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OPINION OF URBAN DWELLERS VARIES TO MANAGE THE URBAN SPACES FOR URBAN FORESTRY: A CASE STUDY OF FAISALABAD CITY

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The unplanned development of cities creates several problems like deterioration of environment, unbalanced ecosystem and poor community interrelation. Furthermore, shifting rural communities to urban areas can damage the urban forestry by conversion of natural habitat into concrete heat island. In this scenario, for improvement of urban environmental quality, people's perception and opinion could be helpful for better implementation of urban management decisions. The objectives of this study were to examine the perception of urban dwellers towards urban trees and to explore the variation in opinion for managing the diverse types of urban spaces. The present study was conducted in 3rd most populous city of Pakistan *viz*. Faisalabad, divided into four categories i.e. parks, hospitals, institutions, and urban communities. A questionnaire-based survey was conducted by four hundred respondents with a hundred from each category to analyze people's perception, attitude, and preference towards urban trees. Results depicted diversity among respondents related to age, education, profession, and monthly income. Three most abundant tree species in Faisalabad named *Eucalyptus camaldulensis* Dehnh. (17%), *Conocarpus erectus L.* (43%) *and Vachellia nilotica* (L.) P. Hurter & Mabb. (12%) were disliked due to various problems like accidents, garbage, sewerage problems, and electric transmission issue, respectively. Moreover, it was also assessed that demographic characters i.e. gender, age, education, income, and profession have a strong association on liking and disliking of urban trees. This study helps to analyze the people's perception, attitude, and preference towards urban vegetation and provide valuable information for establishing future green belts.

Keywords: Afforestation, Urban sustainability, Parks, Urban landscape, Tree planting.

INTRODUCTION

More than half the world's population now lives in towns and cities, and that proportion will continue to grow in the coming decades (Montgomery, 2008; Grimm *et al*., 2008; Pisanty *et al*., 2009). The urban population in 2015 accounted for 54% (4 billion) of the total global population and it is expected to increase to 60% (4.9 billion people) of world population by 2030 (UNH, 2016). In future, more and more people will live in cities. By 2050, 67 % of the world's population is expected to live in urban areas, while for Europe approx. 83 % and for Germany approx. 81 % of the populations are projected to live in cities leading to severe damage of natural resources and ecosystems (UNH, 2016). Although urbanization promotes rapid social and economic development, but at the same time, leads to many problems, such as concentration of the population, traffic jams, housing shortages, resource shortages, biodiversity reductions, "heat island" effects, noise, and air and water pollution. Furthermore, illicit cutting of trees for housing societies and lack of planning for urban forestry is further aggravating the environmental hazards (Savard *et al.,* 2000; Li *et al*.,2005; Onder and Dursun, 2011). In urban areas, trees directly and indirectly play a vital role in the well-being of humanlike ecosystem services, provision of a clean environment, wood, and fruit products. (Escobedo and Chacalo, 2008). In the busy and hectic routine life of cities, trees have some other benefits as well such as minimizing the health hazards by imparting a sense of freshness and reducing stress, developing a base for the socioeconomic sectors (Solecki and Welch, 1995) and providing a habitat for the fauna (MacGregor-Fors *et al*., 2011). Tree density and diversity helps in alleviating the urban heat island effect at different scales (Grimm *et al*., 2008). Tree canopy offers shade thereby reducing the air-conditioning cost of some of the urban infrastructures (Conway and Urbani, 2007). Time has gone when the urban vegetation was just taken considered for its decorative value, now a day it has different values and roles to play in the modern cities (Sanesi and Chiarello, 2006). Lifestyle sociability and behavior of urban dwellers can be modified through development of green belts e.g., parks, gardens, roadside plantation etc. (Younis *et al*., 2002; Berkowitz *et al*., 2003; Swanwick *et al*., 2003). Urban trees are important and multifunctional components of cities owing to their relevance towards urban sustainability, ecological

diversity, aesthetic role, health of citizens, economic benefits, social well-being and providing the essential structural and functional spaces (Senanayake *et al*., 2013). They not only offer a habitat for fauna, but they also provide an ideal arena to spend leisure time and communicate socially (Younis *et al*., 2008). Urban trees also function as neutralizing the urban stresses e.g. stench, noise, dust, heat and air pollution (You, 2016). As a consequence of abrupt population growth and deficiency in proper urban green patches planning, cities of the developing countries have higher environmental issues in contrast to the cities in developed countries (Senanayake *et al*., 2013). Urban green patches are postern for fulfilling demand of the sustainable development and they cannot be overlooked by policymakers (Riaz *et al*., 2012). Frequent deficit in-terms of both the quantity and quality demands appropriate strategies for the development, maintenance and improvement of urban vegetation. However, it has been proposed that urban vegetation and green patches enhance sustainability and thereby providing a healthier and cleaner environment (Henwood and Pidgeon, 2001).

