



DEPARTMENT OF ENVIRONMENT GOVERNMENT OF TAMIL NADU



SPECIAL EMPHASES ON AIR POLLUTION TOLERANT PLANT SPECIES

AIR POLLUTION



Globally 7 million deaths linked to air pollution annually

CLIMATE CHANGE



Many harmful air pollutants also affect the climate

HEALTH



Reducing air pollution saves lives and helps to slow the pace of near-term climate change

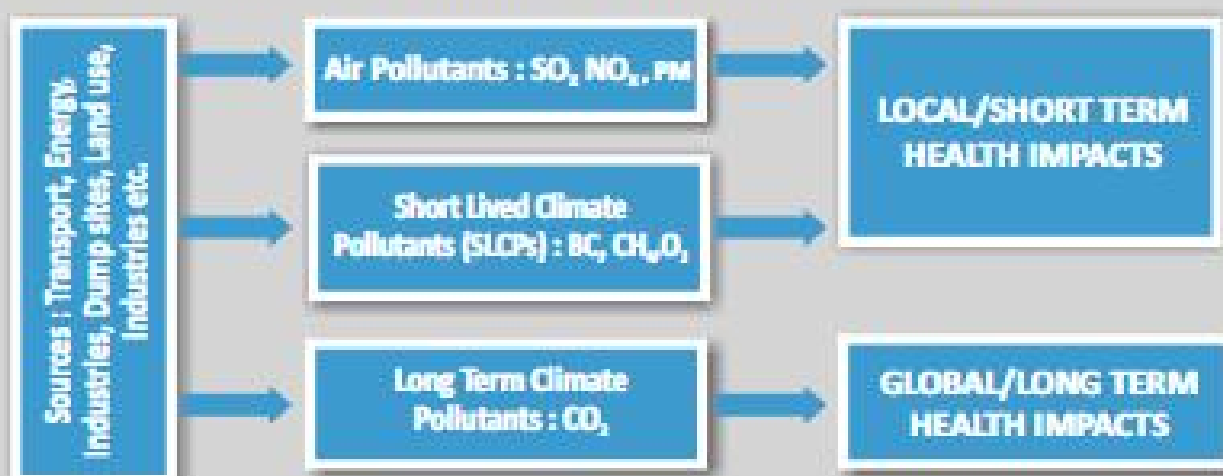
"TOGETHER WE CAN BEAT AIR POLLUTION"



AIR POLLUTION

- ✦ It makes the world's largest environmental health risk, comparable with health risks due to obesity, high cholesterol and smoking.
- ✦ Air Pollution related death rate of about 4.3 million due to household air pollution and 3.7 million deaths are due to outdoor air pollution.
- ✦ Most air pollution-related deaths are from non-communicable diseases, in terms of global disease burden, air pollution is the cause of over one-third of deaths from stroke, lung cancer and chronic respiratory disease globally and one-quarter of deaths due to ischemic heart disease.
- ✦ Air pollution exposures in India constitute a major public health threat and impact of air pollution on health in India is severe and prevalent across all States and socio-demographic groups.
- ✦ Air Pollution levels in most Indian cities are at alarming levels especially in terms of Particulate Matter, highest levels of PM_{10} & $PM_{2.5}$ (particles with diameter of 10 microns and 2.5 microns) (WHO 2018).
- ✦ Sectors that contribute to greenhouse gas emissions are also sources of air pollution and the co-benefits from addressing problems related to both climate change and air pollution will improve the health status of community.

COMMON SOURCE OF AIR POLLUTION, CLIMATE CHANGE AND HEALTH



IMPACT OF SHORT-LIVED CLIMATE POLLUTANTS IN AIR QUALITY, CLIMATE & HEALTH

"Short-lived climate pollutants" (SLCPs), found in ambient outdoor and household air pollution, produce strong climate change effects, they remain in the atmosphere briefly for a few days to weeks. Short life span of SLCPs means that assertive action now to reduce emissions can rapidly improve both air quality as well as slowing the rate of near-term climate change.

