

**ADVANCES OF ROADSIDE
AVENUE IN URBAN AREA FOR
ENVIRONMENT PURIFICATION**

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**Advances of Roadside Avenue in Urban Area for
Environment Purification**

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Introduction

What is Avenue-

Avenue is an access to a tree-lined country house. Generally, it means a row of trees planted along roads and paths. Avenue plantations are one of the key practices of growing trees along streets and canal sides to add aesthetic value and provide shade to roaming animals and travelers.

What is Tree-

The tree is a perennial plant with a well-defined trunk, a canopy at the top, an elongated trunk and supported branches. Trees are the most important part of human life because they provide oxygen for humans to breathe.

Benefits of Tree-

- Release the oxygen we need to breathe.
- Improve our air quality by filtering out harmful dust and pollutants.
- Trees can reduce storm water runoff, reduce waterway erosion and pollution.

- Trees have reduced the urban heat island effect by evaporative cooling.
- Provide food, shelter and homes for many birds and mammals.

Benefits of Avenue Planting

How Roadside Trees Help Pedestrians and Travelers-

- Roadside trees provide shade.
- They provide shelter from the rain.
- Protect against the wind.
- Road side trees serve as shelters.
- Prevent erosion and protect the side walls.

History-

- Emperor Ashoka was the first Indian king to plant shaded roadside trees.
- During the Mughal Empire, Sher Shah Suri built the famous Grand Trunk Road and planted tree-lined roads on both sides.
- In 1938, Chaturvedi drew government attention to the new problem of neglect of plantations by preparing a work program for U.P. roads.

- After independence, Dr. M. S. Randhawa proposed a plan to planted trees along highways and streets in the national bio-aesthetic planning.

How roadside trees help the environment

(1) Temperature-

- Plants can be successfully used to reduce heat.
- Their leaves capture, reflect, adsorb, and transmit solar radiation.
- Trees are air conditioners to cool down temperature, shade buildings in the summer, and block the wind in the winter.
- One big tree can produce the cooling effect of 10 indoor-sized air conditioners that operate 24 hours a day.

- Under trees, dew and frost are less common because less radiant energy is emitted from the ground.

(2) Air Pollution-

- Annual quality trends from 2009 to 2015, based on annual average pollutant concentrations, were seen along with comparisons with existing National Ambient Air Quality Standards (NAAQS), 2009.
- The air quality of the three major pollutants (SO₂, NO₂ and PM₁₀) has been determined to understand the pollution trends in Delhi from 2009 to 2015.
- As can be seen from the figure, some of the tree pollutants have SO₂, NO₂, PM₁₀, NO₂ and PM₁₀ concentrations that exceed the specified standard values.

