CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

The Industrial sectors and transport are largely responsible for the air pollution in the cities and the particulate matter is the most pollution causing agent. There are many sources of the particulate emissions which include large industrial plants, medium and small scale industries, refuse burning, household burning biomass for cooking and heating, vehicular exhausts, re-suspended road dust, construction, particles migrating from other regions and naturally occurring dust. These sources emit the particles of different sizes of which the small particles are a cause of serious concern since they affect the public health more than the large particles.

6.2 Air Pollution in Aurangabad

The air pollution seems to be one of the serious problems in Aurangabad city. It is necessary to have a better understanding of the emissions from these sources so as to build a proper plan of action and a strategy to reduce the pollution due to particulate matters. The emission from the two wheelers is a very serious problem in the city. Reduction in number of two wheelers depends on the use of public vehicles by the people. Air pollution inhibits plant growth, reduces stomatal frequency and stomatal index in trees located in polluted areas. These features can be used as indicators of air pollution in an area. It is suggested that such patterns in the plants of polluted areas may be significant in determining the degree of pollution and preventive measures can be taken to minimize the level of air pollution in polluted areas which have been focused in present study. Different responses of plants are observed in polluted and unpolluted atmosphere using different indicator parameters which serve as indicators of pollution and are useful for monitoring and are preferred in present investigation.
6.3 Plant response studies

Plants respond differently to air pollution. It is observed from the study of different parameters and indices that plants growing in non-polluted environment have higher APTI than less polluted environment. Plants having higher air pollution tolerance index are tolerant to air pollution, while plants having lower tolerance index are unable and vulnerable but tolerate the increased level of pollution. In rainy season plants showed higher APTI value than winter. The total chlorophyll, water content, leaf extract pH and the APTI were found in reducing order in plants from unpolluted to polluted areas while the ascorbic acid content of leaf was increased in trees from polluted areas than the unpolluted. Chlorophyll was generally found influenced by the duration and exposure to intense solar radiation in the plants grown in un-shaded areas and was influenced by the shade, restricting the direct exposure to the solar radiation. When the Chlorophyll content increases, the ascorbic acid decreases in plants as a consequence of air pollution which indicates that the chlorophyll content and ascorbic acid content have negative correlation in different seasons.

The dust deposition on leaves varied in season to seasons. It is observed that in winter, dust deposition is more than summer and rainy season. Stomatal density and stomatal index also was reduced from control to polluted areas. *Azadirachta indica* and *Mangifera indica* are found to be the tolerant tree species than *Polyalthia longifolia* and *Dalbergia sissoo*. In rainy season plants showed higher APTI value than summer and winter. *Azadirachta indica* found to be most tolerant tree species among all other species. It has dense canopy. The economic and aesthetic value of this tree species is also well known. *Mangifera indica* is also another tree species having good API and tolerance to air pollution. It is an evergreen tree having dense canopy, rough leaves and valuable for aesthetic and economic uses. *Polyalthia longifolia* is also evergreen tree but its economic uses are less so the API value calculated is moderate. *Polyalthia longifolia* is an evergreen tree but its economic uses are less so the API value calculated is moderate. *Dalbergia Sissoo* is a deciduous tree and the size is medium texture is
smooth so the API value calculated is poor and not recommended for the planting nearby roads.

Plants responded differently according seasons to seasons. Climatic conditions affected the biochemical process in plants. Chlorophyll content was decreased in plants because of some natural and anthropogenic factors. Alkaline conditions caused by dissolution of dust particles in cell sap led to pigment degradation while shading effect of dust was created due to increased number of vehicles. There was an increase in ascorbic acid content in leaves with a decrease in chlorophyll content. The concentration of ascorbic acid in plant species were maximum in winter followed by summer and rainy season.

6.4 Public opinion

According to the interviewers, present condition of air in Aurangabad city is relatively clean and good. Industries are the major source of air pollution in adjoining area of Aurangabad city. As reflected in the answers responding the questionnaires, citizens of Aurangabad city are suffering with some respiratory and other type of diseases by air pollutants. To avoid air pollution in city, the air pollution tolerant trees like neem, mango, peepal, ashoka etc. are suggested by the citizens. The information generated is helpful for the urban planners working for Municipal Corporation and those who have role in dealing with the environment, to have more ideas in developing design criteria for safer urban environment and a better quality for human beings.

