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URBAN LANDSCAPE AND POLLEN ALLERGY

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ABSTRACT. The growth of urban areas and the impact of urban ecosystems on public health and urban sustainability are very important in big cities. The United Nations predicts that 60% of the world's population will live in cities by 2030. More than 10-15 million Turkish people suffer from pollen allergy and pollen allergy poses a major risk for humans. Pollen allergy induces bronchitis, bronchial asthma and may even be life-threatening. Thus, pollen allergies greatly affect the daily life of individuals. But nowadays, The allergenicity of plants, however, is often neglected. In this paper are suggested that the major causes of this extensive allergenicity, including: the presence of exotic and invasive species, the mutual effect between allergenic pollen and air pollutants, cross-reactivity between allergenic species and the choice of male plant which produce a lot of allergenic pollen individuals in dioecious species and the guidelines created by the study contain eight recommendations that, if implemented by city planners and local authorities, would reduce the effects of pollen on people living and working in cities.

1. INTRODUCTION

Today, plants are indispensable elements of urban components. Especially, in cities which are under intense pressure because of industry, there is a need for open-green areas for improving the quality of life. That's why urban landscape are a key element in the planning of big cities, in that they encourage the interaction between citizens and the environment within an urban context, aid human health, and provide substantial environmental and recreational benefits to urban citizens. The United Nations predicts that 60% of the world's population will live in cities by 2030 [1].

The plants have beneficial effects on urban ecosystem and human health as well as also harmful effects:

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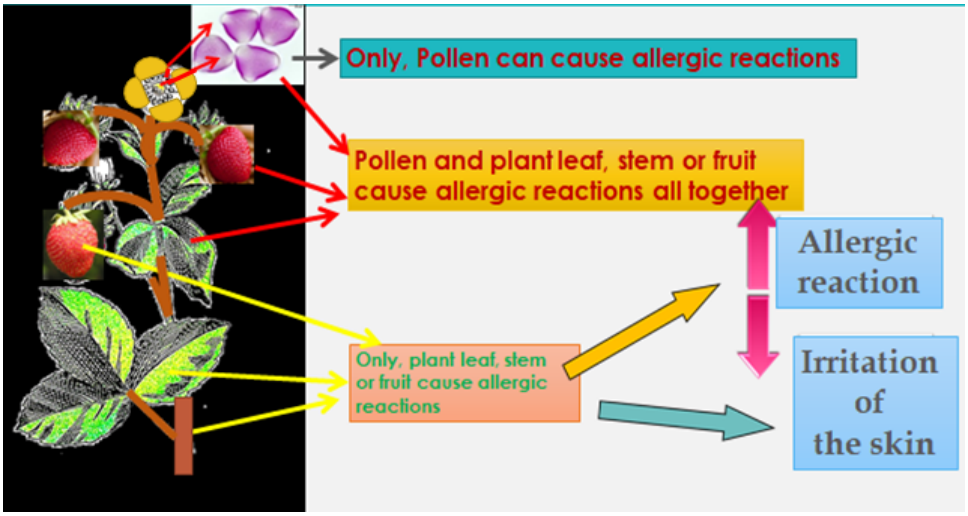
Generate litter	The environmental pollution resulting from the fall of leaves, fruits, seeds, branches and secretions are a common problem of all green plants
Harmful effects	- Damages caused by parts falling from the large trees - The damage can be caused by the thorns of the short plants
Toxic fruit, seeds or leaves	Especially, plants with toxic fruit or flowers grown in areas where young children are present can cause serious problems.
Being a source of bad smell	Some species themselves or some types of rotting fruites may create an unpleasant odor source.
Damages caused by the roots	Some plant roots are quite strong and the development of the plant the construction around it can be damages the building bases and the infrastructure.
Preventing the viewing angle	Particularly on divided roads, plants growing on the driver near the junctions of the road refugees can delay the perception of the hazards and limit the field of view of the drivers, resulting in accidental conclusions..
Allergy effects	????????????????

The allergenicity of plants, however, is often neglected. Plants cause an allergic reaction on people from three different directions:



Perhaps, the most serious challenge posed by urban green spaces, though, is related to human allergic reactions to the airborne vascular plant pollen released during pollination. Recent data suggest that people living in urban areas are 20 % more likely to suffer airborne pollen allergies than people living in rural areas [1-3].

