home gardens of San Pablo can be considered as important areas for agrobiodiversity conservation in the region. Elsewhere in Latin America, similar trends related to intraspecific diversity in home gardens have been found. In Cuba, Castiñeiras *et al.* (2002) reported 16 varieties of plantains and bananas (*Musa* spp.), and 11 varieties of mangos (*Mangifera indica*). However, species such as *Zea mays* L., *Coffea arabica*, *Colocasia esculenta* (L.) Schott or *Persea americana* Mill. were not as diverse in San Pablo as in home gardens of Cuba, Guatemala or Venezuela (Castiñeiras *et al.* 2002, Hoogendijk and Williams 2002), which could be related to variation in agro-ecological conditions and farmers' preferences.

As for variation in plant diversity, some remarkable trends were found in the home gardens of San Pablo. A small proportion of the varieties recorded here came from humanitarian or food programs and almost half of the owners interviewed received plant materials from such programs, which are frequent in Colombia and are among the social factors, aside from the family, that influence garden sustainability (Pulido *et al.* 2008). On the other hand, farmers recognize that some varieties, such as "banano cieneguero" and "plátano quinientano" (*Musa x paradisiaca*), "bore morado" (*Xanthosoma sagittifolium* (L.) Schott), "frijol blanco" (*Phaseolus vulgaris* L.), "guanábana cimarrona" (*Annona purpurea* Moc. & Sessé ex Dunal) or "yuca paloverde" (*Manihot esculenta*), have tended to disappear in the region. According to Peroni and Hanazaki (2002), restrictive environmental laws, rural exodus, increasing tourism and changes in livelihood activities are among the factors that contribute to diversity depletion in swidden cultivation systems in Brazil. Some of these factors may also be operating in San Pablo, for example the exodus generated by the armed conflict or social transformation exacerbated by illicit crops.

Regarding species composition, *Musa x paradisiaca* is the most frequently cultivated species in the home gardens of San Pablo. Although bananas were not considered in previous studies in the Colombian Caribbean (Jiménez-Escobar *et al*. 2011), they are mentioned as one of the most important crops for the economy of region (Arrieta *et al*. 2010, Pasquini *et al*. 2014). Another representative crop are the mangoes; *Mangifera indica* is reported for all Caribbean home garden research and it is recognized as an essential component of the diet of the Colombian coast (Jiménez-Escobar and Estupiñán-González 2011). Another species with high absolute frequency is *Psidium guajava*, which has been listed in previous studies as one of the most important plants for rural communities, not only as food but also as a medicinal species. Cassava (*Manihot esculenta*) that also resulted frequently in home gardens of San Pablo had been recognized as one of the main sources of income for black communities in the Caribbean (Pasquini *et al*. 2014) and as basic food to Colombian people (Pérez-Arbeláez 1996).

The genera *Citrus* and *Dioscorea*, frequent in this research, are also identified as characteristic for tropical home gardens around the world (Wezel and Bender 2003). In the case of yams, *Dioscorea trifida,* a native species, was the most frequent in San Pablo, something that has not been described in previous work in home gardens of the Colombian Caribbean.

Other common native species were *Annona muricata*, *Carica papaya*, *Persea americana*, *Inga spectabilis* (Vahl) Willd. and *Theobroma cacao* L., which were also identified by Jiménez-Escobar *et al*. (2011) and Jiménez-Escobar and Estupiñán-González (2011). It is worth mentioning that cacao is present in most of the San Pablo home gardens due to programs of crop substitution implemented by different organizations (Gutiérrez 2004). The species mentioned above are characteristic of tropical home gardens and are often present in other Latin American countries (Wezel and Bender 2003, Pulido *et al*. 2008, Buchmann 2009).

Food use and commercialization of the species

Fruits are one of the most common food groups in Latin American home gardens, with more species and greater density compared to other regions (Pulido *et al*. 2008), and this is reflected in our study. In all the home gardens of San Pablo we found fruits, representing almost half of the species recorded. Other categories with a significant number of species were spices, roots and tubers, and vegetables. Roots and tubers were particularly frequent in the gardens due to all the varieties of cassava, yams, sweet potatoes, taro and other aroids found. All these categories have been reported as common in home gardens of Latin America and in other regions of the world (Castiñeiras *et al*. 2002, Asfaw 2002, Bennett-Lartey *et al*. 2002).

