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Araştırma Makalesi / Research Article

Determination of Seed Plants in Gardens of Some Middle Schools in Giresun

Seda YEŞİLYURT[1], Bahadır KOZ[2*]

Abstract

This study aims to determine the seed plants in the gardens of some public and private secondary schools in Giresun and to determine the green area amount of the school gardens in Turkey and in the world. In this context, observation studies were carried out in 9 secondary schools in the centrum of Giresun and 4 secondary schools in Piraziz district, which were determined by random sampling. The data were obtained by using qualitative collection techniques. The method of the study is field studies, literature review and observation. In conclusion; As a result of the study carried out in the selected schools, it shows that the green space for per student in the schools is insufficient, the Ministry of National Education does not carry out a special landscape work in the schools, and the afforestation works are carried out by the school administrations with limited facilities. It has also been found that plant species in school gardens are unconsciously selected, with some being poisonous and allergenic. By the findings obtained in the study, it is recommended that school gardens should be planned large and green, schools should be built away from heavy traffic areas, and school garden boundaries should be equipped with at least two rows of trees. In the process of designing these areas, specialists should be worked with also the expectations of students and stakeholders should be taken into account.

Keywords: Middle school, School gardens, Plant diversity, Green space.

Giresun'daki Bazı Ortaokulların Bahçelerinde Bulunan Tohumlu Bitkilerin Belirlenmesi

Öz

Bu çalışma; Giresun'da bulunan bazı devlet okulları ve özel okullarda, ortaokul kademelerinin bahçelerindeki tohumlu bitkilerin tespitini ve bahçe alanlarındaki yeşil alan miktarlarının belirlenerek, Türkiye ve dünyadaki durumunu tespit etmeyi amaçlamaktadır. Bu bağlamda tesadüfi örnekleme yoluyla saptanan, Giresun merkezde 9 ve Piraziz ilçesinde 4 ortaokulda gözlem çalışması gerçekleştirilmiştir. Veriler nitel toplama teknikleri kullanılarak elde edilmiştir. Çalışmanın yöntemi; saha çalışmaları, literatür taraması ve gözlemdir. Okullarda yapılan çalışmalar neticesinde öğrenci başına düşen yeşil alanın yetersiz olduğu, Milli Eğitim Bakanlığı'nın okullarda özel bir peyzaj çalışması yapmadığı, bunun dışında ağaçlandırma ve bakım çalışmalarının sınırlı imkanlarla okul idarecileri tarafından yapıldığı görülmektedir. Ayrıca okul bahçelerindeki bitki türlerinin bilinçsizce seçildiği, bazılarının zehirli ve alerjen etkiye sahip olduğu tespit edilmiştir. Çalışmada elde edilen bulgular doğrultusunda, okul bahçelerinin geniş ve yeşil planlanması, okulların yoğun trafik alanlarından uzağa inşa edilmesi ve okul bahçe sınırlarının en az iki sıra her dem ağaçlarla donatılması önerilmektedir. Bu alanların tasarlanması sürecinde uzmanlarla çalışılmalı, öğrenci ve paydaşların beklentileri dikkate alınmalıdır.

Anahtar Kelimeler: Ortaokul, Okul bahçeleri, Bitki çeşitliliği, Yeşil alan.

[1]Ministry of National Education/Piraziz Imam Hatip Secondary School Piraziz/Giresun, Türkiye, yesilyurtseda52@gmail.com
[2]Giresun University, Mat. and Science. Department of Education, Giresun, Türkiye, bahadir.koz@giresun.edu.tr

[*]Sorumlu Yazar/Corresponding Author
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1. Introduction

People need green spaces for healthy development and peaceful life. Every broken connection with nature causes physical and psychological effects (Zubari, 2019). In order to protect our future, it is essential to raise a psychologically and spiritually healthy human generation. In many developed countries, various projects have been initiated to provide more livable cities for children. By these projects, efforts are being made to develop and increase green spaces and playgrounds in the streets. In recent years, these studies in cities have also included schools; Planting and afforestation efforts in schools and school roads have accelerated. The "Boston School Gardens Initiative" started in 1995 in Boston, USA. In this initiative project educators, administrators, families, students and landscape architects worked in collaboration. This initiative has produced an exemplary school garden guide. According to this guide; it is aimed to ensure that the garden receives enough sun, to select safe materials against injuries in the garden and to use permeable surfaces, thus bringing children together with nature. Additionally, it is recommended that plants selected for the school garden be aesthetic, natural, and durable. Moreover, it is advised to create lawn areas and to use local plants in school gardens (Kutay, 2019).