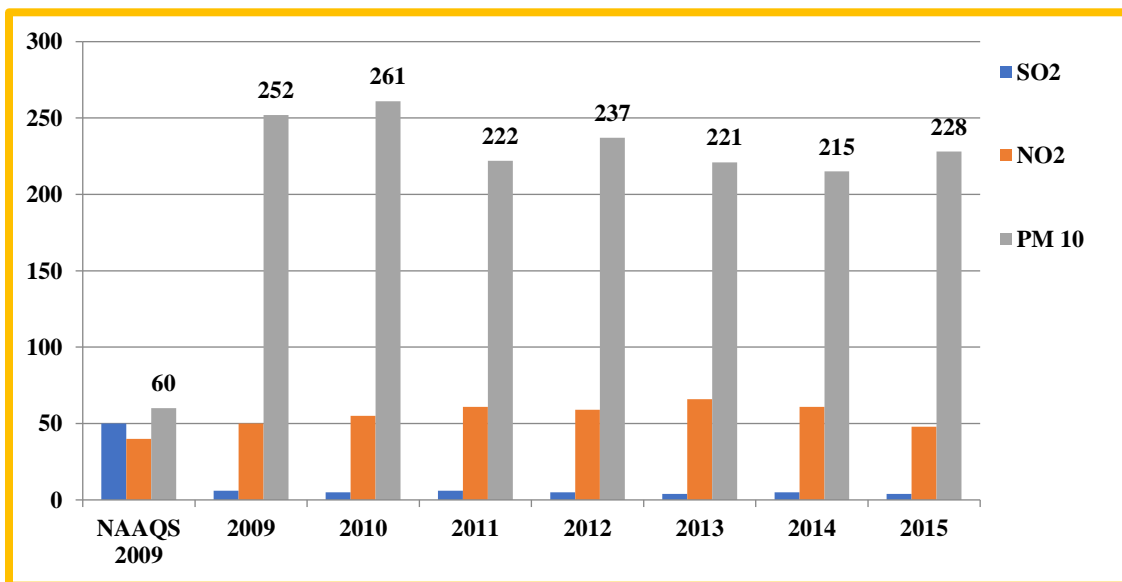


Fig: Air quality trends in Delhi (2009 to 2015) based on manual air quality monitoring station.

(3) Noise Pollution-

- Noise pollution from transportation, construction, public works and industry affects human systems.
- Noise levels above 80 decibels cause tension and elevated blood pressure.
- Continuous exposure to noise levels of 115-120 db can cause permanent deafness.
- In addition to engineering techniques, for noise reduction plant can be successfully used.
- Urban residential areas may be protected by rows of dense shrubs supported by rows of tall trees 20 feet wide.

(4) Carbon Sequestration-

- Increased CO₂ accounts for about 65% of the current direct radiative forcing from greenhouse gases produced as a result of human activity.
- The concentration of CO₂ in the atmosphere increased by 30% due to an annual increase in emissions from fossil fuel combustion and cement production per industrial time by 0.4%.
- Trees remove CO₂ from the atmosphere during photosynthesis to form carbohydrates and return oxygen as a by-product.
- One hectare of plants absorbs about 3.7 tons of CO₂ annually and produces 2.5 tons of life-sustaining oxygen.

Objectives-

- To reduce the effects of air pollution and dust, as trees and shrubs are known to be natural sinks of air pollutants.

- To provide much needed shade on glaring hot streets during summer.
- It reduces the impact of increased noise pollution due to an increase in the number of vehicles.
- Stop soil erosion on the embankment.
- Moderate the effects of wind and incoming radiation.
- Employment to local people.

Types of Avenues

- **Single Avenue-** When the street is not wide enough to accommodate one or two rows of trees, it is called a single avenue.
- **Double Avenue-** A Street wide enough to accommodate two rows of trees is called Double Avenue.
- **Pure Avenue-** A particular type of plant is planted along a long stretch known as a pure street, which is named after that particular tree such as Mahua Avenue, Tamarind Avenue, Mango Avenue, etc.
- **Mixed Avenue-** Trees with flowers of different colors are called mixed avenue.

Selection of trees for Avenue

- Trees need to be resistant to the gas emitted by the vehicle.
- Trees should be resistant to stray goats and cattle.
- They must grow rapidly and be strong.
- It is deeply rooted and can withstand drought and flooding.
- You need to plant evergreens.

- Such trees should not be planted, which drops their leaves and flowers and pollutes the place.

Avenues for National Highways

Selection of Trees- Road trees should be selected with regard to rainfall, soil, temperature and water level.

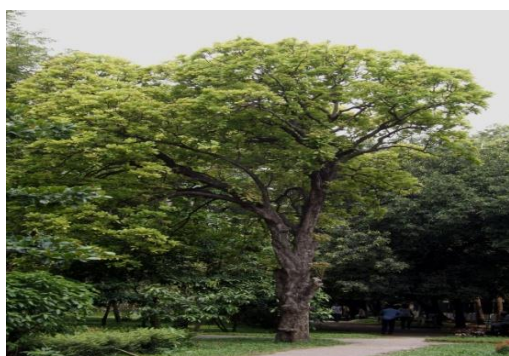
- Only those trees that are shaded and economically valuable should be planted along the road.

The following trees are recommended-

- 1. Neem (*Azadirachta indica*)-** Its leaves and bark are used medicinally and its seeds provide valuable oil.



- 2. Mahua (*Madhuca longifolia*)-** Fruits are edible and seeds make oil. It is also ornamental and its copper red color



leaves appear beautiful in March-April months.

- 3. Imli (*Tamarindus indicus*)-** The fruits and trees are also valuable.