With regard to the purpose of use, we consider that the main objective of the home gardeners of San Pablo is to provide food and livelihood for their families. When cultivated varieties do not completely satisfy these needs, trade plays an important role in providing economic resources to acquire other foods. However, self-consumption is one of the most representative features of these agroecosystems. The same result has been obtained in diverse studies in Latin America (Blanckaert *et al*. 2004, Pulido *et al*. 2008), where the vast majority of species were produced for family consumption.

The San Pablo farmers' interest in maintaining a diverse food supply is reflected in the fact that the home gardens harbored on average plants from five food categories, especially fruits and roots and tubers. In terms of food security, fruits are very important providing vitamins and other nutrients essential to treat "hidden hanger" (Frison *et al*. 2011). Roots and tubers such as cassava, yams and sweet potatoes provide calories in the daily diet. Local people recognize that increasing food insecurity does not depend on food production. However, government programs have been focused on providing plants such cacao (*Theobroma cacao*) or even promoting oil palm, without recognizing the great variety of foods produced by local farmers. According to Boone and Taylor (2016) "food production controlled by households is more reliable and sustainable than nutrition programs that rely on government donations and financial support."

The relation between socio-economic factors and plant richness

According to the results, the farmers' ages and the number household members are the only two socioeconomic variables that significantly influence species richness (Appendix 2), although in the case of household members the correlation is a negative one. The number of species in the gardens increases with the farmers' ages, and the vast majority of authors who have investigated this variable also found a significant correlation (Quiroz *et al*. 2002, Ban and Coomes 2004, Perrault-Archambault and Coomes 2008, Gbedomon *et al*. 2015). On the other hand, the number of species in the gardens decreases as the number of household members increases, which is a trend that has not been described in the literature. In Venezuela, Quiroz *et al*. (2002) found that there was greater plant diversity in households with a larger number of family members. The trend found in San Pablo could be related with the fact that not all family members participate in garden management.

The absence of a significant correlation between species richness and other socio-economic variables (Appendix 2), does not have a clear explanation, but could be related to the number of gardens studied, or to the dynamics of family agriculture in San Pablo. Both the armed conflict and illicit crops could also be factors that have influenced the variety of food plants managed by the gardeners. To increase our understanding of these agricultural systems, it will be necessary to address factors such as how the monetary surplus generated by illicit crops affects farmers' decisions or how trade restrictions imposed by armed groups affects crop diversity. Situations like these have been frequent across many regions of Colombia, such as the Caribbean Darien, where socio-ecological changes generated by armed conflict and drug trafficking have put the local food supply at risk (Álvarez-Salas and Gálvez-Abadía 2014). We would encourage further research on food plants diversity in similar social and alimentary contexts.

AUTHORS PARTICIPATION

DV conducted interviews, collected specimens, performed statistical analyses, co-designed the experiment and co-wrote the manuscript. NG participated in all the above aspects of the research as well as the final correction of manuscript.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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LITERATURE CITED

Abdoellah OS, Hadikusumah HY, Takeuchi K, Okubo S, Parikesit. 2006. Commercialization of homegardens in an Indonesian village: Vegetation composition and functional changes. Agrofor. Syst. 68(1): 1–13. doi:10.1007/s10457-005-7475-x.

Albuquerque UP, Andrade LHC, Caballero J. 2005. Structure and floristics of homegardens in Northeastern Brazil. J. Arid Environ. 62: 491–506. doi:10.1016/j.jaridenv.2005.01.003.

Altieri M. 1999. The ecological role of biodiversity in agroecosystems. Agric. Ecosyst. Environ. 74: 19–31.

Álvarez-Salas L, Gálvez-Abadía A. 2014. Food Sovereignty in a Socioecological Transformation Context in the Caribbean Darién of Colombia. Agroecol. Sustain. Food Syst. 38(7): 812–838. doi:10.1080/21683565.2014.881951.