6.5 Specific Suggestions and Recommendations

6.5.1 Indoor air pollution control

The WHO (www.who.int) suggested some remedial measures to control indoor pollution. These include use of cleaner and more efficient fuels replacing the solid fuels, use of cleaner and efficient energy producing technology. People should be encouraged to use improved stoves or install biogas plants for household energy needs to lower indoor pollution levels in poor rural communities. There should be improvement in the ventilation in homes, schools and at the working environment. Solutions must be found related to problems on dampness in housing to decrease
the risk of exposure to hazardous microbes. Tobacco smoking must be avoided. Smoking in public buildings must be prohibited. Risk reduction strategies for indoor pollution must be fixed. Use of cleaner fuels like LPG for domestic consumption would reduce indoor air pollution to a great extent.

6.5.2 Outdoor air pollution control

The WHO also suggested some remedial measures to control outdoor pollution (www.who.int). As per these suggestions, the scientific and technological solutions should be evolved to reduce emissions from stationary sources and conventional vehicles, alternative fuels must be investigated and the control mechanisms efficiently implemented. For improving the air quality, an integration of environmental and health considerations in urban planning is advisable. This also includes management aspects like locating offices and commercial space in the areas convenient for pedestrians and bicyclists in order to reduce the need for motorized transport, preventing traffic congestion, creating green areas, separating pedestrians and bicyclists from road traffic and locating non-residential functions around urban highways. Transportation systems should be improved which will create alternative personal vehicles to insure no or low emissions. Electric or alternative fuel–powered buses and cycling or walking are some of these alternatives. The use of the clean, renewable energy sources, like as solar and wind-powered energy, hydel energy and geothermal energy may be promoted. Dependency on conventional and polluting sources of energy like wood and fossil fuel must be reduced. Monitor regularly the air quality and informing the public about the status and effective pollution reduction activities and associated health benefits help a lot in improving outdoor air quality.

6.6 Control Industrial pollution

Industries should use eco-friendly technology and should regularly maintain their machineries. Steps should be taken to shift the industries located in the non conforming zones to the designated industrial areas. Waste minimization technologies should be adopted involving process change, raw material substitution, improved housekeeping. Like that waste utilization technologies
involving reclamation and utilization of wastes as secondary raw material should also be adopted. Incentives should be given for the development and adoption of clean technology and emission reduction. Database on available technologies, their performance, sources, investment required, etc, should be created, regularly updated and widely disseminated.

Emission standards for various categories of industries need to be strengthened. To shift from pollution control to pollution prevention, rules related to load based standards instead of concentration based standards need to be enforced. Appropriate siting of high pollution potential industries/projects should be done. Fiscal incentives for pollution prevention and control measures should take in hands. Other pollution abatement measures should be adopted. The monitoring network requires a massive quality control program and expansion of its operations to cover new stations.

Adequate air pollution control equipments like dust collectors and scrubbers should be used in the industries. Monitoring programs should also implement in Industries. In power plants there should be use of washed or beneficiated coal. Installation of bag filter for utilization of fly ash should be done. Identification of new sites for fly ash disposal and methods of utilization should be identified.

6.7 Control vehicular pollution

Vehicles contribute significantly to the total air pollution load in most urban areas, vehicular pollution control deserves top priority. To avoid the increased level of air pollution public transport systems have to make strong. Rules and regulations related to air pollution should be implemented strictly. Vehicles should be inspected regularly and strict actions should be taken for the defaulters. Modifications in test procedures and standards for additional pollutants should be introduced for testing in all categories of vehicles. On road inspection of vehicles should be planned. There should be restriction of entry of non-destined commercial vehicles in city. Restriction should put on goods vehicle and passenger buses entering the city. The transport department should amend the motor vehicle act to
facilitate the registration of only 4 stroke two wheelers, auto rickshaws and also converting 2 stroke two wheelers and auto rickshaws to 4 strokes.

Traffic planning and management should be done. Also, construction of express highways linking major urban areas should be undertaken. Taxes on fuels, vehicles and the revenue generated should be used for pollution control measures. Use of alternative fuels such as CNG/LPG/Propane/ battery operated vehicles should be encouraged. There should be expansion of CNG dispensing facilities and increased fiscal incentives for CNG kits. Inspection and maintenance system should make strong. It should include testing of various elements of safety, road worthiness and compliance to pollution norms. Gasoline engines can be replaced with electric cars or ones powered by fuel cells that produce less pollution. It is easier to keep those going than to create an entirely new power system based on solar panels, wind turbines and other forms of renewable energy. Cars with conventional gasoline engines can be fitted with catalytic converter that removes some of the pollutants from the exhaust gases.