Although the significance of trees in cities has been well-reckoned now, yet the vegetation cover is normally limited due to the present developmental approaches giving less attention to them (Ezcurra, 1990). However, urban vegetation playing a significant role, people's perspectives about trees have not been focused much (Hamer and McDonnell, 2008). Attitude and perception toward trees in cities are multidimensional and complex; residents of urban areas use green patches having social implications of pertinence (Sanesi and Chiarello, 2006). Accepting the perceptions of people towards their vicinity and surroundings and how their predilections shape and create environments of their own are crucial for making of a policy and its subsequent implementation (Zheng *et al*., 2011).

Faisalabad is the first planned city in the subcontinent, a second megacity of Punjab province and largest textile hub in Pakistan. Being an industrial hub, Faisalabad is rapidly becoming populous resulting in pollution, health and social issues. Lack of interest regarding the maintenance of green belts is also a major issue. Thus, there is a need to discuss how urban dwellers perceive the changes in urban vegetation and their perspective to make improvements. Public attitudes and preferences must be understood, and accounted for future planning strategies. This study was thus aimed at investigating the social perception, behavior towards urban trees for urban sustainability and precision planning.

MATERIAL AND METHODS

Study area: The study focused on urban areas of city Faisalabad of province Punjab, Pakistan. It is the third-largest textile industry hub in the country. Owing to the huge textile industry, it is the largest tax revenue generator for the country, and due these attribute the city known as the "Manchester of Pakistan". Being an industrial city, Faisalabad is rapidly becoming populous resulting in pollution, health and social issues. The study area was categorized into four sections i.e., Parks, Hospitals, Institutions and Urban communities owing to different types of urban forestry practices in each category. To achieve the desired results from the project of urban trees, the attitude and response of citizen toward urban vegetation for future planning and urban sustainability were considered appropriate. Unfortunately, the green belts are also damaged with the passage of time. The alarming situation represents the least interest shown by urban community and other responsible authorities.

Questionnaire design: A questionnaire-based survey was conducted to investigate the perception and attitude of the residents towards urban trees. Questions were developed in the English language to collect information about the demographics and socioeconomics situation of the respondents according to gender, age group, level of education, residence place and the monthly income. The remaining portion of the questionnaire comprised of the study objectives, opinions, and perceptions, preference related to trees species and their traits (shade, size, color, leafiness, and flower etc.), problems creates urban trees in urban areas and suggestions for future policymaking process. The questionnaire was designed to keep it convenient for the respondents and to make him/her understand the research rationale. After getting the responses to each group of questions, the respondents were asked to record open-ended opinions. Some services of the ecosystem and the negative impacts associated with urban trees were identified based on Miller (1997).

Collection of data: The clustered sampling framework provided a suitable and cost-effective approach to evaluate large populations (Jakobsson and Dragun, 1996). The survey which collected demographic information of residents, helped to randomly choose four hundred respondents from four different categories with 100 respondents from each category (parks, institutions, hospitals, and urban communities). The issues that were studied in the urban area with respect to urban vegetation included: 1) people's perception towards urban vegetation regarding favorite tree and dislike tree 2) traits for tree likening 3) problems faced by the urban dwellers 4) future planning for urban sustainability in the urban area. For this purpose, data were collected through questionnaire format. For the respondent's convenience, the questions in official language (English and Urdu) were asked. The interview timings were 9:00 a.m. to 6:30 p.m. because of maximum availability of citizens.

Statistical Analysis: The collected data were analyzed using SPSS Statistical Software, v.20.0 (SPSS INC, Chicago, USA). The percentage frequency of the responses to each individual question was calculated and indicated the most frequent responses. The independent variables of the correlations (i.e. respondents' gender, age groups, education,

income, and profession) were examined separately with each of the respondents' perception that constituted the dependent variables and summarized in contingency tables. Chi-square test of independence for each contingency table was used to examine the presence of a relationship between the variables at $p = 0.05$. Following, Phi (phi), Cramer's V (V), and Kendall's tau (τ) coefficients were used for measuring association at $p = 0.05$ based on the related contingency table and type of measured data (Field, 2009).