In our country, it is becoming increasingly difficult for children in big cities to find green spaces. This situation is exacerbated by the decreasing number of green spaces, the difficulty of access for children, and the screen addiction to technological devices such as tablets, phones, and computers (Zubari, 2019). As a result, increasing emotional, biological and physiological problems are observed in children as they grow older (Aklıbasında et al., 2018). According to TUIK (2022) data, there are 18,735,111 children in the 0-14 age group in Turkey. In our country, where children constitute approximately 21.96% of the population, the safe areas allocated to children are decreasing day by day compared to developed countries, and the limited areas are separated from nature. However, every child has the right to live in a sustainable environment where they are safe and interact with nature (Tandogan, 2014).

Obesity, one of the diseases of the modern age, is defined by WHO (World Health Organization) as "excess fat accumulated in the body to the point of impairing health". Obesity has been associated with cardiovascular disorders, diabetes, muscle and bone system disorders, and some types of cancer (WHO, 2021). Obesity from childhood has become a problem that affects the whole society. Therefore, lifestyle changes that will increase physical activity in society, especially for children, should be implemented as soon as possible.

The best place and time to encourage children to engage in physical activity is schools, where they spend most of the day, and during break times. Approximately 28% of the time spent at school is made up of breaks. Children who move partially during the lesson want to relax and relieve the

fatigue of the lesson during breaks. When children are provided with sufficient space in school gardens, they have the opportunity to move freely after class. In this way, children come to the next lesson having released their excess energy and feeling motivated.

School gardens should be well planned and these areas should not be disconnected from nature. Studies show that noise and stress are lower in schools with properly designed green gardens (Ozdemir and Yilmaz, 2008). Schools are areas where personal development occurs as well as education and teaching. School gardens enhance the quality of the school and the quality of education (Basar, 2020).

Since childhood is the period when the foundations of identity are laid, it is necessary to introduce the child to nature at the earliest possible age. Thus, his personality is shaped together with the nature he lives in. Long-term studies show that children who have natural areas around them embrace their environment more and their interest in nature continues in the following years (Laaksoharju and Rappe, 2017).

No study has been found about Giresun school gardens and green areas in the garden, and this will be the first time such a study has been conducted. In addition, in this study, a different dimension that is not encountered in the literature on school gardens was examined and the plant species and plant diversity in school gardens were observed. By revealing the situation of school gardens in Giresun, the study will both provide data to the Ministry of Education and contribute to filling a gap in the literature.

2. Materials and Methods

2.1. Study area

The research was selected through simple random sampling from 13 different secondary schools in Giresun. While nine of the secondary schools subject to the research are located in Giresun center, four are located in Piraziz district. Eleven of these schools are public schools and two are private schools. In this study, the gardens of the schools were examined, observations were made and photographs were taken.

9 secondary schools located in Giresun center and 4 secondary schools located in Piraziz district of Giresun are shown on the study area map (Figure 1).