Black Carbon is a strong SLCP that is a major component of harmful PM_{2.5} (Particulate Matter with diameter of 2.5 microns) emitted particularly from diesel vehicles, diesel engines, coal and biomass stoves and waste incineration. Since black carbon persists for only a short time in the atmosphere, reducing black carbon

emissions can have significant near-term climate and health benefits.

Ground-level Ozone (O₃) a SLCP, is formed by a mix of air pollutants typically emitted over cities or nearby rural areas, including methane (another SLCP) from urban sewage waste and agriculture, as well as oxides of nitrogen from vehicles. It is considered as key factor in respiratory illness, and reduces crop yields.

United Nations Environment Programme (UNEP) and World Meteorological Organization (WMO) have estimated that reducing SLCP emissions from key sources such as traffic, cook stoves, waste, agriculture and industry could reduce global warming by about 0.5° C by the year 2050.

SHORT-LIVED CLIMATE POLLUTANTS

Response to mitigation efforts



VARIOUS HEALTH IMPACTS ASSOCIATED WITH AIR POLLUTION

RESPIRATORY ILLNESS

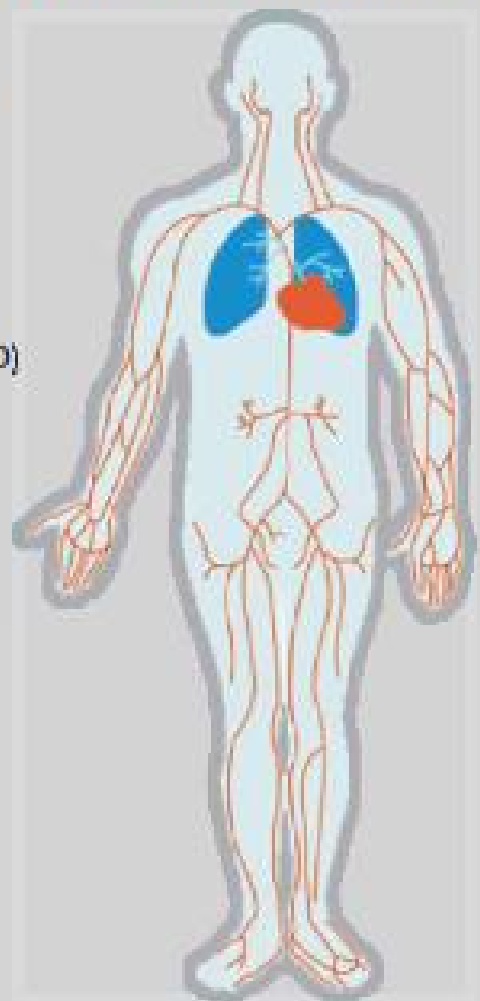
- Respiratory irritation (coughing, wheezing) & airway inflammation
- Decreased lung function and lung growth
- Lower respiratory infection (pneumonia), Asthma
- Chronic Obstructive Pulmonary Disease (COPD)
- Lung cancer

CARDIO VASCULAR ILLNESS

- Stroke
- Heart disease
- Hypertension

OTHER HEALTH RISKS

- Low birth weight
- Cataract
- Nasopharyngeal cancer
- Laryngeal cancer
- Decreased cognitive ability



VARIOUS MITIGATION OPTIONS FOR CONTROLLING AIR POLLUTION



EFFECTIVE WAYS OF REDUCING AIR POLLUTION USING TREES

Trees are an important, cost-effective solution for reducing pollution and improving air quality. Trees help to lower air temperatures and the urban heat island effects. This reduction of temperature not only lowers energy use, it also improves air quality, as the formation of ozone is dependent on temperature.

Trees also reduce pollution by actively removing it from the atmosphere. Leaf

stomata, the pores on the leaf surface, take in polluting gases which are then absorbed by water inside the leaf.