6.8 Shoulder responsibilities on oil companies

The public sector oil companies should start supply of diesel containing 0.05% sulfur and petrol with Benzene content of 1%. The oil companies should keep a vigilance to check the supply of loose 2T at the retail fuel outlets, so that this can be curbed and action can be taken against the defaulters. Low leaded petrol (0.15 g/l) + unleaded petrol should be introduced. Leaded Petrol should be phased out. There should be reduction of sulphur content in diesel and petrol.

6.9 Create Public awareness

Without people being aware of pollution and its damaging effects all the clean technologies are useless. Many times people pollute the environment without even realizing it. Helping people to understand the causes and effects of pollution and what they can do to tackle the issue is the best way to tackle the problem of air pollution. Switch to low energy lamps, whenever possible use a laptop computer instead of a desktop, dry your clothes outdoors and allow entering the sunlight in your home. Use more sunlight than electrical light. Making electricity in
conventional power plants generates pollution so whatever you will do to save energy will help to reduce pollution. Massive thrust should be provided to mass awareness campaigns involving community organizations such as residents associations, students, voluntary bodies and NGOs. Strategic action plans for implementation should be devised. Training and education for the industry, governmental agencies and the public, as well as greater coordination among institutions is essential. People should be encouraged for the replacement of old vehicles with new vehicles on gaseous fuels. Maintenance and regular servicing of vehicles should be done. Alternative fuel like biofuel should be used. Cars are the biggest source of air pollution in most urban areas. Travelling some other way like bus or a train or for shorter distances walk or cycle through a town or city helps to keep the air clean. If it is not possible then drive efficiently to save fuel and money. Education awareness will be effective to make people aware about how to control pollution and keep our environment safe and clean. Neighborhood air pollution problems can be tackled through local community campaigns. Mostly in city areas where there is more number of industries and vehicle we can avoid pollution through environmental awareness programs. Media (T.V and Newspaper) should make awareness about the safe and clean environment. Air pollution tolerating trees like neem and mango should be planted nearby the roads so that they will absorb harmful air pollutants and keep the environment pollution free.

6.10 Environment management Plan

An effective environment management plan should be devised in such a way that includes environmental strategy, regulation, institutional capacity-building, economic incentives and penalties. Appropriate design of green belts and proper selection of plant species should be done. Wherever necessary, the policies/standards need to be reformulated keeping in mind the fast-changing scenario. Measures such as stringent emission norms for vehicles, cleaner fuel quality, timely inspections and maintenance programs are expected to make some contribution towards improvement in the air quality. New initiatives and definite programs need to be formulated for the efficient management of urban air pollution. Air quality standards should be based on local dose-response
relationships for which appropriate environmental epidemiological studies can be undertaken. Measure such as pollution bulletins and air pollution forecasts should be started on a regular basis. Plans should be proposed to move public transport to run on clean fuels. Any other form of public transport can be planned like metro or bus rapid transit. Transport policy should be formulated to induce a modal shift from private to public modes of transport, implementation of parking policy, reduce traffic congestion, planning and construction of road by-pass, removal of encroachment on roads, promote no motorized transport, traffic signaling system, penalties for traffic rule violations.

A comprehensive urban air quality management strategy should be formulated that includes information related to urban planning, ambient air quality, emission inventory, and air quality dispersion models. Effectiveness of environmental impact assessment as a tool and environmental audit should be critically assessed. Systematically planned emission load mapping studies should be undertaken at regular intervals. The government formulated legislations, policies, and programs for protecting the environment should be implemented strictly. The air (Prevention and control of pollution) Act, 1981 and the Environment (Protection) Act, 1986 should be followed strictly. Ambient air quality standards should be followed strictly.

For air monitoring in city areas number of monitoring stations, frequency of monitoring should be increased. Quality control of air quality data monitoring of additional pollutants should be implemented. Automatic monitoring stations should be installed. New studies should be planned for the effects of air pollution. Studies should be done on health impact of air pollution in the city area. Agency should be formed to supervise, monitor and coordinate and report on the progress of implementation of the action plan. Implementation plan for tree plantation Green belt development should be formulated.
6.11 Promote miscellaneous activities

In miscellaneous activities, environment friendly people who care for environment should never burn the biomass on open. They should make the plan for effective control and find alternative ways like composting etc. Citizens should be encouraged for vermi-composting in their housing societies, institutions and hospitals. Construction of vermi-compost pits should made compulsory in the newly constructed housing societies. Compost their household and garden refuse, bury it, or dispose it some other way. Avoid the vicious solvents in paints, varnishes and wood preservatives. Buying new things is fun, but reusing old things can be just as good. Try to adopt the principle of 3 R’s i.e. Reduce, Reuse and Recycle. Cigarettes smoke also creates air pollution. It contains chemical called nicotine. It also causes all kinds of health problems. Demand for cleaner fuel instead of conventional fuel. Installation of adequate pollution control measures in industries, feasibility of alternate cleaner fuels and implementation should be done.