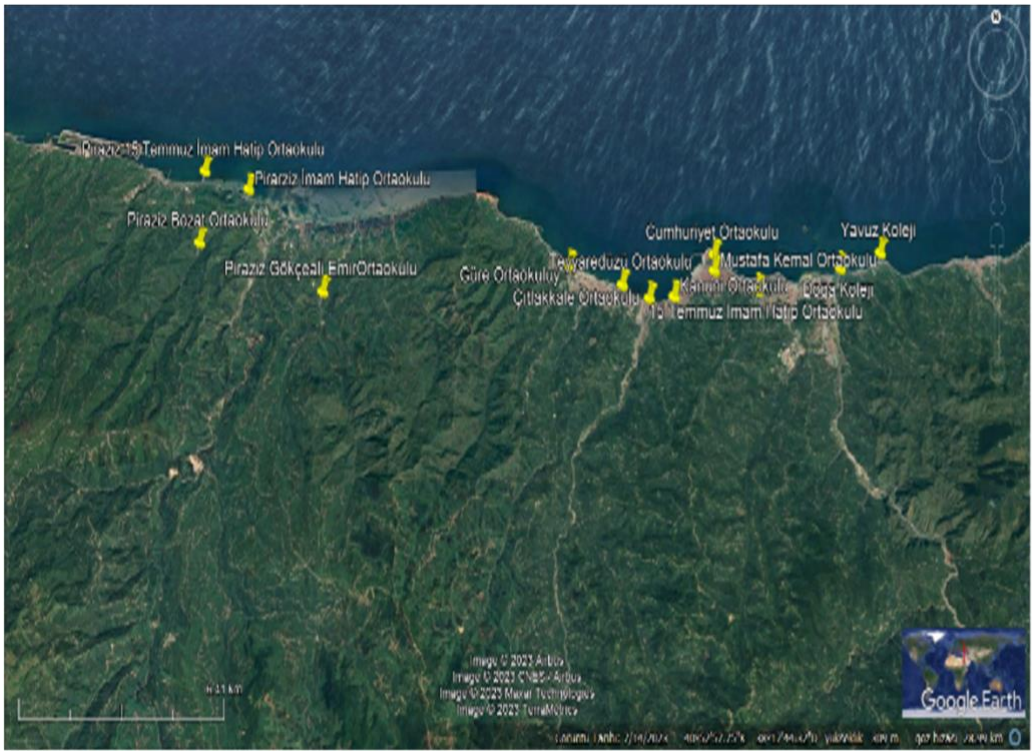

Figure 1. Study Area Map

Among the data obtained in the research, the total area of the schools (m^2), the garden area of the schools (m^2), the green garden area of the gardens (m^2) and the number of students were used. By dividing the garden areas of schools by the number of students, the amount of gardens per student was obtained. Likewise, by dividing the green areas in school gardens (m^2) by the number of students, the green area per student (m^2) was found. The data found were analysed and synthesised by comparing them with the standards of schools in Turkey and abroad.

The seed plants in the school garden were determined with the help of an expert. In determining the plant species, the book Plant Systematics written by Michael G. Simpson, "Herbaceous Plants Systematics" written by Faik Yaltırak and Asuman Efe; species identifications were made using sources such as the book "Seed Plants - Woody Taxa" written by Rahim Anşin and Zafer Cemal Özkan and "Outdoor Ornamental Plants and Their Uses in Landscape" written by Gürkan Ceylan.

3. Findings and Discussion

Table 1 shows the number of students (m^2), total area (m^2), garden area (m^2), green area of the school (m^2), garden area per student (m^2/person) and green area per student (m^2/person) of the schools where the study was conducted.

Of the 13 randomly selected schools in the study, 11 are public schools and 2 are private sector schools. 9 of these schools are located in the center and 4 of them are located in the district. According

to Table 1 the total number of students in the secondary schools where the study was conducted is 6211. The school with the highest number of students is Doğa College (1074), while the school with the lowest number of students is Doğa College (1074). Gökçeali Emir Yücel Secondary School (52). The total area of the 13 schools examined is 93497 m^2. The total area of 2 private secondary schools is 42250 m^2, and the total area of 11 public schools is 51247 m^2. The largest school area belongs to Doğa College with an area of 23500 m^2, and the smallest school area belongs to Piraziz Imam Hatip Secondary School (2040 m^2). The total garden area of the schools is 60973 m^2. While the school with the largest garden area is Giresun 15 July Martyrs Imam Hatip Secondary School (11760 m^2), the school with the smallest garden area is Piraziz Imam Hatip Secondary School (1515 m^2).

Table 1. Information from the schools studied.

Secondary schools	Number of students	Total area (m^2)	Garden area (m^2)	School green area (m^2)	Garden area per student (m^2/kişi)	Öğrenci başına düşen yeşil alan (m^2/kişi)
Gure Secondary School	292	3800	2950	600	10.1	2.05
Teyyareduzu Sehit Ufuk Bingol Secondary School	536	3350	2610	650	4.86	1.21
Cıtlakkale Secondary School	520	3394	2514	600	4.83	1.15
Kanuni Secondary School	442	2530	1995	150	4.51	0.34
Mustafa Kemal Secondary School	740	7850	6705	2800	9.06	3.78
Cumhuriyet Secondary School	930	3585	2485	100	2.67	0.11
Giresun 15 July Martyrs I.H.O.	456	12860	11760	3000	25.78	6.57
Doga College	1074	23500	8500	2500	7.91	2.32
Yavuz College	793	18750	11000	7000	13.87	8.82
Piraziz Imam Hatip Secondary School	64	2040	1515	200	23.67	3.13
Piraziz 15 July Martyrs Secondary School	246	6000	5300	460	21.54	1.87
Bozat Regional Boarding Secondary School	66	3000	1750	400	26.51	6.06
Gokceali Emir Yucel Secondary School	52	2838	1889	900	36.32	17.30

The total green area of the schools is 19360 m^2. The school with the largest green garden area is Yavuz College (7000 m^2), and the smallest is Cumhuriyet Secondary School (100 m^2). The average green area per student is 4.2 m^2. The largest of these areas belongs to Gökçeali Emir Yücel Secondary School (17.30 m^2), and the smallest belongs to Kanuni Secondary School (0.11 m^2). Average garden area for per student is 9.81 m^2. The smallest garden area per student is found at Cumhuriyet Ortaokulu (2.67 m^2), while the largest is found at Gökçeali Emir Yücel Ortaokulu (36.32 m^2).

