



Research article

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## Characteristics of private gardens in the older and newer neighborhoods in the city of Taibe, Israel

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### A B S T R A C T

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Private gardens fulfill ecological, sociological, cultural, health and engineering advantages. Garden design in terms of structure, inventory, and treatment interface was studied in an Arab city – Taibe – in Israel. Two neighborhoods in the city, which differed in time of establishment, were selected: An older residential area constructed more than 70 years ago, and a newer one built 10 years ago. In each neighborhood, 15 private gardens were randomly chosen. In total, the study was conducted in 30 gardens. A survey was conducted in all the gardens to determine an inventory of their components and questionnaires were distributed to the owners of the gardens. These questionnaires referred to how the garden is cared for, the person who carries out the gardening chores, and the social functions of the garden. The survey showed that in both neighborhoods most of the gardens included a paved area, which was allocated for hosting, parking, and clotheslines. Also, the majority of the gardens contained an un-paved area used for growing fruits, ornamental trees and shrubs, flowers and herbs. The gardens of the newer neighborhood offered a richer inventory of components and vegetation species than those of the older one. Additionally, the former offered more modern facilities for the family entertainment and hospitality. Parents were the main source of knowledge for practicing gardening in both neighborhoods. However, in the latter, more residents noted that television, friends, and the internet were sources of gardening information as well.

### 1. Introduction

Private gardens serve as open spaces surrounding residential dwellings, in which householders have sole responsibility for management. Similar to urban parks' functions, private gardens present ecological, sociological, cultural, economic, health and engineering advantages. Moreover, many gardens express overlap and dependence between the various beneficial elements, resulting in a synergy of advantages making the gardens even more useful (Galhena et al., 2013).

Gardens provide a variety of ecological niches that support species conservation and increase species richness in the city (Cannon et al., 2005; Ladon-Lane, 2011; Li et al., 2006; Trinh et al., 2003). Their vegetation reduces the urban heat island effect, directly by shading on heat-absorbing surfaces and indirectly by evapotranspiration, and absorbing pollutants and greenhouse gases (Kotzen, 2003). In addition, vegetation enhances rainfall infiltration and thereby reduces runoff generation and flooding (Calvo-Cases et al., 2003). This results in lesser loads on the municipal drainage system.

Gardens are experienced as a private retreat; a haven from the public world; a setting for creativity; a social place for sharing; a connection to heritage values; a reflection of one's identity; a status symbol; and as a natural world rendered more comprehensible values (Bhatti and Church, 2001). Gardens increase chances of leisure activities (Rojek, 1995) and strengthen the sense of mental well-being (Coolen and Meesters, 2012). Owning a verdant garden seems to be more important than visiting urban open green spaces (Stigsdotter and Grahn, 2004). In developing countries, gardens are commonly used also for agriculture, increase nutritional security by providing a variety of food sources and improve economic welfare (Calvet-Mir, 2012; Galhena et al., 2012).

Gardens vary in geographical neighborhoods, and their functions and structure can be explained by complex relations between factors such as leisure activities, time availability, age, income, gender, cultural and national identity (Bhatti and Church, 2001), all originating from the local tradition, and by agro-climatic factors (Zemedede and Ayele, 1995). The functions and meanings of gardens also reflect differences in cultural and national identities.

In the Jewish society of Israel, until the mid-1970s, most of the private houses were owned by members of Kibbutzim and Moshavim (smallholder's rural settlements), as well as by a small group from the upper class in luxury neighborhoods in cities or suburbs. In the late 1980s, there was an increase in the construction of private houses in city suburbs and peripheral localities because of the improved economic condition of the middle class. These houses include private yards (hereafter gardens) which are undoubtedly a central component of the house, both as a status symbol and as a place for socialization (recreation, relaxation, and hospitality). Most gardens include a lawn, 2–3 trees of Mediterranean affinity especially olive, vine, oak, pomegranate, cypress, palm, Ficus and citrus, irrigation drippers, garden furniture systems, pergola, decorations such as clay pottery and statues. The front and back yards are usually connected to each other by a concrete path (Almog, 2008).