Arimond M, Ruel MT. 2004. Community and International Nutrition Dietary Diversity Is Associated with Child Nutritional Status: Evidence from 11 Demographic and Health Surveys. J. Nutr. 134(10): 2579–2585.

Arrieta RA, Martínez AG, Guardo LL. 2010. Hambre y desnutrición en Bolívar: Un análisis desde el enfoque de la equidad y la seguridad alimentaria. 1st ed. Cartagena: Universidad de Cartagena. Instituto de Políticas Públicas Regionales y de Gobierno IPREG.

Asfaw Z. 2002. Home gardens in Ethiopia: some observations and generalizations. In: Watson J, Eyzaguirre P, editors. Home gardens and in situ conservation of plant genetic resources in farming systems. Witzenhausen: International Plant Genetic Resources Institute. p. 125–139.

Ban N, Coomes OT. 2004. Home gardens in Amazonian Peru: Diversity and exchange of planting material. Geogr. Rev. 94(3): 348–367. doi:10.1111/j.1931-0846.2004.tb00177.x.

Bennett-Lartey SO, Ayernor GS, Markwei CM, Asante IK, Abbiw DK, Boateng SK, Anchirinah VM, Ekpe P. 2002. Contribution of Home Gardens to in situ Conservation of Plant Genetic Resources in Farming Systems in Ghana. In: Watson J, Eyzaguirre P, editors. Home gardens and in situ conservation of plant genetic resources in farming systems. Witzenhausen: International Plant Genetic Resources Institute. p. 83–96.

Blanckaert I, Swennen R., Paredes Flores M, Rosas López R, Lira Saade R. 2004. Floristic composition, plant uses and management practices in homegardens of San Rafael Coxcatlán, Valley of Tehuacán-Cuicatlán, Mexico. J. Arid Environ. 57:179–202. doi:10.1016/S0140-1963(03)00100-9.

Boone K, Taylor PL. 2016. Deconstructing homegardens: food security and sovereignty in northern Nicaragua. Agric. Human Values 33(2):239–255. doi:10.1007/s10460-015-9604-0.

Buchmann C. 2009. Cuban Home Gardens and Their Role in Social – Ecological Resilience. Hum. Ecol. 37:705–721. doi:10.1007/s10745-009-9283-9.

Caballero-Serrano V, Onaindia M, Alday JG, Caballero D, Carrasco JC, McLaren B, Amigo J. 2016. Plant diversity and ecosystem services in Amazonian homegardens of Ecuador. Agric. Ecosyst. Environ. 225:116–125. doi:10.1016/j.agee.2016.04.005.

Castiñeiras L, Fundora Mayor, Z Shagarodsky T, Moreno V, Barrios O, Fernández L, Cristóbal R. 2002. Contribution of home gardens to in situ conservation of plant genetic resources in farming systems - Cuban component. In: Watson J, Eyzaguirre P, editors. Home gardens and in situ conservation of plant genetic resources in farming systems. Witzenhausen: International Plant Genetic Resources Institute. p. 42–55.

(DANE) Departamento Administrativo Nacional de Estadísticas. 2005. Censo General 2005, República de Colombia. Bogotá: Dirección de Censos y Demografía.

Engels J. 2002. Home gardens - a genetic resources perspective. In: Watson J, Eyzaguirre P, editors. 2002. Home gardens and in situ conservation of plant genetic resources in farming systems. Witzenhausen: International Plant Genetic Resources Institute. p. 3–9.

Frison EA, Cherfas J, Hodgkin T. 2011. Agricultural Biodiversity Is Essential for a Sustainable Improvement in Food and Nutrition Security. Sustainability 3(1):238–253. doi:10.3390/su3010238.

Galluzzi G, Eyzaguirre P, Negri V. 2010. Home gardens: Neglected hotspots of agro-biodiversity and cultural diversity. Biodivers. Conserv. 19(13):3635–3654. doi:10.1007/s10531-010-9919-5.

