RESPONSE OF PLANT SPECIES GROWN ON CENTRAL VERGE AREA OF NH-8 NEAR NAVSARI, INDIA

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ABSTRACT
Either by loading or settle the dust flowing in the air, combating the air pollution by vehicle and prevents the vehicle users from the excessive light glare during night through the growing of several plant species as well as provided aesthetic value of National High-way. Among the plantation of eight species like viz., Narium oleander cv. Album, Narium oleander cv. Roseum, Narium oleander cv. Variegatum plenum, Cassia bicapsularis, Thevati peruviana cv. Yellow, Thevati peruviana cv. White, Calliandra hybida cv. Alipore and Bougainvillea peruviana cv. Partha were studied out growth pattern for seven month (Pooled data of October-2008 to May-2009 and October-2009 to May-2010) at NH-8 near Navsari (as Central Verge Plantation Area-CVPA) which was compared with same plant species grown around N.A.U., Navsari campus (as Reference Area-RA). Assessment of all parameters, among them maximum growth were observed at RA as compared to CVPA due to favourable growing condition alongside the polluted area. Among all the eight plant species, minimum interruption in growth parameters was found in Calliandra hybida cv. Alipore followed by Narium oleander cv. Roseum and Thevati peruviana cv. White. In case of number of flowers per branch had minimum disturbance noted in Cassia bicapsularis (23.56%) followed by Bougainvillea peruviana cv. Partha (24.31%) flowers per branch. The maximum dust loading capacity was noted in Narium oleander cv. Roseum (187mg/leaf) and maximum light glare interruption (78.29%) observed in Calliandra hybida cv. Alipore. In case of peroxidase activity of CVPA and RA had remain almost constant in Calliandra hybrid acv. Alipore and Narium oleander cv. Roseum.

Key Words: Karen, Bougainvillea, Cassia bicapsularis, Calliandra, Growth, Flowering, Peroxidase activity, Dust loading capacity, Light glare interruption, Vehicular pollution

INTRODUCTION
Rise in consumption of petroleum product due to growth in population, industries, automobiles etc. have introduced several pollutants into the atmosphere. The vehicular pollution regarded as the primary cause of air pollution in the urban areas followed by industrial area in India. The exhaust of these vehicles comprises of a variety of air pollutants viz., SO₂, NO₂, O₃, Hydrogen fluoride, smoke, dust particles and combined gases which aggravating the health problems rising harshness to drive a vehicles. Concomitantly, selection and growing of the resistant plant species is another fact of problem of pollution. The cultivation of such species in the polluted habitats leads to rapid amelioration of habitat cope with pollutant environment. Such plants can effectively be used as indicator and pollutant scavenger. Plants can answer the number of environmental problems and can be an aid in removal of air, noise and dust pollution further modified air temperature. Ornamental plants in green belt, traffic islands, public park, avenue plantation, can serves as a good solution to the pollution control in urban area and aid in combating global warming.

AIMS AND OBJECTIVES
To find out the most effective plant species for prevent the vehicle users from the excessive light glare during night and either loading or settle the dust flowing in the air as well as combating the air pollution with addition to provided aesthetic value on National High-way.

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MATERIAL AND METHODS

A thorough survey of the Navsari district was undertaken to select polluted and reference area where the plant species grown. A segment of National Highway-8 (Central Verge Plantation Area-CVPA) has been designated as polluted site where as which was compared with N.A.U., Navsari campus (Reference Area-RA), where comparatively very few vehicles are moving. Among the plantation of eight species like viz., Narium oleander cv. Album, Narium oleander cv. Roseum, Narium oleander cv. Variegatum plenum, Cassia bicapsularis, Thevatia peruviana cv. Yellow, Thevatia peruviana cv. White, Calliandra hybrida cv. Alipore and Bougainvella peruviana cv. Partha were planted at 1.75mX1.0mX0.7 m distance. Two years old different plant species were selected for studied out and analyzed various growth, flowering and biochemical parameters by the department of floriculture for seven month (Pooled data of October-2008 to May-2009 and October-2009 to May-2010). The dust loading capacity was measured by weight balance and light glare from opposite side vehicles measured by lux meter during night time in front of plant and behind the plant.