RESULTS

***Socio-economic characteristics*:** Human attitude is reported to be markedly influenced by their socio-economic characteristics e.g., gender, age, level of education, total income, profession and residential period as all of these have a pivotal role in modifying human behavior. Likewise, education and profession role was also acknowledged and documented.

A total of 400 respondents were surveyed with 100 people from each category i.e. Parks, Institutions, Hospitals, and Urban community with both gender (male & female) and four age classes (<25, 25-40, 41-60 and >60). A significant relationship among the views and observations of teenagers and other age groups were observed. Among all respondents evaluated regarding age, results depicted that the maximum respondent belongs to a category of 41-60 years (28.75%) followed by people of less than 25 years (28.25%), 26-40 years (26.5%) and more than 60 years (16.5%; Table 1). Regarding the educational status of respondents in Faisalabad city, majority of respondents falls in graduated (27%), followed by intermediate (22%), matriculation (21%), middle (17%) and least in or above master level (13%). The distribution regarding income status of respondents reveals that maximum respondents (30.25%) earn a monthly income of less than 10K (K= 1 Thousand) whereas 29.5% earn (10-30K), 28.75% (30-80K), 5.25% (80-120K) and 6.5% have to earn about more than 120K (Table 1). Whereas survey results regarding profession showed that the proportion of respondents in the different professions are: student (16.75%), labor (23.75%), employer (28%) and business (31.5%) (Table 1). Residential period also varies into four-span

Table 1. Demographic characteristics of respondents in different categories of Faisalabad city (*K= Thousand)

	Parks	Hospitals	Institution	Urban community	Total	Percentage
Gender						
Male	46	68	51	73	238	59.50
Female	54	32	49	27	162	40.50
Age (years)						
<25	11	17	64	21	113	28.25
26- 40	16	8	16	66	106	26.50
41- 60	20	72	12	11	115	28.75
>60	53	3	8	2	66	16.50
Education						
Middle	11	36	2	19	68	17.00
Matric	29	20	8	27	84	21.00
Intermediate	24	10	36	18	88	22.00
Graduation	24	25	40	19	108	27.00
Master	12	9	14	17	52	13.00
Income						
< 10 K	24	8	76	13	121	30.25
10- 30 K	29	51	2	35	117	29.25
31- 80 K	35	22	14	44	115	28.75
81- 120 K	5	8	3	5	21	5.25
> 120 K	7	11	5	3	26	6.50
Profession						
Student	12	13	29	13	67	16.75
Labor	23	36	17	19	95	23.75
Employ	36	22	24	30	112	28.00
Businessman	29	29	30	38	126	31.50
Residential period						
5 years	45	41	52	39	177	44.25
10 years	31	30	24	26	111	27.75
15 years	13	14	17	22	66	16.50
20 years	11	15	7	13	46	11.50

(44.25%) 5 years, (27.75%) 10 years, (16.5%) 15 years and (11.5%) 20 years.

Social perception of urban vegetation varies from person to person. Several tree species existed in the urban area of Faisalabad. However, the attitude and response of people varies regarding different trees species. The results (Fig. 1a) shows in case of parks 17%, 43%, 12% and 28% of the respondents disliked *Eucalyptus camaldulensis, Conocarpus erectus, V. nilotica and* other tree species respectively. A similar trend was observed in case of hospitals where 20%, 26%, 21% and 33% of the respondents' views expressed that *E. camaldulensis, C. erectus, V. nilotica and* other tree species were disliked respectively. The results also conclude that regarding institutions 32%, 18%, 31% and 19% of the respondents conclude that *E. camaldulensis, C. erectus, V. nilotica and* other tree species were predominantly disliked. Moreover, similar conclusions were made in case of urban community (Fig. 1a).

People's opinions and preferences about urban vegetation varied from person to person. The urban dwellers showed positive response towards urban trees due to various traits i.e. size, shade, color, leafiness and flower. The results shown in Fig. 1b depict outcomes of survey conducted in parks where 27%, 30%, 21%, 12% and 10% of the respondents liked the trees due to their size, shade, color, leafiness and flower, respectively. While results derived from hospital-based survey also concludes similar outcomes with no major differences as 21%, 26%, 13%, 19% and 21% of the respondents liked the trees due to their size, shade, color, leafiness and flower, respectively. Likewise, results from institution-based survey expressed that 12%, 20%, 31%, 18% and 29% of the respondents rate the trees on following traits size, shade, color, leafiness and flower, respectively. Similar outcomes were observed in case of urban community based survey (Fig. 1b).