Gbedomon RC, Fandohan AB, Salako VK, Idohou AFR, Kakaï RG, Assogbadjo AE. 2015. Factors affecting home gardens ownership, diversity and structure: a case study from Benin. J. Ethnobiol. Ethnomed. 11:56. doi:10.1186/s13002-015-0041-3.

Gutiérrez O. 2004. Desplazamiento forzoso y tenencia de la tierra en San Pablo (sur de Bolívar). Rev. Controversia. 183:39–47.

Hernández JE and León J, editors. 1992. Cultivos marginados, otra perspectiva de 1492. Roma: Organización de las Naciones Unidas para la Agricultura y la Alimentación FAO.

Hoogendijk M, Williams DE. 2002. Characterizing the genetic diversity of home garden crops: some examples from the Americas. In: Watson J, Eyzaguirre P, editors. Home gardens and in situ conservation of plant genetic resources in farming systems. Witzenhausen: International Plant Genetic Resources Institute. p. 34–40.

Howard PL. 2006. Gender and social dynamics in swidden and homegardens in Latin America. In: Kumar BM and Nair PKR, editors. Tropical Homegardens: A Time-Tested Example of Sustainable Agroforestry. Dordrecht: Springer. p. 159−184.

Jiménez-Escobar ND, Albuquerque U, Rangel C-H O. 2011. Huertos familiares en la bahía de Cispatá, Córdoba, Colombia. Bonplandia 20(2):309–328.

Jiménez-Escobar ND, Estupiñán-González AC. 2011. Useful trees of the Caribbean Region of Colombia. Bioremediation, Biodivers. Bioavailab. 5(Special Issue 1):65–79.

Kabir ME, Webb EL. 2009. Household and homegarden characteristics in southwestern Bangladesh. Agrofor. Syst. 75:129–145. doi:10.1007/s10457-008-9142-5.

Kehlenbeck K, Maass BL. 2006. Are tropical homegardens sustainable? Some evidence from Central Sulawesi, Indonesia. In: Kumar BM and Nair PKR, editors. Tropical Homegardens: A Time-Tested Example of Sustainable Agroforestry. Dordrecht: Springer. p. 339–354.

Kehlenbeck K, Arifin HS, Maass BL. 2007. Plant diversity in homegardens in a socio-economic and agro-ecological context. In: Tscharntke T, Leuschner C, Zeller M, Guhardja E and Bidin A, editors. Stability of Tropical Rainforest Margins. Berlin: Springer. p. 295–317.

Lin BB, Gaston KJ, Fuller RA, Wu D, Bush R, Shanahan DF. 2017. How green is your garden?: Urban form and socio-demographic factors influence yard vegetation, visitation, and ecosystem service benefits. Landsc. Urban Plan. 157:239–246. doi:10.1016/j.landurbplan.2016.07.007.

Mesa Intersectorial Alimentaria del Magdalena Medio. 2012. Propuesta estratégica para la seguridad alimentaria y nutricional del Magdalena Medio. Unpublished document. San Pablo: Corporación Ubusinga.

Molano A. 2009. En medio del Magdalena Medio. Bogotá: Centro de Investigaciones y Educación Popular, CINEP.

Nunes Carvalho TK, Batista de Oliveira Abreu D, Marques de Lucena C, Marques Pedrosa K, Vasconcelos Neto CF, Belarmino Alves CA, Pessoa Félix L, Florentino ATN, Alves RR da N, de Andrade LA, de Lucena RFP. 2013. Structure and floristics of home gardens in an altitudinal marsh in Northeastern Brazil. Ethnobot. Res. Appl. 11:29–48.

Pasquini M, Sánchez-Ospina C, Mendoza J. 2014. Distribución del conocimiento y usos por generación y género de plantas comestibles en tres comunidades afrodescendientes en Bolívar, Colombia. Rev. Luna Azul. 38:58–85.

Pérez-Arbeláez E. 1996. Plantas útiles de Colombia. Quinta edición. Bogotá: Fondo FEN Colombia.