The average garden area per student of schools in Giresun city center is 9.28 m^2, and the average

garden area per student of schools in Piraziz district is 27.01 m^2. The average garden area per student in public schools is 15.44 m^2 and the average garden area per student in private schools is 10.89 m^2. While the average green area per student of schools in Giresun city center is 2.92 m^2, the average green area per student of schools in Piraziz district is 6.4 m^2. The average green area per student in public schools is 3.96 m^2 and the average green area per student in private schools is 5.57 m^2 (Table 1.).

Güre Secondary School was established on an area of 3800 m^2. At Güre Secondary School; the garden area per student was found to be 10.1 m^2, and the green area per student was 2.05 m^2 (Table 1.). The plants detected in the school area: *Tilia cordota* (Linden Tree), *Syringa vulgaris* (Lilac), *Prunus domestica* (Plum tree), *Robinia pseudoacacia* (Acacia tree), *Acacia dealbata* (Silver acacia), *Pinus pinaster* (Seaside pine), *Acer pseudoplatanus* (Mountain maple), *Juniperus comminus* (Juniper tree), *Ulmaceae* (Elm tree), *Vitis vinifera* (Vine tree), *Ricinus communis* (Castor oil plant), *Albizia julibrissin* (Gulbrissin), *Rosa sp.* (Rose), *Gravillea robusta* (Gravilla plant), *Gazania rigens* (Sheep's eye flower), *Chamomillae romanae* (Daisy), *Rosa canina* (Bird's nose), *Lilium* (Lily plant).

Teyyaredüzü Şehit Ufuk Bingol Secondary School (ŞUBSS) was established on an area of 3350 m^2. In Teyyaredüzü ŞUBSS; the garden area per student was found to be 4.86 m^2, and the green area per student was 1.21 m^2 (Table 1.). The plants identified in the school are: *Platanus orientalis* (Plane tree), *Picea pungens* (Blue spruce), *Cupressus sempervirens* (Cypress tree), *Pinus pinaster* (Seaside pine), *Tilia cordota* (Linden tree), *Ulmaceae* (Elm tree), *Juniperus comminus* (Juniper tree) , *Picea orientalis* (Oriental spruce), *Alnus glutinosa* (Alder tree), *Morus alba* (White mulberry tree), *Prunus laurocerasus* (Black berry tree), *Molus domestica* (Apple tree), *Pyrus communis* (Pear tree), *Prunus avium* (Cherry tree), *Vitis vinifera* (Vine tree), *Lycopersium esculantum* (Tomato), *Solanum melongena* (Egg plant), *Ficus carica* (Fig), *Rosa sp.* (Rose), *Hedera helix* (Wall ivy), *Galega officinalis* (Goat rue).

The total area of Citlakkale Secondary School is 3394 m^2. The plant diversity detected is low. At Citlakkale Secondary School the garden area per student was found to be 4,83 m^2 and the green area per student was 1,15 m^2. The plants identified in the school are: *Cupressus sempervirens* (Cypress tree), *Acacia dealbata* (Silver acacia).

Kanuni Secondary School is established on an area of 2530 m^2. At Kanuni Secondary School; the garden area per student is 4,51 m^2 and the green area per student is 0,34 m^2. The plants identified in the school are: *Cedrus libani* (Lebanese cedar), *Pinus pinaster* (Seaside pine), *Pinus sylvestris* (Scots pine), *Juniperus comminus* (Juniper), *Ulmaceae* (Elm), *Hydrangea macrophylla* (Hydrangea), *Morus alba* (White mulberry tree), *Robinia pseudoacacia* (Acacia tree), *Junglans regia* L. (Walnut tree), *Rosa sp.* (Rose), *Nerium oleander* (Oleander), *Ficus carica* (Fig), *Hedera helix* (Wall ivy), *Ilex aquifolim* (holly), *Trachelospermum jasminoides* (Star jasmine), *Syringa vulvaris* (Lilac), *Wisterias*

sinensis (Purple wisteria), *Ligustrum vulgare* (Prive plant).