Urban areas comprising peoples with different mindsets, behavior and attitudes display serious concern about urban trees. Unluckily, some mindsets assume that trees create several problems in urban areas. The results showed survey conducted in parks expressed that 22%, 29%, 34% and 15% of the respondents presumes that urban trees create problems in urban areas such as accidents, garbage, sewerage problems and electric transmission issue respectively (Fig. 1c). whereas peoples from hospitals also expressed in following ratio 26%, 16%, 31% and 27% regarding the severity of trees in causing accidents, garbage, sewerage problems, and electric transmission issue, respectively. Moreover, likewise conclusions were made from institution based survey as 14%, 36%, 19% and 31% of the respondents disliked urban trees due to occurrence of accidents, garbage, sewerage problems and electric transmission issue, respectively. Similar outcomes were observed in case of an urban community-based survey (Fig. 1c).

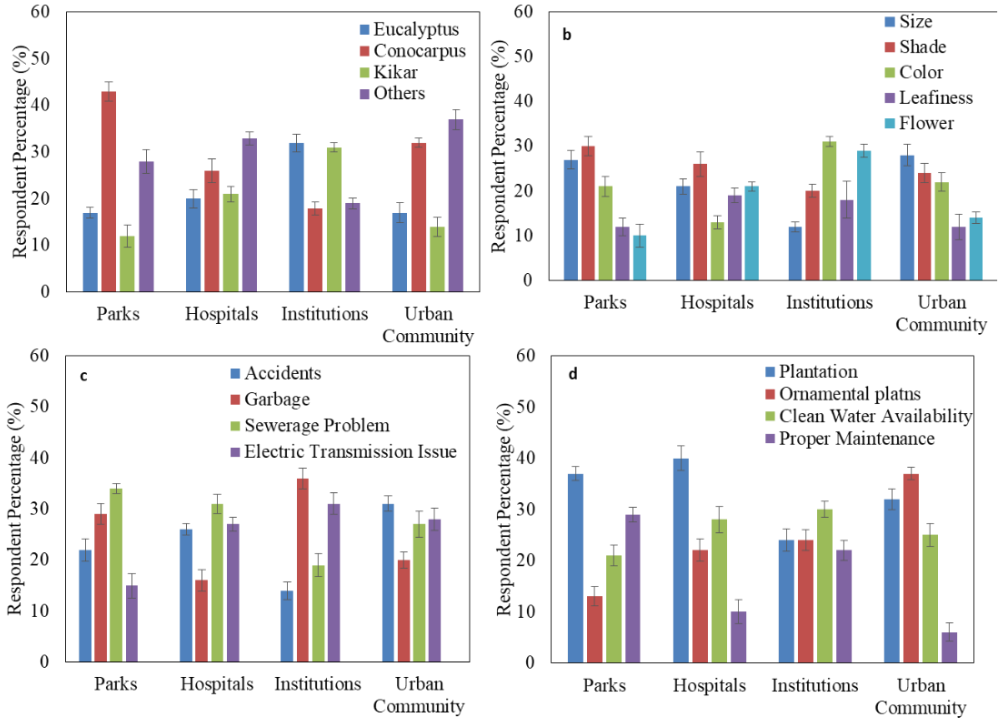

Figure.1. Response of urban community regarding urban trees. a): Disliked urban tree species, b): Preferred traits of urban trees, c): Hazards of urban trees and d): Public suggestions for future urban planting.

The results depicted in (Fig. 1d) expressed that parks 37%, 13%, 21% and 29% of the respondents give different suggestions for better management of urban areas in future such as plantations, ornamental plants, clean water availability to preexisting vegetation and proper maintenance, respectively. While in case of hospitals 44%, 22%, 28% and 10% of the respondents give different suggestions for better management of urban areas in future such as plantations, ornamental plants, clean water availability to preexisting vegetation and proper maintenance, respectively. Whereas, institutions based outcomes depicts that 24%, 24%, 30% and 22% of the respondents give different suggestions for better management of urban areas in future such as plantations, ornamental plants, clean water availability to preexisting vegetation and proper maintenance, respectively. In case of urban community 32%, 37%, 25% and 26% of the respondents give different suggestions for better management of urban areas in future such as plantations, ornamental plants, clean water availability to preexisting vegetation and proper maintenance, respectively (Fig. 1d).