In the Arab localities in Israel, small part of the land is used for public gardens while greater part of the land is allocated for residential purposes. Most of the houses are of one or two floors and rarely exceed four floors. The houses have an adjacent garden. Part of the garden is paved with asphalt or concrete that allows parking, and the other is allocated for growing plants, mainly spices and vegetables, and for planting trees (Almog et al., 2008; Hornstein and Almog, 2010). In such localities, an expansion of neighborhoods from the center to the periphery is found. This is explained by an improvement in the economic condition of the Arab sector, which encourages young and old

families to build modern houses on the outskirts of the village (Hornstein and Almog, 2010). Given the different house styles between the neighborhoods in the center and those in the margins mentioned above, we wanted to investigate whether the characteristics of the gardens differ as well.

We asked whether gardens in the newer neighborhood of Taibe, an Arab city in Israel, have different design characteristics compared to those in the older neighborhood. Also, we asked if there are differences in use and perception of the garden between these two neighborhoods. The objectives of the study were (1) to characterize the garden design in terms of structure and inventory of the newer neighborhood and the older neighborhood in the city of Taibe; (2) to study the gardening–treatment interface and the social role of the gardens in the above neighborhoods. It was hypothesized that the different construction styles of the older and newer neighborhoods would be expressed in different gardens' characteristics also.

## 2. Materials and methods

### 2.1 Study area

The city of Taibe is located on a hilly area of 100–150 m above sea level in the central district of Israel (N 326262 E350089) (Figure 1). The average annual precipitation is 550 mm, which fall from November to April. The coldest month is January with an average temperature of 14°C and the hottest month is August with an average temperature of 32°C (Israel Meteorological Service, 2018). The population of the city is 42,400 inhabitants and the city's jurisdiction area is 18.7 km<sup>2</sup>. About 20% of the area is allocated to residential purposes, 10% to industry, commerce and services, and 70% to plantations, field crops, and other open areas (Israel Central Bureau of Statistics, 2017). The residential area is mainly composed of houses of one or two floors. The houses and gardens are privately owned by the residents. Taibe was formerly a village but with the increase in its population the village was declared a city in 1990.

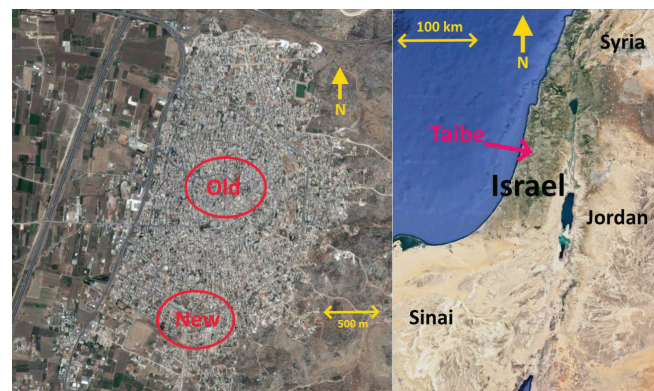


Figure 1: Map of the study site

### 2.2 Selection and survey of gardens

Two neighborhoods in the city, which differed in time of establishment were selected: an older neighborhood (hereafter ON) built over 70 years ago, and a newer neighborhood

(hereafter NN) built 10 years ago (Figure 1). In each city neighborhood, 15 gardens were randomly chosen. Pictures of several gardens are shown in Figure 2.



**Figure 2:** Pictures of gardens in the older (a) and newer (b) neighborhoods (29.11.2017)

A survey in all selected gardens was conducted to determine an inventory of their components. The inventory included ornamental and fruit trees, herbs, pots, paved area, soil, special garden decorations, stationary barbeque installations, furniture, lighting, and watering systems. Then the number of gardens that included each component was counted. Only when a garden included a paved area greater than 25 m<sup>2</sup> and more than 25 pots, the components "paved area" and "pots" were considered for the counting. The component "soil" described soil, which was partially covered by trees and/or herbaceous vegetation. The number of gardens of each component was subjected to Fisher's exact test (Fisher, 1955) at the  $p < 0.05$  level of significance, to determine significant differences between the older and the newer neighborhoods. The survey also addressed the plant species growing in the gardens.

### 2.3 Questionnaires

Questionnaires were distributed to the owners of the 30 private gardens. In these questionnaires, they were asked to answer questions regarding the treatment given to the garden, the person who carries out the gardening, and the functions of the garden for the family.