Mustafa Kemal Secondary School is built on an area of 7850 m^2. The plants identified in the school are: *Pinus pinaster* (Seaside pine), *Juniperus comminus* (Juniper tree), *Ulmaceae* (Elm), *Carpinus betulus* (Horbeam), *Pinus sylventris* (Scots pine), *Citrus reticulata* (Tangerine tree), *Citrus sinensis* (Orange tree), *Nerium oleander* (Oleander), *Hydrangea macrophylla* (Hydrangea), *Narcissus poeticus* (Narcissus), *Rosa sp*. (Rose).

Cumhuriyet Secondary School has an area of 3585 m^2. The garden area per student is 2.67 m^2 and the green area per student is 0.11 m^2 (Table 1.). The plants identified in the school are: *Morus alba* (White mulberry tree), *Wisteria Sinensis* (Purple Wisteria), *Chamaerops Excelsa* (Palm), *Tilia cordota* (Linden tree), *Syringa vulgaris* (Lilac).

15 July Martyrs Imam Hatip Secondary School has an area of 12860 m^2. The garden area per student is 25.78 m^2 and the green area per student is 6.57 m^2 (Table 1.). The plants identified in the school are: *Tilia cordota* (Linden tree), *Cedrus libani* (Lebanese cedar), *Ulmaceae* (Elm), *Pinus sylventris* (Scots pine), *Juniperus comminus* (Juniper tree), *Pinus pinaster* (Seaside pine), *Robinia pseudoacacia* (Acacia tree), *Eriobotrya japonica* (Maltese plum), *Prunus domestica* (Plum tree), *Molus domestica* (Apple tree), *Pyrus communis* (Pear tree), *Prunus laurocerasus* (Black berry), *Ficus carica* (Fig tree), *Prunus armeniaca* (Apricot tree), *Prunus avium* (Cherry tree), *Prunus persica* (Peach tree), *Citrus* (Lemon tree), *Vitis vinifera* (vine tree), *Corylus avellena* (Hazelnut tree), *Hedera helix* (Wall ivy), *Rosa sp.* (Rose), *Syringa vulgaris* (Lilac), *Lilium* (Lily plant*), Ligustrum vulgare* (Prive plant).

Doğa College is a private school established on an area of 23500 m^2. The garden area per student is 7.91 m^2 and the green area per student is 2.32 m^2 (Table 1.). The plants identified in the school are: *Tilia cordota* (Linden tree), *Ligustrum vulgare* (Prive plant), *Petroselinum crispum* (Parsley), *Solanum lycopersicum* (Tomato), *Juniperus comminus* (Juniper tree), *Ilex aquifolim* (Holy holly), *Hedera helix* (Wall). ivy), *Photinia serratifolia* (Red flame bush), *Accacia dealbata* (Yellow mimosa), *Helichrysum italicum* (Butterfly), *Phormium Tenax* (New Zealand flax), *Elaeagnus pungens maculata aurea* (Gold-leaved water oleaster), *Nandina domestica* (Paradise bamboo), *Juniperus virginiana* (Pencil juniper), *Lilium* (Lilium plant), *Acer palmatum* (Japanese maple), *Berberis Vulgaris* (Ladywood).

Yavuz College is a private school established on an area of 18750 m^2. The garden area per student is 13.87 m^2 and the green area per student is 8.87 m^2 (Table 4.1.). Plants identified in the school: *Robinia pseudoacacia* (Acacia tree), *Acacia dealbata* (Silver acacia), *Platanus orientalis* (Plane tree), *Picea pungens* (Blue spruce), *Cupressus sempervirens* (Cypress tree), *Pinus pinaster* (Seaside pine), *Pinus sylvestris* (Scots pine), *Tilia cordota* (Linden tree), *Cedrus libani* (Lebanese cedar), *Carpinus betulus* (Horbeam), *Acer pseudoplatanus* (Mountain maple), *Ulmaceae* (Elm),

Juniperus comminus (Juniper tree), *Picea orientalis* (Oriental spruce), *Alnus glutinosa* (Alder), *Morus alba* (White mulberry tree), *Prunus laurocerasus* (Blackberry), *Molus domestica* (Apple tree), *Pyrus communis* (Pear tree), *Prunus avium* (Cherry tree), *Solanis lycopersicum* (Tomato), *Solanum melongena* (Eggplant)), *Ficus carica* (Fig), *Rosa sp.* (Rose), *Ilex aquifolim* (Holly), *Hydrangea macrophylla* (Hydrangea), *Vitis vinifera* (Vine), *Laurus nobilis* (Laurel), *Lonicera caprifolium* (Honeysuckle plant), *Eriobotrya japonica* (Maltese plum), *Magnolia grandiflora* (Magnolia), Zea mays (Corn), *Phaseolus vulgasis* (Beans), *Petroselinum crispum* (Parsley), *Pisum sativum* (Peas), *Lactuca sativa* (Lettuce), *Brassica oleracea* (Kale), *Citrus reticulata* (Tangerine tree), *Prunus persica* (Peach), *Capsicum annuum* (Pepper), *Olanum melongena* (Eggplant), *Brassica oleracea capitata* (Cabbage), *Cucurbita moschata* (Pumpkin), *Lilium* (Lily plant).