The revenue generated from city areas should be used for enforcement, collection, treatment facilities and research and development for the betterment of air quality of city. Incentives should be given for environmentally benign substitute, technologies and energy conservation. Promotion of renewable energy sources such as hydropower, wind power and solar power should be done.
SUMMARY

7.1 Introduction

Air pollution is a serious concern nowadays. It does not harm only the animals including human being but to the vegetation present in urban areas. The responses of plants to air pollution provide a simple and low cost monitoring and reference method for gaseous pollutants. Trees have their own tolerance ability against the air pollution. When the pollution load increases, their tolerance capacity reduces. These tolerance indices of some selected tree species grown in and around Aurangabad city has carried out in the present research work. Different plant parameters were studied for biomonitoring of air pollution in Aurangabad city. These includes visible foliar injury, membrane permeability, ascorbic acid, relative water content, chlorophyll content and leaf extract pH. The values of these four parameters were put in the standard formula of APTI and Air pollution tolerance index of some selective tree species were determined.

7.2 Details of studies conducted

Aurangabad is a famous city in our country due to its famous tourism spots like Biwi ka Makbara, Panchakki, Aurangabad caves and also the Ajanta and Ellora caves which are in the district of Aurangabad. The city has more than 12 lacks population. Four species of plants were selected from the city area for the study. Out of these two are Evergreen (*Mangifera indica* and *Polyalthia longifolia*) while other two are Deciduas (*Azadirachta indica* and *Dalbergia Sissoo*). These tree species are most common, economically important and their performances to tolerate pollution are relatively good as compared with other trees. The present study was planned to study the tolerance of these trees against the air pollution. The study sites for plant sampling were 1) University area (Reference site) 2) Cannaught Area (Commercial zone) 3) Kranti chowk (High traffic zone) and 4) Chikalthana MIDC (Industrial zone).
Detailed study of the selective tree species tolerance to air pollution on plants was carried in present research. The comparison of effect of pollution on plants at high polluting, moderate polluting, less polluting and unpolluted areas is made on the basis of measurable parameters. Prediction of the pollution reduction potential of trees to suggest tree plantation in the city is successfully completed through the research supporting with the field survey method based on questionnaire. In all 300 citizens including students and employers were interviewed and the data was recorded. The information generated is helpful for the landscape architects, urban planners, those who have roles in dealing with the environment, to have more ideas in developing design criteria. Thus, they will have the tools to design a safer urban environment and a better quality of life for human beings.

The theoretical background of air pollution and meteorological parameters of the city is taken into account during the present investigation. According to the planning the status of air pollution is studied and meteorological parameters are discussed in detail. The literature survey was carried out to know the past and present research status and co-relate the study undertaken at Aurangabad under the present study. The review of past and present literature on the air pollution tolerance indices was entirely not only of the study region but also of the other regions and even other countries. Historical background of the subject matter is discussed while the role of trees for biomonitoring of air pollution is stressed.

The experimental methods to evaluate the impact of pollution on plants in terms of certain parameters like chlorophyll, ascorbic acid, relative water content and leaf extract pH are referred from literature and used as per need. Plant species were selected after conducting preliminary field survey. Standard methods were used for the necessary laboratory analysis.

The data collected is treated as experimental results and detailed outcomes of experimental analysis have been carried out. These includes the matters related to impact of pollution on chlorophyll content of plants, effect of tree canopy-shade on pigment contents, seasonal variation in chlorophyll, ascorbic acid, leaf extracts
pH, relative water content, seasonal dust deposition and overall APTI of some selected tree species. Stomatal studies of plants are also discussed in detail with respect to impact of pollution on stomatal size and stomatal density. Total chlorophyll reflected different responses from species to species to the air pollution.