### 3. Results

The study gardens of both neighborhoods included paved area that ranged from 20 to 30 m<sup>2</sup> and a non-paved area that ranged from 100 to 300 m<sup>2</sup> and from 150 to 250 m<sup>2</sup> in the ON and NN, respectively. The inventory components of the gardens in the ON and in the NN are summarized in table 1. It can be seen that the number of gardens having garden lighting system, drippers, outdoor furniture, barbeque grill and children playing facilities was significantly higher in NN than in ON. Lawn and garden decoration are also predominant in NN. In both neighborhoods, the number of gardens with paved area, automatic irrigation system, pots, herbs, fruit, and ornamental trees were similar. The number of gardens irrigate by pipes was significantly higher in ON.

**Table 1:** The number of gardens for each inventory component in the older and newer neighborhoods. N=15 for each neighborhood

Components	No. of gardens		P-value
	Old	New	
Lawn	3	8	0.0536
Paved area	10	12	0.2334
Soil	6	7	0.2689
Irrigation			
Water pipe*	13	7	0.0225
Automatic system	2	2	0.4023
Drippers*	0	10	<0.0001
Herbs	10	10	0.3001
Fruit and ornamental trees	15	15	1
Pots	12	12	0.3487
Garden decoration	3	8	0.0536
Garden lighting system*	2	15	<0.0001
Outdoor furniture*	2	15	<0.0001
Barbecue (stationary*)	3	14	<0.0001
Vegetables	2	4	0.2414
Children playing facilities*	1	14	<0.0001

\* The difference between neighborhoods is significant if p-value < 0.05

Table 2 presents the plant species in the gardens of both city neighborhoods. The herbs and vegetables species were similar in both neighborhoods. 16 similar species of ornamental and shrub trees were observed in both neighborhoods. In NN, 11 more species were observed, so that in total there were 27 and 16 species in NN and ON, respectively. The ON was dominated by Lemon (25 trees in 13 gardens) and Olive (11 trees in 5 gardens) while the NN was dominated by Arecaceae (Palms) and Cypress (53 and 32 trees in 8 and 11 gardens, respectively).

**Table 2:** Vegetation species in the gardens of the older and newer neighborhoods

Old neighborhood	New neighborhood
<p><b>Fruit tree</b></p> <p>Palm (<i>Phoenix dactylifera</i>), Lemon (<i>Citrus limon</i> (L.) Osbeck), Pomegranate (<i>Punica granatum</i>), Loquat (<i>Eriobotrya japonica</i>), Guava (<i>Psidium</i>), Grape (<i>Vitis vinifera</i>), Fig (<i>Ficus carica</i>), Clementine (<i>Citrus x aurantium</i>), Banana (<i>Musa</i>), Cumquat (<i>Citrus japonica</i>), Almond (<i>Prunus dulcis</i>), Olive (<i>Olea europaea</i>), Pomelo (<i>Citrus maxima</i>), Orange (<i>Citrus sinensis</i> (L.) Osbeck), Avocado (<i>Persea Americana</i>), Peach (<i>Prunus persica</i>). In total 16 trees.</p> <p><b>Ornamental Trees and Shrubs</b></p> <p>Bougainvillea (<i>Bougainvillea glabra</i>) Jasmine (<i>Jasminum</i>), Myrtle (<i>Myrtus Communis</i>), Cypress (<i>Cupressus</i>), Arecales.</p> <p><b>Common trees</b></p> <p>Lemon (25 trees in 13 gardens), Olive (11 trees in 5 gardens).</p> <p><b>Herbs</b></p> <p>Esob (<i>Origanum syriacum</i>), Basil (<i>Ocimum basilicum</i>), Oregano (<i>Origanum vulgare</i>), Spearmint (<i>Mentha spicata</i>), Sage (<i>Salvia officinalis</i>), Parsley (<i>Petroselinum crispum</i>), Lemon grass (<i>Cymbopogon schoenanthus</i>), Rosemary (<i>Rosmarinus officinalis</i>), Hot pepper (<i>Capsicum</i>), Rose Geranium (<i>Pelargonium graveolens</i>).</p> <p><b>Common herb</b></p> <p>Spearmint (<i>Mentha spicata</i>).</p> <p><b>Vegetables</b></p> <p>Tomatoes, zucchini, eggplant, pumpkin, cabbage.</p>	<p>In addition to the tree species of the old area the new area also contained: Quince (<i>Cydonia oblonga</i>), Plum (<i>Prunus subg. Prunus</i>), Carambola (<i>Averrhoa carambola</i>), Lychee (<i>Litchi chinensis</i>), Persimmon (<i>Diospyros kaki</i>), Sugar apple (<i>Annona squamosa</i>), Apricot (<i>Prunus armeniaca</i>), Mango (<i>Mangifera indica</i>), Feijoa (<i>Feijoa sellowiana</i>), Mandarine (<i>Citrus reticulata</i>), Surinam cherry (<i>Eugenia uniflora</i>). In total 27 trees.</p> <p>Bougainvillea (<i>Bougainvillea glabra</i>) Jasmine (<i>Jasminum</i>), Myrtle (<i>Myrtus Communis</i>), Cypress (<i>Cupressus</i>), Arecales.</p> <p>Arecales (53 trees in 9 gardens), Cypress (29 trees in 11 gardens).</p> <p>White micromeria (<i>Micromeria fruticosa Barbata</i>), Ezob (<i>Origanum syriacum</i>), Peppermint (<i>Mentha piperita</i>), Spearmint (<i>Mentha spicata</i>), Sage (<i>Salvia officinalis</i>), Parsley (<i>Petroselinum crispum</i>), Lemon grass (<i>Cymbopogon schoenanthus</i>), Rosemary (<i>Rosmarinus officinalis</i>), Hot pepper (<i>Capsicum</i>), Rose Geranium (<i>Pelargonium graveolens</i>).</p> <p>Spearmint (<i>Mentha spicata</i>).</p> <p>Tomatoes, zucchini, eggplant, pumpkin, cabbage.</p>