Piraziz Imam Hatip Secondary School is established on an area of 2040 m^2. The garden area per student of Piraziz Imam Hatip Secondary School is 23.67 m^2 and the green area per student is 3.13 m^2 (Table 1.). Plants identified in the school: *Acer pseudoplatanus* (Mountain maple), *Molus domestica* (Apple tree), *Vitis venifera* (vine tree), *Citrus* (Lemon tree), *Citrus reticulata* (Tangerine tree), *Olea europaea* L. (Olive tree), *Ficus carica* (Fig tree), *Elaeagnus umbellata* (Fallberry plant), *Narcissus poeticus* (Narcissus plant), *Iris germanica* (Lily), *Cucurbita moschata* (Pumpkin), *Rosa sp.* (Rose), *Antirrhinum* (Snapdragon plant), *Aloe vera* (Aloe vera plant), *Mirabilis jalapa* (Evening primrose plant), *Citrullus lanatus* (Watermelon), *Cichorium intybus* (White chicory).

Piraziz 15 July Martyrs Secondary School is established on an area of 6000 m^2. The garden area per student of Piraziz 15 July Martyrs Secondary School is 21.54 m^2 and the green area per student is 1.87 m^2 (Table 4.1.). Plants identified in the school: *Chamaecyparis* (False cypress), *Cupressus sempervirens* (Cypress tree), *Acacia dealbata* (Silver acacia), *Picea orientalis* (Oriental spruce), *Eriobotrya japonica* (Maltese plum), *Citrus* (Lemon tree), *Pyrus pyrifolia* (Nashi pear)), *Cichorium intybus* (White chicory), *Rosa sp.* (Rose), *Phaseolus vulgasis* (Beans), *Pisum sativum* (Peas), *Lactuca sativa* (Lettuce), *Solanis lycopersicum* (Tomato), *Capsicum annuum* (Pepper), *Solanum melongena* (Eggplant), *Vitis vinifera* (Vine tree).

Bozat Regional Boarding Secondary School is established on an area of 3000 m^2. The garden area per student of Bozat Regional Boarding Secondary School is 26.51 m^2 and the green area per student is 6.06 m^2 (Table 4.1.). Plants identified in the school: *Rosa sp*. (Rose), *Salix Babylonica* (Weeping willow), *Pinus pinaster* (Seaside pine), *Cupressus sempervirens* (Cypress tree), *Robinia pseudoacacia* (Acacia tree), *Prunus domestica* (Plum tree), *Prunus laurocerasus* (Blackberry tree), *Hedera helix* (Wall) ivy.

Gökçeali Emir Yücel Secondary School is established on an area of 2838 m^2. Gökçeali Emir Yucel Secondary School's garden area per student is 36.32 m^2 and the green area per student is 17.30 m^2 (Table 1.). Plants identified in the school: *Picea orientalis* (Eastern spruce), *Chamaerops excelsa*

(Palm), *Tilia cordota* (Linden Tree), *Prunus laurocerasus* (Blackberry), *Rosa sp.* (Rose), *Prunus domestica* (Plum tree), *Pyrus communis* (Pear tree), *Cydonia onlonga* (Quince Tree), *Cupressus sempervirens* (Cypress tree), *Deutzia scabra* (Towel tassel), *Spriraea cantoniensis* (Bride flower).

Green areas are important for children's mental, social, physical and psychological healthy development. In rapidly urbanizing societies after the industrial revolution, school gardens are the places where children can most quickly access green areas. The school gardens should be able to meet the needs of children in terms of area, plant diversity and suitability.

The presence of green areas increases the quality of schools. In the study conducted in Giresun province, the green area per student was found to be 4.20 m^2. This value is even below the minimum area value of 9 m^2 recommended by WHO. However, the lack of green areas causes children to get bored easily (Moore and Wong, 1997), to be unable to relieve stress, to be unable to socialize, and to a decrease in creativity (Ozdemir and Yilmaz, 2008). Children who stay away from green areas solve their problems by fighting (Aksu, 2023). Additionally, the lack of green areas increases the noise problem; it causes restlessness and stress in children and reduces productivity (Kalipci, 2007). The minimum green area per person recommended in the Spatial Plans Construction Regulation of the Zoning Law No. 3194 (2017) is 10 m^2. However, in the study, it was seen that the only school that met this standard was Gökçeali Emir Yucel Secondary School (17.30 m^2) (Table 4.1.).