Peroni N, Hanazaki N. 2002. Current and lost diversity of cultivated varieties, especially cassava, under swidden cultivation systems in the Brazilian Atlantic Forest. Agric. Ecosyst. Environ. 92:171–183. doi:10.1016/S0167-8809(01)00298-5.

Perrault-Archambault M, Coomes O. 2008. Distribution of agrobiodiversity in home gardens along the Corrientes River, Peruvian Amazon. Econ. Bot. 62:109–126.

Peyre A, Guidal A, Wiersum KF, Bongers F. 2006. Dynamics of homegarden structure and function in Kerala, India. Agrofor. Syst. 66(2):101–115. doi:10.1007/s10457-005-2919-x.

Poot-Pool WS, van der Wal H, Flores-Guido S, Pat-Fernández JM, Esparza-Olguín L. 2015. Home garden agrobiodiversity differentiates along a rural-peri-urban gradient in Campeche, México. Econ. Bot. 69(3):203–217. doi:10.1007/s 12231-015-9313-z.

Prieto E. 2016. Las transformaciones del vínculo comunitario a través del proceso de retorno. El caso de Vallecito, Sur de Bolívar. [Tesis]. [Bogotá]: Pontificia Universidad Javeriana.

Pulido MT, Pagaza-Calderón EM, Martínez-Ballesté A, Maldonado-Almanza B, Saynes A, Pacheco RM. 2008. Home gardens as an alternative for sustainability: challenges and perspectives in Latin America. In: Albuquerque UP, Alves-Ramos M, editors. Current topics in ethnobotany research. Kerala, India: Research Signpost. p. 55–79.

Quiroz C, Gutiérrez M, Rodríguez D, Pérez D, Ynfante J, Gamez J, Pérez de Fernández T, Marques A, Pacheco W. 2002. Home gardens and *in situ* conservation of agrobiodiversity - Venezuelan component. In: Watson J, Eyzaguirre P, editors. Home gardens and in situ conservation of plant genetic resources in farming systems. Witzenhausen: International Plant Genetic Resources Institute. p. 73–82.

Sabogal CR. 2013. Análisis espacial de la correlación entre cultivo de palma de aceite y desplazamiento forzado en Colombia. Cuad. Econ. 32(61):683–718.

Thrupp LA. 2000. Linking agricultural biodiversity and food security: the valuable role of agrobiodiversity for sustainable agriculture. Int. Aff. 76(2):265–281. doi: 10.1111/1468-2346.00133

Trinh LN, Watson JW, Hue NN, De NN, Minh NV, Chu P, Sthapit BR, Eyzaguirre PB. 2003. Agrobiodiversity conservation and development in Vietnamese home gardens. Agric. Ecosyst. Environ. 97(1–3):317–344. doi:10.1016/S0167-8809(02)00228-1.

Wezel A, Bender S. 2003. Plant species diversity of homegardens of Cuba and its significance for household food supply. Agrofor. Syst. 1990:39–49.

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Appendix 1. List of food plants species found in the home gardens of San Pablo, Bolívar, Colombia.

Scientific name	Family	Management category	Food category	Varieties number*	Home gardens (frequency)
Anacardium occidentale L.	Anacardiaceae	Cultivated	Fruit and Seed	1	4 (0.2)
Mangifera indica L.	Anacardiaceae	Cultivated	Fruit	9	18 (0.9)
Spondias mombin L.	Anacardiaceae	Cultivated	Fruit	1	5 (0.25)
Annona glabra L.	Annonaceae	Cultivated	Fruit	1	2 (0.1)
Annona muricata L.	Annonaceae	Cultivated	Fruit	3	14 (0.7)
Annona purpurea Moc. & Sessé ex Dunal	Annonaceae	Cultivated	Fruit	1	1 (0.05)
Annona squamosa L.	Annonaceae	Cultivated	Fruit	1	5 (0.25)
Coriandrum sativum L.	Apiaceae	Cultivated	Spice	1	3 (0.15)

(*Continúa*)