- 4. Sheesham (*Delbergia sissoo*)-** It is an excellent timber producing tree.



Avenue for town roads

Choice of Trees –

- Shade and economic benefits should be the criteria for choosing trees for national and district roads through the country.
- On the streets of the city, shade and beauty are the only criteria to consider when choosing a tree.

- 1. Gulmohar (*Delonix regia*)-** Gulmohar is known for its beautiful flowers. However, it also has some

medicinal properties such as anti-diabetes and antibacterial activity.

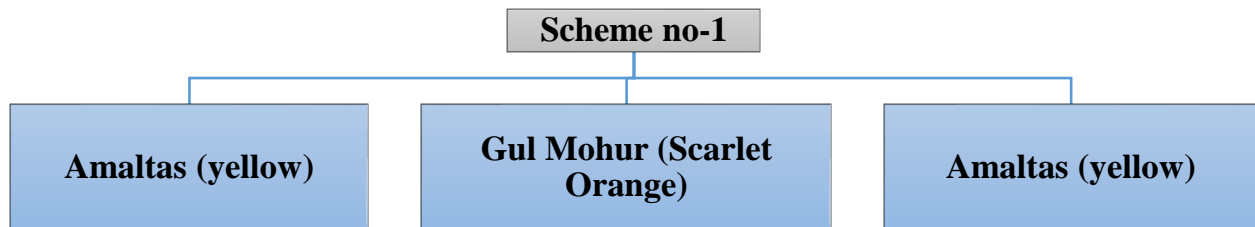


2. **Amaltas (*Cassia fistula*)**- Suitable for creating frames and screen effects. Jacaranda can be altered along the streets of Amaltas.

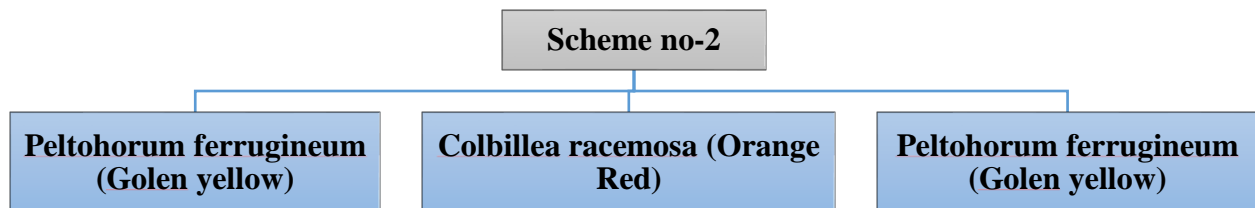
3. **Jacaranda (*Jacaranda mimosifolia*)**- The dried leaves of jacaranda are used in ointments to heal wounds. The leaves are also used as a wound healing agent and the infusion is given as a pectoral.

Colour schemes-

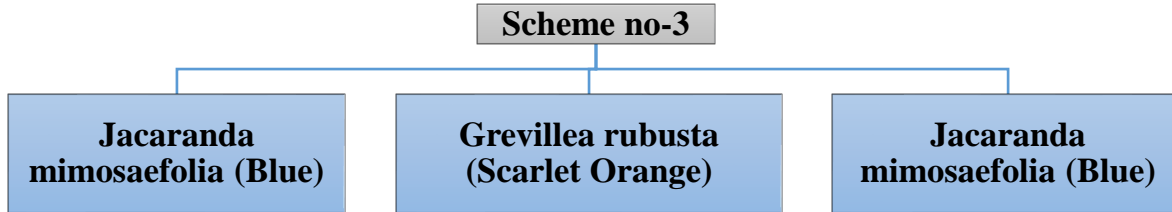
- The rich yellow colour of Amaltas flowers contrasting with the scarlet orange colour of gulmohar flowers in the month of May.