Table 3 presents the results of the questionnaire on the nature of garden care and its social uses, and the homeowners' answers to these questions in both city neighborhoods. It can be seen that in ON, 40% of the gardens underwent major rehabilitation works over the past ten years. Gardening was done by father (40%), mother (20%), and all the family (33.3%). Herbaceous vegetation replacement was carried out once or twice a year in about half of the gardens (53.3%). Most respondents noted that they spend time in the garden at least 3–4 times a week (73.3%) and that the garden serves as a place for family gathering (86.7%). Low percentage of the respondents (20%) noted that the garden also serves for rest and relaxation, and for hospitality.

Compared to the gardens of the ON, the gardens of the NN underwent less rehabilitation works (20%), gardening was done by employed gardener (26.7%), father (33.3%), mother (33.3%),

and all the family (6.7%). Less respondents claimed that they spend time in the garden at least 3–4 times a week (60%). Most of respondents noted that garden was used for gathering with family and for rest, relaxation, hospitality, and barbeque. 'Parents' were the main source of knowledge for practicing gardening in the ON and NN (93.3 and 86.7%, respectively). In addition, in both neighborhoods, friends and internet served as sources for such knowledge in the ON and the NN (13.3 and 40%, 6.7 and 20%, respectively). Only in the NN was television also considered a source (13.3%).

In both neighborhoods the major treatments given to the garden included tree pruning, planting, soil hoeing and weeding. In most of the gardens fertilizers were not used nor pesticides, and the herbaceous vegetation was replaced once or twice a year.

**Table 3:** Questions and number of respondents regarding gardening activities and garden functions

1. Who is the main person responsible for handling the garden?

	<b>Father</b>	<b>Mother</b>	<b>Grandfather</b>	<b>Grandmother</b>	<b>All family</b>	<b>Gardner</b>	<b>Children</b>
Old	6	3	0	1	5	0	0
New	5	5	0	0	1	4	0

2. What types of treatments are given to the garden? (\*)

	<b>Pruning trees</b>	<b>Soil hoeing</b>	<b>Adding organic fertilizer</b>	<b>Adding chemical fertilizer</b>	<b>Pesticides usage</b>	<b>Planting</b>	<b>Weeding</b>
Old	9	6	2	2	5	10	10
New	11	4	4	4	5	10	12

3. Where there any major rehabilitation works done in the garden (such as soil replacement, replacement of all vegetation) over the past 10 years?