A questionnaire based study used to assess the urban dwellers views in the prospect of tree liking yielded outcomes that are expressed in Table 2. Results have concluded that 191 males and 140 females liked the trees while 47 males and 22 females have disliked the trees. The *p*- value showed that these variables are independent of each other and there is a statistically approached the borderline of a significant relationship between respondent's age and tree liking (Table 3). While the result shown in Table 4 depicts the association between respondent age and tree likeness as 199 respondents less of age than 35 years and 126 respondents having more than 35 years of age have disliked trees in the following numbers 59 and 16, respectively. The *p*- value showed that these variables are slightly independent of each other and that there is a statistically significant relationship between respondent age and tree like in Table 5.

Moreover, result showed (Table 6) also concludes association between education and tree likeness as 191 undergraduate and 140 postgraduate like the trees but 61 undergraduate and 14 postgraduate dislike the trees. The *p*- value showed that these variables are independent of each other and that there is a statistically highly significant relationship between respondent's education and tree liking (Table 7). Similar outcomes regarding respondent income and tree likeness were

Table 2. Cross tabulation for gender of respondents and tree liking by respondents

		Tree liking by respondents		Total
		Yes	No	
Gender of respondents	Male	191	47	238
	Female	140	22	162
Total		331	69	400

Table 3. Chi-Square test for gender of respondents and tree liking by respondents

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.569[a]	1	0.109		
Continuity Correction[b]	2.155	1	0.142		
Likelihood Ratio	2.629	1	0.105		
Fisher's Exact Test				0.138	0.070
N of Valid Cases	400				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 27.95. b. Computed only for a 2x2 table

Table 4. Cross tabulation for age of respondents and tree liking by respondents

		Tree liking by respondents		Total
		Yes	No	
Age of respondents	<35	199	59	258
	>35	126	16	142
Total		325	75	400

Table 5. Chi-Square test for age of respondents and tree liking by respondents

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	8.091[a]	1	0.004		
Continuity Correction[b]	7.347	1	0.007		
Likelihood Ratio	8.631	1	0.003		
Fisher's Exact Test				0.005	0.003
N of Valid Cases	400				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 26.63. b. Computed only for a 2x2 table

expressed in Table 8 where 294 respondents having income < 50,000 Rs. and 37 respondents having income > 50,000 Rs. liked the trees but 68 (< 50,000 Rs.) and 1 (> 50,000 Rs.) respondents dislike the trees.

The *p*- value (Table 9) showed that these variables are slightly independent of each other and that there is a statistically significant relationship between respondent income and tree liking. Likewise, findings in Table 10 relate association between profession and tree likeness, where 224 employed and 107 unemployed peoples like trees but 53 employed and 16 unemployed dislike the trees. The *p*- value showed that these variables are independent of each other and that there is a certain trend towards significant relationship between respondent's profession and tree liking (Table 11).

Table 6. Crosstabulation for education of respondents and tree liking by respondents

		Tree liking by respondents		Total
		Yes	No	
Education of respondents	Undergraduate	216	61	277
	Postgraduate	109	14	123
Total		325	75	400

Table 7. Chi-Square test for education of respondents and tree liking by respondents

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	6.329[a]	1	0.012		
Continuity Correction[b]	5.650	1	0.017		
Likelihood Ratio	6.813	1	0.009		
Fisher's Exact Test				0.012	0.007
N of Valid Cases	400				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 23.06. b. Computed only for a 2x2 table

Table 8. Cross tabulation for income of respondents and tree liking by respondents

		Tree liking by respondents		Total
		Yes	No	
Income of respondents	<50,000	294	68	362
	>50,000	37	1	38
Total		331	69	400

Table 9. Chi-Square test for income of respondents and tree liking by respondents

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	6.286[a]	1	.012		
Continuity Correction[b]	5.205	1	.023		
Likelihood Ratio	8.861	1	.003		
Fisher's Exact Test				.011	.005
N of Valid Cases	400				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 6.56. b. Computed only for a 2x2 table

Table 10. Cross tabulation for profession of respondents and tree liking by respondents

		Tree liking by respondents		Total
		Yes	No	
Profession of respondents	Employed	224	53	277
	Unemployed	107	16	123
Total		331	69	400