RESULTS AND DISCUSSION

Details of various parameters studied in CVPA (Central Verge Plantation Area) and RA (Reference Area) has been depicted in Table 2. CVPA plant has been observed the reduction in vegetative and flowering parameters compared to RA. Decrease in the all parameter by environment polluting gases emitted by vehicles which directly affected the foliage of the plants by entering inside and destroying individual cell and reducing the plant ability to produce food though climatic variations were at both site. Growth pattern (Table 2) of the both area reduced progressively depending on the level of pollution and climatic condition (Table 1). Significant positive correlation between strong solar radiation, air temperature, relative humidity, concentration of CO₂, CO and NO₂ may lead the reduction in plant growth at polluted site. Among all the plant species had significantly minimum interruption in case of plant height, length of branch, no of canes/plants, cane diameter, no of leaves/branch and size of leave was noted in Calliandra hybrida cv. Alipore followed by Narium oleander cv. Roseum and Thevatia peruviana cv. Yellow grown at CVPA as compared to grown at RA even though the leaves were almost free of injury due to the natural selection trough capability of adaptation and pollution resistant genotypes are allow to survive. All the plant species taxonomically differ in terms of flowering too. Among all eight species, the flower width and length were observed lower intrusion at CVPA as compared to RA. Minimum intrusion observed in Calliandra hybrida cv. Alipore followed by Bougainvella peruviana cv. Partha (9.92 %, 6.98 %), Narium oleander cv. Variegatum plenum (11.63 %, 9.51 %), N. oleander cv. Roseum (11.79 %, 7.97 %) and Thevatia peruviana cv. Yellow (11.92 % and 11.67%) while the highest was noted in Cassia bicapsularis (20.75 % and 41.63 %). In case of number of flowers/ branch had minimum disturbance observed in Cassia bicapsularis (23.56 %) followed by Bougainvella peruviana cv. Partha (24.31%) flower per branch. This view was due to the capacity of the plant species endure against the concentration level of different pollutants. The maximum dust loading capacity (Fig. 1) was noted in Narium oleander cv. Roseum (187mg /leaf) and maximum light glare from opposite side vehicles (Fig. 2) was observed.

Table 1 : Meteorological observation (October 2009-May-2010)

<table>
<thead>
<tr>
<th>Site</th>
<th>Average temperature (°C)</th>
<th>Range of temperature (°C)</th>
<th>Humidity (%)</th>
<th>Range of Humidity (%)</th>
<th>CO₂ mg/m³</th>
<th>CO µg/m³</th>
<th>NO₂ µg/m³</th>
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<td>17.4-45.7</td>
<td>46.8</td>
<td>29.6-80.4</td>
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<td>30.8</td>
<td>13.6-41.8</td>
<td>50.7</td>
<td>33.5-89.2</td>
<td>475</td>
<td>310</td>
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<td>B</td>
<td>C</td>
<td>D</td>
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<td>G</td>
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A- Cassia bicapsularis  B- Thevatia peruviana cv. Yellow  C- T. peruviana cv. White  D- Calliandra hybrida cv. Alipore  E- Bougainvillea peruviana cv. Partha  F-  Narium. oleander cv. Album  G-  N. oleander cv. Roseum  H- N. oleander cv. Variegatum plenum  1- Plant height (cm)  2-Length of branch (cm)  3-Circumference of plant (cm)  4-No of Cane  5-Cane Diameter (mm)  6-No of leaf/branch  7-Leaf width (mm)  8-Leaf length (mm)  9-Flower width (mm)  10-Flower length (mm)  11- No of flowers/branch
78.29% interruption in *Calliandra hybrida* cv. *Alipore* might be due to the less interruption in vegetative growth as well as branching habit and nature of the plant. In case of peroxidase activity (Fig. 3) of CVPA and RA had remain almost constant in *Calliandra hybrida* cv. *Alipore* and *Narium oleander* cv. *Roseum*. Similar kind of result had been observed in *Ficus bengalensis* as compared to other tree species grown in polluted area. Because of the higher level of exhaust produced by high traffic density at place where plants are growing might have caused some abnormalities in biochemical and physiological aspects.

**Fig. 1**: Comparison of dust loading capacity of leaf (mg) through different plant species grown on CVPA and RA

**Fig. 2**: Comparison of Light interruption (%) through different plant species grown on CVPA and RA

**Fig. 3**: Comparison of peroxidise activity (OD) through different plant species grown on CVPA and RA
CONCLUSION

Overall study for phonologically, physically and biochemically reveled that most of the plants growing in the polluted environment are badly affected by automassion. However, Callitandra hybrida cv. Alipore, Narium oleander cv. Variegatum plenum, N. oleander cv. Roseum and Thevatica peruviana cv. Yellow had more preference of further plantation in Central Verge Plantation Area of busy highway.

REFERENCES