Scientific name	Family	Management category	Food category	Varieties number*	Home gardens (frequency)
Daucus carota L.	Apiaceae	Cultivated	Root-tuber	1	1 (0.05)
Eryngium foetidum L.	Apiaceae	Cultivated	Spice	1	4 (0.2)
Pimpinella anisum L.	Apiaceae	Cultivated	Spice	1	1 (0.05)
Colocasia esculenta (L.) Schott	Araceae	Cultivated	Root-tuber	1	2 (0.1)
Xanthosoma sagittifolium (L.) Schott	Araceae	Cultivated	Root-tuber	4	7 (0.35)
Cocos nucifera L.	Arecaceae	Cultivated	Fruit	1	6 (0.3)
Acmella oppositifolia (Lam.) R.K.Jansen	Asteraceae	Cultivated	Spice	1	1 (0.05)
Bixa orellana L.	Bixaceae	Cultivated	Spice	1	1 (0.05)
Brassica oleracea L.	Brassicaceae	Cultivated	Vegetable	2(1)	3 (0.15)
Ananas comosus (L.) Merr.	Bromeliaceae	Cultivated	Fruit	4	6 (0.3)
Carica papaya L.	Caricaceae	Cultivated	Fruit	4	12 (0.6)
Ipomoea batatas (L.) Lam.	Convolvulaceae	Cultivated	Root-tuber	1	3 (0.15)
Citrullus lanatus (Thunb.) Matsum. & Nakai	Cucurbitaceae	Cultivated	Fruit	1(1)	3 (0.15)
Cucumis melo L.	Cucurbitaceae	Cultivated	Fruit	1(1)	2 (0.1)
Cucumis sativus L.	Cucurbitaceae	Cultivated	Vegetable	2(1)	2 (0.1)
Cucurbita maxima Duchesne	Cucurbitaceae	Cultivated	Vegetable	2	9 (0.45)
Cucurbita pepo L.	Cucurbitaceae	Cultivated	Vegetable	1	1 (0.05)
Dioscorea alata L.	Dioscoreaceae	Cultivated	Root-tuber	5	5 (0.25)
Dioscorea bulbifera L.	Dioscoreaceae	Cultivated	Root-tuber	1	1 (0.05)
Dioscorea cayennensis Lam.	Dioscoreaceae	Cultivated	Root-tuber	2(1)	3 (0.15)
Dioscorea trifida L.f.	Dioscoreaceae	Cultivated	Root-tuber	3	9 (0.45)
Manihot esculenta Crantz	Euphorbiaceae	Cultivated	Root-tuber	8	12 (0.6)
Cajanus cajan (L.) Millsp.	Fabaceae	Cultivated	Legume	1	3 (0.15)
Inga spectabilis (Vahl) Willd.	Fabaceae	Wild / Cultivated	Fruit	1	10 (0.5)
Inga thibaudiana DC.	Fabaceae	Wild	Fruit	1	1 (0.05)
Phaseolus vulgaris L.	Fabaceae	Cultivated	Legume	5(1)	5 (0.25)
Tamarindus indica L.	Fabaceae	Cultivated	Fruit	1	3 (0.15)
Vigna unguiculata (L.) Walp.	Fabaceae	Cultivated	Legume	1	1 (0.05)
Mentha x piperita L.	Lamiaceae	Cultivated	Spice	1(1)	1 (0.05)
Ocimum americanum L.	Lamiaceae	Cultivated	Spice	1	1 (0.05)

(*Continúa*)