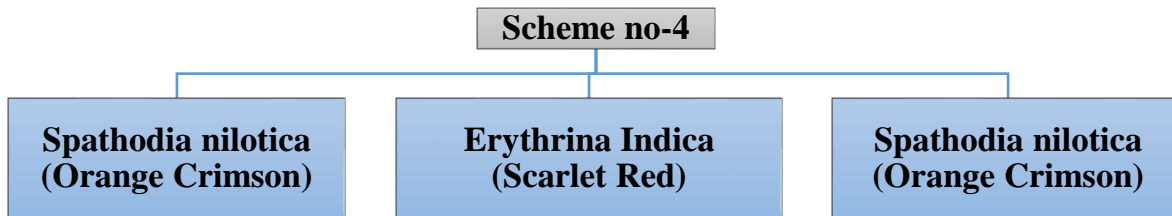
- This colour scheme is very effective in October, when both these trees are flowering and a colour effects similar to that in scheme No. 1 is produced



- Both these trees flower in April together and a beautiful colour effect is produced.



- Both these trees flower in March, when they are blaze of colour.



Planting Procedure

Preparation of Pit-

- The pits should be prepared two months before planting so that the soil is exposed from the scorching sun.
- The size of the tree pit should be 1.2 x 1.2 x 1.2m. The pits must be properly dug to the specifications.
- When digging, remove the topsoil to a depth of 6-9 inches and set it aside.
- If the water retention capacity of the subsoil is poor, it is necessary to treat it with 3 parts of organic manure + 2



parts of sweet soil + 1 part of sand [3: 2: 1]. This will improve drainage conditions and improve soil fertility.

- After adding water, organic manure can generate heat. Therefore, it is necessary to take precautions to protect the plants. In addition, one-



third of the compost manure is added during refilling.

Advances for Avenue Planting

- The first row along the highway consists of small and medium-sized ornamental trees.

- Subsequent row consist of some sort of ornamental or shaded trees taller than the first row, depending on the width available.
- In rural areas, the last row is always made up of tall trees in the shade.
- Medium shrubs are planted.
- Herbaceous species as a ground cover plant on a special landscape in the center and on the slopes of the embankment.

Species Recommended For First Row of Avenue Plantation-

Sr. No.	Soil	Botanical Name	Local Name
1.	Loamy	<i>Delonix regia</i>	Red gulmohar
2.	-	<i>Cassia fistula</i>	Amaltas
3.	-	<i>Bauhinia spp.</i>	Kanchnar
4.	-	<i>Cassia nodosa</i>	Cassia
5.	-	<i>Jacranda mimusifolia</i>	Jacaranda
6.	Water logged	<i>Terminalia arjuna</i>	Arjun
7.	-	<i>Syzygium cuminii</i>	Jamun
8.	-	<i>Cordia dictoma</i>	Lasoda
9.	Alkaline	<i>Pongamia pinnata</i>	Kanji
10.	-	<i>Albizzia lebbak</i>	Kala Siris

Species recommended for second row except the last row of avenue plantations-

Sr. NO.	Soil	Botanical Name	Local Name
1.	Loamy soil	<i>Melia azadiracta</i>	Bakain
2.	-	<i>Pongamia pinnata</i>	Kanji

3.	-	<i>Gravillea robusta</i>	Silver Oak
4.	-	<i>Albizzia lebbek</i>	Kala Siris
5.	-	<i>Dalbergia sissoo</i>	Shisham

Shade trees recommended for last row in road side Avenue-

Sr. No.	Soil	Botanical Name	Local Name
1.	Loamy	<i>Ficus religiosa</i>	Peepal
2.	-	<i>Ficus infactoria</i>	Paker
3.	-	<i>Madhuca indica</i>	Mahua
4.	-	<i>Mangifera indica</i>	Mango
5.	-	<i>Azadirachta indica</i>	Neem
6.	-	<i>Tamarindus indica</i>	Imli
7.	-	<i>Syzygium cuminii</i>	Jamun
8.	Sandy	<i>Dalbergia sissoo</i>	Shisham
9.	Alkaline	<i>Azadirachta indica</i>	Neem
10.	-	<i>Pongamia pinnata</i>	Kanji
11.	-	<i>Terminalia arjuna</i>	Arjun
12.	-	<i>Syzygium communi</i>	Jamun

Plantation Scheme-

- Planting of Tree along the highway turfing with grasses and shrub/herb.
- Central / Special landscape / Embankment slope planting.

➤ **Plantation schemes are broadly divided into categories -**

Height of the plants

More than 2 mts.