Due to current issues such as global warming, unplanned urbanization, uncontrolled population growth, and resource depletion; the importance of green areas has increased and recommended green area standards have been raised. Having sufficient green areas in schools creates a calming effect (Yücekaya et al., 2022) and reduces attention deficit and hyperactivity disorders (Kuo et al., 2004). Additionally, it positively contributes to students' academic achievement. (Wu et al., 2014).

The presence of green areas in school gardens positively affects not only schools but also the environment in which the school is located. These green areas increase the image of the schools as well as the image of the neighborhood in which they are located (Vural and Yilmaz, 2018). Green areas have a psychologically relaxing effect and reduce crime rates (Kuo et al., 2001). Located in the Black Sea region, which is famous for its greenery, the province of Giresun, also known for its lush landscapes and natural beauty, presents an incredible contrast with the hard, monotonous, and bare appearance commonly observed in its school gardens. Schools recruit their students from the region they are located in and interact with this environment. In this sense, greening the schools will positively benefit both the school and the neighborhoods in which it is located and will increase the prestige of the neighborhoods.

School gardens are areas where children play their best games and socialize in schools. Undoubtedly, having these large areas will offer children a comfort zone and enable them to move more freely at school. It was observed that the average area of the school garden areas examined was

9.81 m^2 (Table 4.1.). Although the minimum standard is 5 m^2, many schools fall below this standard. Many developed countries recommend school garden areas as 25 m^2 (Neufert, 2017). Having a large school garden area reduces the noise level and creates a positive environment (Onay, 2021). Narrow school garden areas cause teachers and students to develop negative attitudes towards the school (Karasolak, 2009). Nowadays, especially in cities, children who are captured by technology move very little during the day. As a result, various health problems, especially obesity, occur. School gardens that do not allow physical activity cause obesity (WHO, 2021).

Piraziz Imam Hatip Secondary School, one of the schools observed, was previously opened within the body of other schools, used a common garden with other schools, and then built its own building and moved to its own building in 2020. Even the garden area of this 3-year-old institution is quite small (1515 m^2). In fact, it has the smallest garden area of all the schools observed. What is contradictory here is that, despite the new service, it remains below the minimum standards (5 m^2) regarding the areas per student (3.13 m^2). It is seen that even in newly built schools, the healthy development and needs of children in every aspect can be ignored. When planning school areas, designing the allocated areas to meet the population and student needs will provide superior benefits to both the child and education.

In some schools where observations were made (Teyyaredüzü ŞUBSS, Kanuni Secondary School, Mustafa Kemal Secondary School), a new school with a different level type was opened in the school area and the already narrow gardens became even narrower. However, large school garden areas increase children's physical mobility and thus reduce students' aggression (Ozdemir, 2011). When allocating school garden areas, areas that will support the healthy development of the student in all aspects should be planned and it should be foreseen whether the area to be allocated will respond to population growth in the long term.

Apart from the width of school garden areas, it is also important that they are useful or functional. The garden design of the school is as important as the interior design of the school. It is known that adequate and planned school gardens trigger positive psychological emotions (Karadeniz et al., 2018). School gardens, beautified with ornamental plants and full of trees, ensure that children come to school with enthusiasm. In this way, it is expected that all developmental areas of the student who comes to school with enthusiasm and willingly will increase (Yücekaya et al., 2022). Additionally, aesthetic appearance increases academic success (Radmard et al., 2019). Cold and monotonous structures dominate in the school gardens examined. Doing landscape work will overcome this cold monotonous structure.

Even the green garden area of Gökçeali Emir Yucel Secondary School, which is the school with the most green areas in the schools examined, is not suitable for students' use and is not accessible to students. This area was found to be neglected, sloping and infested with weeds. It can be seen that the

existence and width of green areas alone are not indicators of a healthy education and quality. It is evident that areas where students cannot touch, sense with their five senses, or learn about nature and the environment, and where they experience a lack of greenery despite its abundance, will provide no benefits.