	<b>Yes</b>	<b>No</b>
Old	6	9
New	3	12

4. How often do you spend your time in the garden?

	<b>More than once a day</b>	<b>Once a day</b>	<b>3-4 times a week</b>	<b>Once a week</b>	<b>Less than once a week</b>
Old	3	2	6	0	4
New	4	2	3	3	3

5. What is the main use of the garden? (\*)

	<b>Gathering with family</b>	<b>Barbecue</b>	<b>Rest and relaxation</b>	<b>Hospitality</b>
Old	13	0	3	3
New	13	7	10	9

6. What kind of pesticides do you use? (\*)

	<b>Chemical pesticides</b>	<b>Biological pesticide</b>	<b>Pesticides are not in usage</b>
Old	2	3	10
New	4	1	10

7. How often do you replace/change the herbaceous vegetation?

	<b>Once a year</b>	<b>Twice a year</b>	<b>Once in a few years</b>
Old	4	4	7
New	5	4	6

8. What is your source of knowledge about gardening? (\*)

	<b>Parents</b>	<b>Grandparents</b>	<b>Friends</b>	<b>Television</b>	<b>Internet</b>	<b>Magazines</b>
Old	14	1	2	0	1	0
New	13	4	6	2	3	0

(\*) You can mark more than one answer

## 4. Discussion

### 4.1 Garden design characteristics

The gardens of the older and newer neighborhoods were characterized by having both paved and non-paved areas (Figure 2). The former was allocated for hosting, parking, and clotheslines whereas the latter was used for growing fruits, ornamental trees and shrubs, flowers and herbs. However, unlike the older neighborhood, but rather more like the gardens of the Jewish society of Israel, in the newer neighborhood the paved area structure consisted of two sections – one in front of the house and the other in the back, both connected to each other by a path. This is in agreement with a previous description of the general structure of a traditional private garden in Arab localities in Israel (Almog, 2008; Hornstein and Almog, 2010).

The older neighborhood expressed lower percentage of garden components and accessories (such as lawn outdoor furniture and garden lighting system) whereas the newer one showed that more than a half of the gardens included such components and accessories. This can be explained by a difference in the incomes of the residents between the older and the newer neighborhoods that affect the residential purchasing ability; the older neighborhood had lower incomes and purchasing capacity with respect to those of the newer one (Madigan and Munro, 1996), thus the richer inventory in the latter neighborhood.

Adding any component to the garden can affect the entry of other components into the garden system. A garden having a lawn allows construction of barbecues (Almog et al., 2010) and children's playing facilities, which encourages the introduction of garden furniture and the installation of a garden lighting system that increase the sense of personal security. In addition, a more advanced irrigation system optimizes and simplifies the care of the garden.

When all these components exist in the garden, the garden functions for cooking and leisure, and strengthens the social relationships of the family. The fact that the garden includes components that once existed mainly in the inner rooms of the house reinforces the social functions of the garden as an outdoor room (Williams, 1995). Therefore, the current study suggests defining lawn as a 'garden motivating component' – a component that triggers both social and physical processes in the garden system.

The number of fruit trees species in the newer neighborhood was 1.7 times greater than that of the city core, meaning that the newer neighborhood offers not only a richer inventory of components (Table 1), but also a higher richness of fruit trees (Table 2). Accordingly, the newer gardens offered more modern facilities for family entertainment and hospitality. Both the

rich inventory and modern facilities express a silent statement about belonging to a high socioeconomic group (Madigan and Munro, 1996). The economic factor affects not only the wealth of the gardens, but also their geographical location. Hornstein and Almog (2010) explained the expansion of construction from the center (older neighborhood) to the periphery (newer neighborhood) of the village by an improvement in the economic condition of the Arab sector. Young and old families who wanted to improve their housing conditions and standard of living chose to build modern houses on the outskirts of the village.

The large number of *Arecaceae* and *Cypress* trees in the new neighborhoods probably indicates a desire of the gardens' owners to reach a so-called developed garden in a short time. The rapid growth of these trees and their special shape (a very picturesque tree that can be sculpted) allow a young garden to appear green and developed within a few years. A trend of rejuvenation of the *Arecaceae* is common also in the gardens of the Jewish society in Israel (Sh. Pariente, personal communication). The fact that the new gardens contained non-traditional tropical fruit trees (such as Lychee [*Litchi chinensis*], Persimmon [*Diospyros kaki*] and Sugar apple [*Annona Squamosa*]) possibly marks an entry of innovation into the Arab society as well as improved economic capabilities. The introduction of such trees to the garden also indicates a social adjustment to a new garden fashion, which also exists in the gardens of the Jewish society (Sh. Pariente, personal communication). Growing fruit trees for self-consumption is a long-standing tradition in Arab society. The introduction of tropical fruit trees into the gardens can be also interpreted as a continuation of this tradition. These trees replace other traditional trees like figs and olives, which are still common in the plantations at the outskirts of the city's residential area.