Table 11. Chi-Square test for profession of respondents and tree liking by respondents

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.239[a]	1	0.135		
Continuity Correction[b]	1.830	1	0.176		
Likelihood Ratio	2.336	1	0.126		
Fisher's Exact Test				0.153	0.086
N of Valid Cases	400				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 21.22. b. Computed only for a 2x2 table

DISCUSSION

The present study provides information about the general apprehension on insight of the local population towards urban vegetation in the city of Faisalabad. With the advent of time, peoples are much more aware and concerned about the urban forests and their impact on ecology and surrounding of society. Every person has a direct contact with the nature to a certain degree, thus it has a definite role in shaping their lives. Nature impacts quality of their life (Bentsen *et al*., 2010). Therefore, the perceptions of the indigenous populaces must be taken into account while planning and implementing decisions regarding urban green spaces (Bonnes *et al*., 2011; Zheng *et al*., 2011.

The current study identified the social demands of the citizens and highlighted their attitudes towards the urban parks and green spaces in order to provide the pertinent information for devising future strategies of urban sustainability to improve quality of life. The findings of this study illustrates the fact that among socio-economic factors age, education, profession and income are the critical ones that actually shape the attitude of the respondents. The findings of our study indicated that most of the respondents were male (59.5%), and fall in the age category of 41-60 years with graduation level of education 27% showed most interest in the assessment of urban trees benefits.

The patronage of urban trees appeared to be low among citizen older than 60 years, accounting for only 16.5%. These findings are in agreement to the results described by Farah *et al*. (2012) where they observed older people in low percentage to visits parks or green spaces. However, some findings of present study were different from similar studies reported by several researchers e.g. an urban forest study in Finland found that the benefits related outdoor activities and exercise were rated most. The least consideration was given to climate and environmental quality such as noise abatement and pollution mitigation (Tyrvainen, 2001). Moreover, results also concluded the diversity in the attitudes of respondents belonging to different income groups. It also exploited that priorities, behavior and trends of the respondents towards urban vegetation differ with respect to their profession and income levels as mentioned by Jim *et al*. (2009). This is very true in case of current study as the maximum percentage of respondents (31.5%) was engaged in doing business.

The study indicated that among the four surveyed categories, *C. erectus* has been extensively planted in parks and urban communities during the last decade (Shams, 2016).While *Eucalyptus camaldulensis*, *V. nilotica* and *Cassia fistula* were abundantly present in institutions and hospitals. Garcia *et al.* (2016) disclosed that exotic species were less suitable for planting in urban area compared to native species. The aesthetic value and shade of tree species makes them the most favorable trees of the urban community (Younis *et al.*, 2018). However, on the other hand certain traits of urban trees like garbage generation, dangerousness, oldness, shadeless and side-walk problems reduce their value in urban areas. Tree favouriteness and dislikeness because of certain traits like garbage generation, sidewalk problem and dangerousness were previously reported by several other researchers around the globe (Chiesura, 2004; Flannigan, 2005; Schroeder *et al*., 2006, Younis *et al*., 2018; Shams *et al.*, 2019). These results reinforce the common notion that aesthetics is the most-easily elicited value associated with the urban forest.

It was concluded from the present study that the most disliked trees were the ones who become a source of garbage, look ugly, become cause of accidents or are not well maintained. Among these, the "garbage producing" trees were the most disliked as their leaves continue to fall constantly (Arnberger and Eder, 2012). Some trees, along road sides and even in houses, owing to their canopy architecture and the root system tend to fall more quickly and become a source of the accident. Similar results have been submitted by Nali and Lorenzini, (2009) in Italy. They pointed that prevalence of dead trees in urban areas was perceived as unpleasant and a stringent risk by the citizens.

***Conclusion*:** For sustainable development of urban forests and green spaces, the views and preferences of the local people are worth considering during the policy making process. This study is a step forward in gathering more comprehensive information about urban trees and their correlation with improved quality and sustainability of urban lives. The study findings suggested that urban vegetation is preferred for certain traits such as size, shade, leafiness, etc. while the *E. camaldulensis, C. erectus* and *V. nilotica* are considered notorious in urban vegetation in Faisalabad. These findings, thus, should be taken into consideration while establishing and planting of trees in parks, hospitals, institutions and urban communities. Further research regarding the opinion of urban dwellers towards participatory urban forestry and obstacles behind the promotion of urban forestry will be beneficial to understand current findings.

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