In *Azadirachta indica* the concentration of total chlorophyll content was 10.25 mg/g in leaves sample collected from reference site (University area) while the concentration of total chlorophyll was 7.57 mg/g in leaves sample collected from site Kranti chowk. In *Mangifera indica* the concentration of total chlorophyll content was 8.26 mg/g in leaves sample collected from reference site (University area) while the concentration of total chlorophyll was 4.14 mg/g in leaves sample collected from site Kranti chowk. In *Polyalthia longifolia* the concentration of total chlorophyll content was 9.13 mg/g, in leaves sample collected from reference site (University area), while the concentration of total chlorophyll was 5.92 mg/g in leaves sample collected from site Kranti chowk and in *Dalbergia sissoo* the concentration of total chlorophyll content was 7.21 mg/g, in leaves sample collected from reference site (University area) while the concentration of total chlorophyll in leaves sample collected from site Kranti chowk was 4.35 mg/g.

Dusted or crusted leaf surface is responsible for reduced photosynthesis and thereby cause reduction in chlorophyll content. Any reduction in chlorophyll corresponds directly to the reduced plant growth (Joshi and swami, 2009). Negative correlation of chlorophyll and ascorbic acid content in different seasons is observed. In *Azadirachta indica* when chlorophyll content was 10.25 mg/g that time Ascorbic acid recorded was 7.90 mg/g same results were recorded in case of *Polyalthia longifolia, Dalbergia sissoo* and *Mangifera indica* in rainy season. Ascorbic acid is a strong reductant and it activates many physiological and defense mechanism. Its reducing power is directly proportional to its concentration. However its reducing activity is pH dependent. In case of *Azadirachta indica* when pH is high (5.11) at that time concentration of ascorbic acid is low 8.25 mg/g. Hence the leaf extract pH on the higher side gives tolerance to plants against pollution (Agrawal, 1988). In case of *Mangifera indica* the leaf pH showed
maximum (6.2) during monsoon with decrease in winter (5.7) and then in summer (5.3) same results were found in case of *Polyalthia longifolia*, *Dalbergia sissoo* and *Azadirachta indica*. Tripathi and Gautam (2007) also reported the increase in the concentration of ascorbic acid in the leaves of plants near roadside due to enhanced pollution loads of automobiles. Ascorbic acid concentration in *Dalbergia sissoo* is higher (6.25 mg/g) than those of reference sites (5.86 mg/g) in summer season.

The harmful effects of washable dust deposition are evidenced by the reduced leaf area and low chlorophyll content. Dust forms a uniform coating over the leaf surfaces, plugging the leaf stomatal aperture and impairing gas exchange (Stern, 1977, Khoshoo and Ahmad, 1981, Krishnamurthy and Rajachidambaram, 1986). The present study shows that there significant variation in dust deposition in different plants and in different seasons. In winter season higher dust deposition (5mg/cm$^2$) in *Mangifera indica* may be due to the rough surface of the leaf, while less dust accumulation in *Mangifera indica* may be due to the less surface area and smooth leaf surface and vertical position of the leaf. The effluence of leaf characteristics on dust accumulation have also been studied by (Vora and Bhatnagar, 1986, Somshekhar, et al., 1999, Garg, et al., 2000).

Stomatal density calculated in *Azadirachta indica* was 16.11 mm$^2$ at reference site while at polluted site it was 13.33 mm$^2$. In *Mangifera indica* it was 6.11 mm$^2$ at reference site, while at polluted site it was 5.00 mm$^2$. In *Polyalthia longifolia* it was 6.94 mm$^2$ at reference site, while at polluted site it was 5.55 mm$^2$ and in *Dalbergia sissoo* it was 5.00 mm$^2$ at reference site and 4.16 mm$^2$ at polluted site. Stomatal index calculated in *Azadirachta indica* at reference site was 14.28, while at polluted site it was 14.11. In *Mangifera indica* it was 20.00 at reference site, while at polluted site it was 16.07, and in *Polyalthia longifolia* and *Dalbergia sissoo* it was 16.16, 20.00 at reference site and 20.00 and 18.75 at polluted sites respectively.

Leaf length calculated in *Azadirachta indica* was 6.0 cm at reference site, while at polluted site it was 5.0 cm. In *Mangifera indica* it was 20 cm at reference site while, at polluted site it was 18 cm in *Polyalthia longifolia* and *Dalbergia*
sissoo it was 18 cm, 7.0 cm at reference site and 16 cm and 6.5 cm at polluted sites respectively. Leaf width calculated in *Azadirachta indica* was 2.5 cm at reference site while, at polluted site it was 2.0 cm In *Mangifera indica* it was 5.5 cm at reference site while, at polluted site it was 4.8 cm. In *Polyalthia longifolia* and *Dalbergia sissoo* it was 5.4 cm, 6.0 cm at reference site and 4.0 cm and 4.2 cm at polluted sites respectively.