2. Biodiversity In Turkey To Allergy Direction

The total number of plant in the world is about 390.900. It is represented by about 12.000 taxa, 352 species of which are allergenic plants in Turkey [4,5]. Allergic plants of Turkey are composed of 50% trees and shrub, 30 % weeds and 20 % Poaceae. It has been found that 40 % of 41 trees, 37 bushes and 7 climbers used in parks and gardens planted by Istanbul Metropolitan Municipality cause important allergic reactions [6]. For example, taxa of the *Cupressus* spp., *Juniperus* spp., and *Thuja* spp. are very common in the cites of Ankara and Istanbul. There are a lot of Cupressaceae in these cities. They exhibiting the highest pollen production levels between anemophilous species, with more than 1100×106 pollen grains being produced by each tree, the incidence of allergic sensitization is very highest [6-8].

3. Exotic And Invasive Species

Exotic species, are organisms that have moved beyond their natural geographical range of habitat. Exotic plants are used to decorate parks, gardens and roadsides. It has been determined that 76 % of the exotic plants in the park and garden in Adana province cause allergic reactions [9]. It has been established that 51 % of exotic plants used in Ankara landscape cause allergic reactions [10]. For example; Adana has got a lot of *Eucalyptus* trees which are very pollen producing tree as well. *Eucalyptus* pollens were found 1629 pollen/m ^{3} in atmosphere of Adana [11]. It is the exotic plant for Turkey and native plant in Australia. From 1938 onwards, *Eucalyptus* was successfully planted for wetland improvement and to control malaria outbreaks in the Karabucak (Tarsus) wetland of the Cukurova Basin, where the Turkish Eastern Mediterranean Forest is currently located. According to the most recent national inventories, there are over 20.000 ha of *Eucalyptus* plantations in Turkey [9, 12]. These wind and insect pollinated trees produce large amounts of pollen during the main pollen season, which generally occurs during spring. As a result, the pollen counts of *Eucalyptus* trees are sufficient to cause allergy symptoms [11, 13].

An "invasive species" is defined as a species that is non-native (or alien) to the ecosystem under consideration, and whose introduction causes or is likely to cause economic or environmental harm or harm to human health. For example; *Ailanthus altissima* (tree of heaven), which has become popular as a roadside tree, parks and gardens in many cities of Turkey and World and for which rapid propagation has been observed. Its abundance in some areas has been found to generate pollen sensitization reactions in some patients [6, 14,15]. Also, *Ambrosia artemisiifolia* is invasive plant and it causes agricultural losses and severe health problems. *Ambrosia* (ragweed) is one of the most feared pollen sources among hay fever sufferers [16] due to its fierce allergy inducing properties. That's why this was leaded, or already leaded to intensified control measures against *Ambrosia* in order to protect the human population against the *Ambrosia* pollen in some countries.

4. What Are The Reasons For The Increase In Allergies In The Urban Ecosystem?

a. Increasing allergenic plant biodiversity,
b. Increasing exotic flora,
c. Increasing invasive species,
d. Male individuals of dioecious species have been used for planting in park and garden,
e. Higgest pollen production of plants have been choosed for planting in park and garden,
f. The plants which produce highest-to-moderate alergenic pollen, have been chosen for planting in park and garden,
g. Increasing allergenic opportunist and spontaneous species in empty spaces, dumps and neglected gardens,
h. Cross-reaction between plants,
i. Air pollution.

5. What Are The Guidelines For Designing And Planning Of Urban Green Areas With A Low Allergy Impact ?

a. Firstly, there must be active relations between municipalities, botanists, agricultural engineers and doctors about subjects of problems of urban landscape and pollen allergy,

b. Control of exotic plants,

c. Control of invasive plants,
d. Avoid use of male individuals of dioecious species in parks and roadsides,
e. Choose species with low pollen production and choose plants that show pollination with insects,
f. Adopt appropriate management, maintenance and gardening strategies to ensure removal of allergenic opportunist and spontaneous species in empty spaces, dumps and neglected gardens,
g. Obtain expert advice when selecting suitable species for each green area, and avoid fostering cross-reactivity between panallergens,
h. Establish specific by laws ensuring for the designing and planning of urban green areas.

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