Some species of trees are more susceptible to the uptake of pollution, which could negatively affect plant growth. Ideally, trees should be selected that take in higher quantities of polluting gases and are resistant to the negative affects they can cause.



CRITERIA FOR SELECTING PLANTS FOR AIR POLLUTION CONTROL

While selecting the species for pollution control, the following are the important characteristics to be considered. Plants should be evergreen, large leaved, rough bark, indigenous, ecologically compatible, low water requirement, minimum care, high absorption of pollutants, resistant

pollutants, agro-climatic suitability, height and spread, canopy architecture, growth rate and habit (straight undivided trunk), aesthetic effect (foliage, conspicuous and attractive flower color), pollution tolerance and dust scavenging capacity.



1. ECO-FRIENDLY PLANT SPECIES IN URBAN ENVIRONMENT TO MITIGATE AIRBORNE PARTICULATE POLLUTION

S.No	Common Name	Scientific Name
Deciduous Plant species		
1	Siris tree	<i>Albizzia lebbek</i>
2	Neem, Vembu	<i>Azadirachta indica</i>
3	Amaltas, Kondrai	<i>Cassia fistula</i>
4	Sacred fig, Peepul	<i>Ficus religiosa</i>
5	Moringa, drumstick tree	<i>Moringa oleifera</i>
6	White Mulberry	<i>Morus alba</i>
7	Amla	<i>Phyllanthus emblica</i>
8	Guava	<i>Psidium guajava</i>
9	Teak	<i>Tectona grandis</i>
10	Indian Plum	<i>Ziziphus jujuba</i>
11	Rosewood	<i>Dalbergia sissa</i>
Evergreen plant species		
1	Gum Arabic tree	<i>Acacia arabica</i>
2	Custard Apple	<i>Annona squamosa</i>
3	Whistling Pine	<i>Casuarina equisetifolia</i>
4	Lemon Scented Gum	<i>Eucalyptus citriodora</i>
5	Banyan Tree	<i>Ficus benghalensis</i>
6	Wild tamarind	<i>Leucaena leucocephala</i>
7	Mango Tree	<i>Mangifera indica</i>
8	Madras Thorn	<i>Pithecellobium dulce</i>
9	Ashoka Tree	<i>Polyalthia longifolia</i>
10	Arjun Tree, Maruthu	<i>Terminalia arjuna</i>
Shrubs and Grasses		
1	Great Bougainvillea	<i>Bougainvillea spectabilis</i>
2	Crown Tree	<i>Calotropis gigantea</i>
3	Lemon	<i>Citrus limon</i>
4	Morning Glory	<i>Ipomoea purpurea</i>
5	Oleander, Arali	<i>Nerium oleander</i>
6	Coral Jasmine	<i>Nyctanthes arbortristis</i>
7	Castor Bean	<i>Ricinus communis</i>
8	Rose	<i>Rosa indica</i>
9	Sarkanda	<i>Saccharum munja</i>