APTI indices of common trees in Aurangabad city (India) were estimated from four sites in different seasons and results are compared. Highest values were recorded in rainy season. The plant leaf samples were collected from natural clean zone referred as reference site, from industrial zone, commercial zone and high traffic zone. It is observed that *Azadirachta indica* is having highest APTI value of 21.23 followed by *Mangifera indica*, *Polyalthia longifolia* and *Dalbergia sissoo* having APTI values 19.19, 17.86 and 16.16 respectively. In case of *Azadirachta indica* the observed APTI values were highest in rainy season. At site-I (Reference site) it was 21.23 which was followed by summer (19.04) and winter season (18.36). At site II- (Cannought place) highest APTI value calculated was 20.10 in rainy season, which was followed by winter (18.54) and summer (18.14). At site III- (high vehicular zone) highest APTI value was 16.16 in rainy season which was followed by winter (15.19) and summer season (14.60). At polluted site (Chikalthana MIDC) highest value of APTI recorded was in rainy season (14.18) which was followed by winter (13.99) and summer season (13.97)

In case of *Mangifera indica* the observed APTI values were highest in rainy season. At site-I (Reference site) it was 19.19 which was followed by summer (16.48) and winter season (16.02). At site-II (Cannought Place) the highest APTI value was 17.96 in rainy season, which was followed by summer (14.74) and winter (14.70). At site III-(high vehicular zone), the highest APTI value was 14.91 in rainy season which was followed by summer (13.87) and winter season (13.63). At polluted site (Chikalthana MIDC) highest value of APTI was recorded in rainy season (13.54) followed by summer (12.97) and winter season (12.85).
The observed APTI values in *Polyalthia longifolia* were highest in rainy season. At site-I (Reference site) it was 17.86 which was followed by winter (17.22) and summer season (16.98). At site II (Cannought Place) the highest APTI value calculated was 17.82 in rainy season. It was followed by winter (16.48) and summer (16.02). At site III- (high vehicular zone), highest APTI value was 16.48 in winter season followed by summer (16.02) and rainy season (15.82). At polluted site (Chikalthana MIDC) highest value of APTI recorded was in rainy season (15.07) followed by summer (14.45) and winter season (14.01).

In *Dalbergia sissoo* APTI values were highest in rainy season. At site-I (Reference site) it was 16.16 which was followed by summer (15.00) and winter season (14.09). At site-II (Cannought Place) highest APTI value calculated was (15.99) in rainy season. It was followed by summer (14.12) and winter (13.64). At site-III, highest APTI value was 13.09 in rainy season which was followed by winter season (12.76) and summer season (12.67) while at polluted site (IV) highest value of APTI 12.03 was recorded in rainy season which was followed by summer (10.81) and winter season (10.71).

It is concluded from the present investigation that the plant parameter chlorophyll increased in reference site like University campus while it decreased in polluted areas of Kranti chowk and Chikalthana MIDC but in case of ascorbic acid it was found that it increases in polluted environment and decreases in less polluted environment like University campus. Leaf extract pH becomes acidic in polluted environment while the relative water content of leaves reduces in polluted environment. The APTI values of tree species varies season to season. In rainy season the APTI values of trees is more than summer and winter seasons respectively, vehicular emissions adversely affect and reduce the chlorophyll contents of the plant. Trees grown at polluted sites show less chlorophyll content than trees at unpolluted site. Chlorophyll content of plant is more in winter than summer and rainy seasons respectively. Ascorbic acid content of leaves is more in winter than summer and rainy seasons. Leaf extract pH is more in rainy season than winter and summer seasons while relative water content of leaves is more in rainy than winter and summer seasons respectively. Dust deposition also varies from
season to season. The deposited dust on leaves is more in winter season than summer and rainy season. Stomatal responses show various responses according to the different atmosphere. In polluted environment stomatal index and stomatal density is less than unpolluted environment.

The *Azadirachta indica* and *Mangifera indica* are the two species having good anticipated performance index (API) because of their biological and economic uses while *Polyalthia longifolia* and *Dalbergia sissoo* are moderate to tolerate the level of air pollution and it shows moderate and poor API values respectively. The size of stomata, length and width of leaves also decreases in polluted environment. The social survey suggest that people are well aware about the environmental conditions, importance of trees and peoples wish to live in a better environment and are expecting the help and facilities from state and central government to live in the better environment.