Scientific name	Family	Management category	Food category	Varieties number*	Home gardens (frequency)
Ocimum campechianum Mill.	Lamiaceae	Wild	Spice	1	1 (0.05)
Plectranthus amboinicus (Lour.) Spreng.	Lamiaceae	Cultivated	Spice	1	3 (0.15)
Persea americana Mill.	Lauraceae	Cultivated	Fruit	3(1)	13 (0.65)
Allium fistulosum L.	Liliaceae	Cultivated	Vegetable	3	3 (0.15)
Malpighia glabra L.	Malpighiaceae	Cultivated	Fruit	1	1 (0.05)
Hibiscus sabdariffa L.	Malvaceae	Cultivated	Infusion	1	1 (0.05)
Quararibea cordata (Bonpl.) Vischer	Malvaceae	Cultivated	Fruit	1	6 (0.3)
Theobroma cacao L.	Malvaceae	Cultivated	Seed	3(1)	9 (0.45)
Bellucia grossularioides (L.) Triana	Melastomataceae	Wild	Fruit	1	2 (0.1)
Clidemia rubra (Aubl.) Mart.	Melastomataceae	Wild	Fruit	1	1 (0.05)
Artocarpus altiis (Parkinson ex F.A.Zorn) Fosberg	Moraceae	Cultivated	Seed	1	4 (0.2)
Muntingia calabura L.	Muntingiaceae	Wild	Fruit	1	2 (0.1)
Musa acuminata Colla	Musaceae	Cultivated	Fruit	3	2 (0.1)
Musa x paradisiaca L.	Musaceae	Cultivated	Fruit	14	18 (0.9)
Psidium friedrichsthalianum (O.Berg) Nied.	Myrtaceae	Cultivated	Fruit	1	1 (0.05)
Psidium guajava L.	Myrtaceae	Cultivated	Fruit	7	15 (0.75)
Psidium guineense Sw.	Myrtaceae	Cultivated	Fruit	1	7 (0.35)
Syzygium malaccense (L.) Merr. & L.M.Perry	Myrtaceae	Cultivated	Fruit	1	3 (0.15)
Passiflora edulis f. *flavicarpa* O. Deg.	Passifloraceae	Cultivated	Fruit	1	2 (0.1)
Passiflora quadrangularis L.	Passifloraceae	Cultivated	Fruit	1	1 (0.05)
Oryza sativa L.	Poaceae	Cultivated	Cereal	3	3 (0.15)
Saccharum officinarum L.	Poaceae	Cultivated	Sugar	1	2 (0.1)
Zea mays L.	Poaceae	Cultivated	Cereal	3	10 (0.5)
Alibertia patinoi (Cuatrec.) Delprete & C.H.Perss.	Rubiaceae	Cultivated	Fruit	1	1 (0.05)
Coffea arabica L.	Rubiaceae	Cultivated	Seed	4	4 (0.2)
Citrus × aurantium L.	Rutaceae	Cultivated	Fruit	3	15 (0.75)

(*Continúa*)

Scientific name	Family	Man-agement category	Food category	Varieties number*	Home gardens (frequency)
Citrus limon (L.) Osbeck	Rutaceae	Cultivated	Fruit	5	11 (0.55)
Citrus maxima (Burm.) Merr.	Rutaceae	Cultivated	Fruit	2	3 (0.15)
Citrus reticulata Blanco	Rutaceae	Cultivated	Fruit	1	8 (0.4)
Melicoccus bijugatus Jacq.	Sapindaceae	Cultivated	Fruit	1	4 (0.2)
Capsicum annuum L.	Solanaceae	Cultivated	Spice	3(1)	6 (0.3)
Capsicum pubescens Ruiz & Pav.	Solanaceae	Cultivated	Spice	1	2 (0.1)
Capsicum rhomboideum (Dunal) Kuntze	Solanaceae	Cultivated	Spice	1	2 (0.1)
Lycopersicon esculentum Mill.	Solanaceae	Cultivated	Vegetable	4(1)	8 (0.4)
Solanum melongena L.	Solanaceae	Cultivated	Vegetable	2(1)	3 (0.15)
Solanum quitoense Lam.	Solanaceae	Cultivated	Fruit	1	1 (0.05)
Zingiber officinale Roscoe	Zingiberaceae	Cultivated	Spice	1	1 (0.05)

* In brackets number of varieties supplied by humanitarian or alimentary programs.

Appendix 2. Spearman's rank correlation coefficient between species richness and socioeconomic traits of the families and physical aspects of the home gardens surveyed in San Pablo, Bolívar, Colombia.

Variable	r_s	*p value*
Home garden area	0.150	0.53
Home garden distance to the urban center	0.356	0.12
Home garden age	-0.169	0.48
Owner's age	0.461	0.04**
Owner's schooling	-0.337	0.15
Household members	-0.487	0.03**