DECIDUOUS PLANT SPECIES



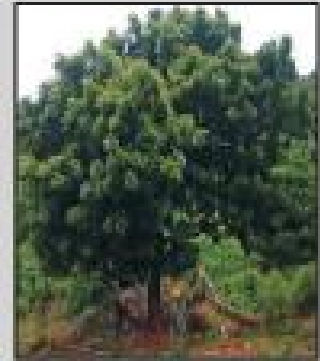
Albizzia lebbek



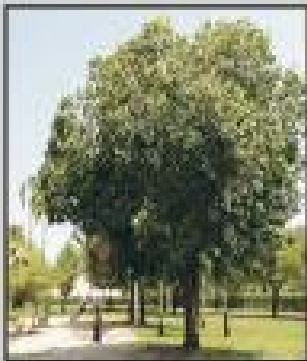
Cassia fistula



Ziziphus jujuba



Azadirachta indica



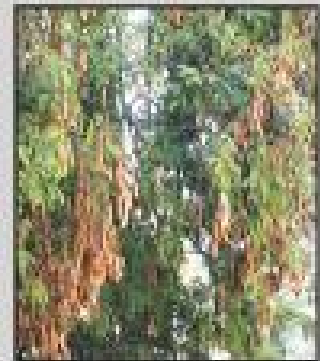
Ficus religiosa



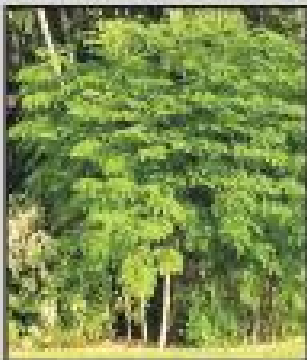
Psidium guajava



Phyllanthus emblica



Tamarindus indica



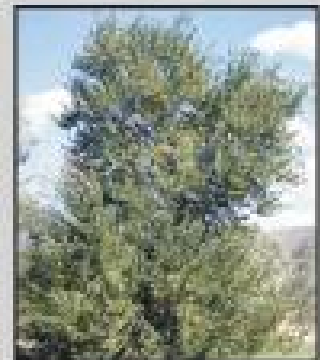
Moringa alifera



Tectona grandis



Morus alba



Dalbergia sissoo



EVERGREEN PLANT SPECIES



Pithecolobium dulce



Ficus benghalensis



Polyalthia longifolia



Terminalia arjuna



Leucana leucocephala



Annona squamosa



Acacia arabica



Mangifera indica

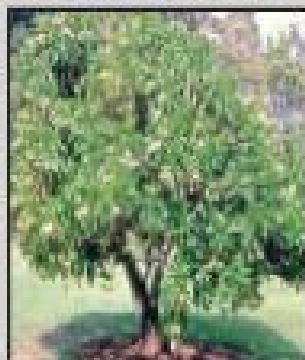
SHRUBS PLANT SPECIES



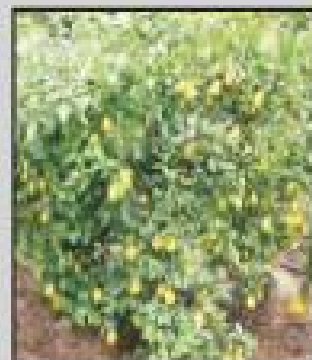
Bougainvillea spectabilis



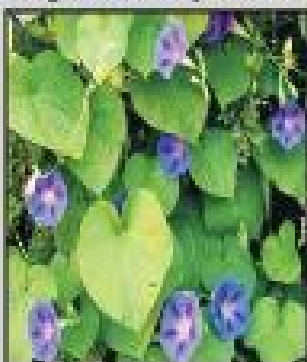
Calotropis gigantea



Ricinus communis



Citrus lemon



Ipomea purpurea



Rosa indica



Nyctanthes arbor-tristis



Nerium oleander



PROMINENT INDOOR AIR POLLUTION SOURCES

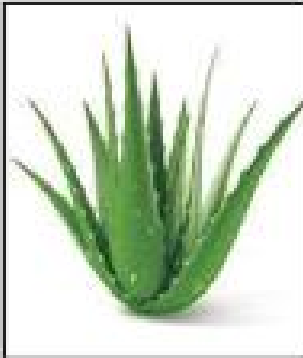


STRATEGIES FOR IMPROVING INDOOR AIR QUALITY

- Promote non toxic paints free from Volatile Organic Compounds and organic Pollutants
- Remove weeds and allergens like Parthenium around the living area
- Use non toxic room sprays and insect repellents
- Provide proper ventilation for fresh air and smoke chimneys, exhaust fans at kitchen
- Use mostly unscented personal care and household cleaning items to decrease exposure to potentially irritating and harmful chemicals
- Don't smoke, especially indoors
- Whenever possible, if purchasing pressed wood furniture and cabinetry ensure it has the Green Guard symbol
- Grow plants throughout your home to help remove dangerous gases
- Try to open several windows in your home for at least 15 minutes per day



INDOOR PLANTS FOR CLEAN AIR



Aloe vera

Aloe vera gel excellent to heal burns and cuts.