When choosing plants for school gardens, the climatic conditions of the region should be taken into consideration. Trees without wide crowns that do not block sunlight should be used in school gardens. Vitamin D, synthesized by sunlight, is necessary for bone development and essential for metabolism. In this context, children need to benefit from sunlight (Dogan and Sevinc, 2021). However, in the city of Giresun, located in the Black Sea region, the number of sunny days is less than other provinces in our country (https://www.mgm.gov.tr, 2023). Therefore, according to the Minimum Design Standards for Educational Structures (2015), trees such as Alnus glutinosa (Alder) and Acer saccharinum (Silver Maple), which shed their leaves in winter and do not block sunlight, should be planted on the east, south, and west sides of schools. Also plants on the north and northwest sides of the school gardens should be planted away from school buildings, considering the possibility of causing moisture in the buildings. On these sides, trees such as Abies alba (Fir), Pinus pinaster (Maritime Pine), and Laurocerasus officinalis (Cherry Laurel) can be planted, provided they are not planted densely.

During pollination periods, allergenic pollen-producing plants such as *Acer negundo* (Box Elder), *Platanus orientalis* (Oriental Plane), *Juniperus sp.* (Juniper), *and Morus sp.* (Mulberry) have been found in school gardens (Ulug and Altan, 2007). The most commonly preferred plant in school gardens is *Rosa sp.* (Rose), which has thorns that can injure children. Additionally, needle-leaved trees in school gardens shed their leaves in the fall, so it may cause schoolyard to be slippery on rainy days and and children to slip and fall. Plants used in school gardens should be selected carefully since children spend a large part of their day there. Since students can come into contact with these plants in the school garden at any time, students should be informed about the plants and precautions should be taken regarding the use of toxic plants. Caution should be taken in using plants that can scratch, injure, or cause children to fall, and the health of the children should not be endangered. There should be maintenance staff for school gardens, and these staff should be informed about poisonous and allergenic plants.

Another factor that affects schoolyards is city traffic. Giresun's urban transportation is primarily by road. Consequently, factors such as noise, dust, and heavy metals negatively impact our schools. Studies conducted by Kalipci (2007) show that the noise in Giresun has reached levels that will affect human health. Most of the schools examined in the study are located in the center of Giresun and in a busy traffic area. However, studies have shown that the noise caused by traffic negatively affects children both physiologically and psychologically, and it also impacts the quality of education,

resulting in decreased academic achievement (Onay, 2021).

Another negativity caused by traffic is that it pollutes the air. In places close to heavy traffic, the quality of the air decreases and the health of the living creatures are negatively affected directly or indirectly. The amount of heavy metals such as lead (Pb), chromium (Cr), and zinc (Zn) in the air and plants is used as an indicator of air pollution. Although the measurements made in Giresun show that heavy metal pollution has been decreasing in recent years, it is still much higher than it should be. Most of the schools examined in Giresun, which is located on the Eastern Black Sea coastal road is located close to the coast and in a high traffic area. The health of all people living in the environment, especially children and the elderly, is affected by heavy metals. Lead (Pb) from heavy metals affects the intelligence development of children and causes nervous system disorders. It also increases the risk of kidney disease and cardiovascular disease in adults. Chromium (Cr) and cobalt (Co) have been associated with metabolic disorders and cancer (Koz et al., 2008).

The air quality around schools can be improved with plants in and around the school garden. In schools situated next to heavy traffic, resilient and evergreen plant species such as *Aesculus* (Horse Chestnut), *Acer negundo* (Box Elder), *Ulmaceae* (Elm), *Ligustrum vulgare* (Privet), and *Cupressus sempervirens* (Cypress) should be planted along the garden edges (Ceylan, 1999). By maintaining greenery throughout the year, the air pollution can be reduced and the noise pollution can be prevented (Dadvand et al., 2015).

4. Conclusions and Recommendations

School garden areas should be large and spacious, transformed into living spaces, green areas should be increased, and students should be brought together with nature. The plants in the school garden should be carefully selected with the help of landscape architects and experts, and the plants should be healthy and suitable for the geographical conditions of the region.

When designing school gardens, the opinions of children, who are the main subjects of the gardens, and other stakeholders should be taken into consideration and their expectations should be met. School campuses should be accessible but away from heavy traffic areas and main roads, and the parts facing the road should be afforested with at least two rows of evergreen trees. In this way, the harmful effects of road traffic can be minimized. Routine checks should be carried out by school administrators and relevant authorities regarding the pruning of tall trees and necessary interventions.

Authors' Contribution

All authors contributed equally to the article.

Conflict of Interest Declaration

There is no conflict of interest between the authors.

Statement of Research and Publication Ethics

Research and publication ethics were complied with in the study.

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