(A) Tree planting along the highways

1. Ornamental plant except last row-

Distance from embankment	1.0 mt. away from the toe of the embankment
Spacing between plant to plant	3 mts.
Spacing between rows	3 mts.
Size of the pits [Normal soil]	60x60x60 cm
For Alkaline soil [Usar]	By Augur
Water logged areas	Mounds with height varying depending on the water level
Species recommended	As per annexure
No. of plants per km	333
Activity and time schedule	As per table
Height of the plant	1.5 to 2 m

2. Shade plants [Last row] –

Distance from the preceding row	3 mts.
Spacing between plant to plant	12 mts.
Size of the pits [Normal soil]	60x60x60 cm
Alkaline soil [Usar]	By Augur
Water logged areas	Mounds
Species recommended	As per the table for shade plants
No. of plants per km	84

(B) Median plantation

- The species planted in the median are low or medium height with a decorative value to improve the visual experience of the street corridors.
- It also functions as a privacy screen to prevent the glare of incoming vehicles.
- The recommended median species are mainly bougainvillea and kaner.
- Bougainvillea is considered as the most suitable species due to its high aesthetic value.
- It also withstands extreme temperatures and climatic conditions and requires less water.



Guidelines for median plantation

- One or two rows of flowering shrubs are recommended, depending on the different widths of the medians of the different sections.
- For sections with an average width of less than 1.5 meters, only lawn is recommended.

- A row of shrubs with an average width of 3 meters. It has been proposed to plant two rows of flowering shrubs with an average width of 5 meters.
- Only two rows of shrubs are planted with a median width of 5 meters, and these plants are placed 1.5 meters from the inner edge of the median strip.
- The plants are spaced 3x3 meters apart and the planting pits are 0.6m in diameter and 0.6m deep.
- Therefore, the number of plants per km is 333 if you propose one row and 666 if you propose two rows.

Protection Measures

- Fencing of single row plantations is done with iron / brick / cement protection.
- Locally available bamboo shelters and thorn fences are also available.
- Multiple rows of plants are preferably surrounded by barbed wire.
- Live fences / bamboo fences / thorn fences can also be used if protection can be guaranteed.

Traditional method of tree transplantation

Planning-

The tree should be selected appropriately for transplantation basis:-

- General health, shape, structure of trees
- Rootball size / root system quality
- Tree size
- Tree type and conservation status

- Availability and compatibility of receptor site
- Site limits.

Preparation-

- The preparations should consider the time of the year
- The soil clearing and root pruning are performed according to prescribed guidelines.
- Width and depth vary from tree to tree and should be consulted with a specialist.
- By gradually pruning and digging the roots, the plant can absorb the shock and establish the roots.
- The plant should be given time to form new roots.



Root Ball preparation and pre lifting-

- The root ball should be selected as per the species.
- Crown trimming should also be done according to the requirements.
- The root ball and tree top must be properly wrapped and tied for transport.
- To keep a tree in a windy situation, you need to provide proper support.



Lifting and transporting-

- To lift and carry the Tree, you need to select the appropriate large equipment.
- Trees are lifted with root ball.
- For smooth transportation, it is necessary to manage the transportation route and keep the route clean. Do not damage the bark of tree trunk when lifting / transporting.



Soil and Land preparation-

- Make a receptor place by digging a hole according to the root ball of the tree.
- The hole is watered and a layer of mulch is applied.
- Must provide proper drainage.

Planting and post care-

- Root ball should be placed properly.
- All wrapping and attachments should be removed.
- Root ball should be covered with excavated top soil and mulch should be applied.
- The tree should be properly supported until the roots are strong.
- Weed growth should be suppressed and fertilization should be applied as needed.
- Watering is the most important.

Conclusion-

- Roadside tree care is the reduction of danger through inspection and mitigation, balancing the level of danger with need to maintain large and beautiful trees on the premises.
- Roadside planting with urban health and proper care has a direct impact on our community through the following benefits: they provide such as cooling the streets and the city, prevent soil erosion and provide a canopy and habitat for wildlife.
- Furthermore, good roadside tree management reduces general complaints about dangerous trees with proper care, trees will be healthier.
- In order to gain a better understanding of roadside tree care and improve public safety, it is necessary to raise public awareness of the risks of roadside trees.