Improves indoor air quality.

Helps to keep home free from benzene which is commonly found in paint and certain chemical cleaners.

Warneck Dracaena *Dracaena deremensis*

Improves indoor air quality especially pollutants released by varnishes and oils.

Grows quickly indoors and thrive in any light.

Known for its white stripes along the edge.



Snake plant

Sansevieria trifasciata

One of the best indoor plants for ridding of dangerous formaldehyde, a chemical used in cleaning products, tissues, toilet paper, and personal care items.

Thrives in low light, and humid conditions.

Absorbs carbon dioxide and release oxygen at night.

Golden Pothos *Scindapsus aureus*

Best houseplant for clean air.

Fast-growing plant that absorbs formaldehyde toxins.

One of the hanging plants for baskets.

Needs bright, indirect light to survive.



INDOOR PLANTS FOR CLEAN AIR



Heart Leaf Philodendron
Philodendron oxycardium

Absorbs various volatile organic compounds like formaldehyde from air.

Thrives in indirect sunlight and requires less maintenance to survive.

Peace Lily
Spathiphyllum wallisii

Requires weekly watering and shade to thrive and produce beautiful blooms.

Fragrant plants are best for removing formaldehyde, trichloroethylene, xylene, toluene, and benzene.



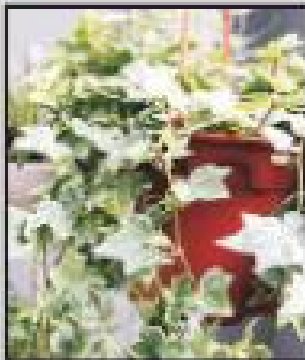
English ivy
Hedera helix

Easy to maintain and thrives in partial shade and fertile, moist soil.

Reduces airborne fecal-matter particles.

Easy to maintain and thrives in partial shade and fertile, moist soil.

Can tolerate dry conditions.



Cane Palm
Chamaedorea sefritzii

Known as reed palm.

Small plant that thrives in shady indoor areas.

One of the best indoor plants for removing Trichloroethylene and Benzene from indoor air, making it a great plant to place around furniture.

Requires bright, indirect light, and thrives in areas of high humidity.



INDOOR PLANTS FOR CLEAN AIR



Weeping Fig
Ficus benjamina

Helps to filter out numerous pollutants including Benzene, Trichloroethylene and Formaldehyde, toxin that is found in furniture and carpeting.

Tricky to grow and maintain but thrive well in bright and indirect light.

Boston fern
Nephrolepis exaltata

Removes more formaldehyde from the indoor air than any other plant. Eliminates benzene and xylene, toxins that enters home through the garage.

Tricky to grow as it requires weekly watering during their growing season and monthly watering in the winter.



Rubber Plant
Ficus elastica

Removes formaldehyde.

Great spot to place these plants because most office furniture is constructed of particle board that is held together by formaldehyde-based glues and also brighten up any room with vibrant colors and rich textures.

Slow growing and can survive in low lights.



Aroid palm (Zu zu plant)
Zamioculcas zamiifolia

Fairly tough plant and does not require much care.

Has air purifying qualities for the indoor environment and is able to remove volatile organic compounds in this order of effectiveness, benzene, toluene, ethylbenzene and xylene.



INDOOR PLANTS FOR CLEAN AIR



Spider Plant
Chlorophytum comosum

Abundant foliage and small white flowers absorbs Formaldehyde, Carbon monoxide, Benzene and Xylene.

Easy to grow and requires cooler temperatures and dry soil.

Chinese evergreen
Aglaonema crispum

Filters out different air pollutants.

As time and exposure continue, it keeps removing more toxins from the air.

Produces beautiful blooms and berries, even in low light conditions.



*"Be a part of the Solution
Not part of the Pollution"*

DEPARTMENT OF ENVIRONMENT GOVERNMENT OF TAMIL NADU

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