Alongside the differences in the garden inventory between the neighborhoods, they also express similarities. The vegetation of both areas is well maintained in terms of clipped trees and shrubs, plenty of green spices and flowers. In both neighborhoods, pots were used for demarcating different areas in the garden and for planting all types of vegetation as well. The pots varied in their raw material (such as dry pumpkin, terracotta, glass), shape and size.

The low number of gardens with vegetables in the study neighborhoods might be a result of the changes in employment characteristics of urban population versus a rural one. The city of Taibe was developed from a village that, like other villages in the Middle East, was primarily agricultural in the past. Over the years, agriculture has declined, while trade and services

have thrived due to changes and improvements in agricultural technology and crop types, and due to economic and political developments in Israel (Brawer, 1975, 1993).

#### **4.2 Footprints of a traditional Islamic garden**

The vegetation inventory of the older and newer neighborhoods includes green ornamental trees, green and colorful fruit trees, green and fragrant spices (such as Spearmint), fragrant flowers (such as Jasmin) of various colors. These garden characteristics are consistent with some design principles of traditional Islamic gardens, which are based mainly on old tradition and on the Koran. Such principles were described by Latiff and Yunus (2016) that marked the garden's architectural principles of Islam; light and refreshing climate, pleasant odors, green colors, trees, flowers, and sounds of running water.

#### **4.3 Social function of the garden**

Compared to the older neighborhood, the gardens of the newer neighborhood underwent less rehabilitation work over the past ten years. This corresponds to the fact that these gardens were established a few years ago. The employment of a gardener attests the above improvement in the socioeconomic status of the population in the new neighborhood (Jacob and Alles, 1987).

Analysis of the questionnaires indicates social similarities between the garden's owners of the two neighborhoods. The owners pointed on similar gardening activities; tree pruning, planting and weeding, and the majority did not use fertilizers nor pesticides. These activities probably express deep emotions for the traditional world of the past. Also, the high rate of herbaceous vegetation replacement indicates a strong commitment of the owners to the aesthetic appearance of the garden and to its sustainability, since the Mediterranean climate conditions prevailing in the city of Taibe require frequent maintenance activities.

The fact that parents were the main source of knowledge for practicing gardening in both neighborhoods shows a long-standing tradition of passing on knowledge from parents to their children. However, in the newer neighborhood more residents used other sources (television, friends, and internet) for gardening information with respect to the older one. This means, that there is greater willingness to use new information tools in the new area. It can be attributed to a younger population and a higher socioeconomic status of the newer neighborhoods with respect to those in the city's core. There are no socioeconomic data on the various neighborhoods of Taibe but only general data for the entire city. Therefore, it was not possible to correlate the research findings with such data.

The present study is based on a survey of only 30 gardens. We are aware of the small amount of data by which the conclusions have been drawn. Yet, the data can indicate social processes that affect the design and use of the garden in the Arab society of Israel. Further research should be conducted that may provide important and distinct insights into contemporary human-nature relations.

### **5. Summary**

The cotemporary gardens in both neighborhoods meet social, traditional, and ecological needs. While the two neighborhoods have many similarities, there are also some strong contrasts. Among the differences, two stand out as quite dominant. First, residents of the younger neighborhood utilize different tree species (palms and cypress) than do homeowners in the older neighborhood (who use lemon and olive most prominently). Second, residents of the younger neighborhood have a greater variety of outdoor accessories, including children's play items, stationary barbeques, outdoor furniture, and outdoor lighting, and use modern irrigation methods.

In both neighborhoods traditional gardening activities still exist indicating deep emotions for the traditional world of the past. All gardens are well maintained although with differences in style and facilities. This suggests their great importance to the owners whether for social and family reasons, and or either for traditional ones. In light of the fact that most of the city's built-up area of Taibe is allocated for residential purposes and only a small part is used for public gardens, the private gardens in the Arab localities in Israel have great ecological and social importance.

The current study suggests that a lawn functions as a "garden motivating component" – a component that triggers both social and physical processes in the garden's system.

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