SJIF 2012: 2.545

UIF 2013: 1.075

Received on:

16th February 2015

Revised on:

20th March 2015

Accepted on:

21th March 2015

Published on:

1st April 2015

Volume No.

Online & Print

9 (2015)

Page No.

26 to 32

IRJC is an international open access print & e journal, peer reviewed, worldwide abstract listed, published quarterly with ISSN, Free-membership, downloads and access.

EFFECT OF DUST FALL OF MARBLE INDUSTRIES ON VEGETATION OF DANTA TALUKA

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ABSTRACT:

The paper describes the effect of marble dust on plants in and around areas Danta, Dist Banaskantha. Trees species growing in and around areas of Danta were selected and various morphological characteristics were studied such as Measuring Air Pollution Tolerance Index in various seasons of various sites. In the study the effects of marble dust on selected tree species was observed.

KEY WORD: *Air Pollution Tolerance Index, Ascorbic acid, Ecological model, APTI value, Economic value, Tolerance.*

INTRODUCTION:

We are so much obsessed and possessed of industrial growth that our natural environment has undergone many ramifications and diversions. It's pristine glory and vigour, vitality and utility has been completely lost. India's main problem ofpollution is due to the fact that her industrial units are located in densely populated urban area . Industrial complexes have been located close to be residential areas without considering the consequences of environmental pollution. Concomitantly selection and growing of the resistant plant species is another facet of the problem of pollution. The cultivation of such species in the polluted habitat leads to rapid amelioration of habitat to cope with the polluted environment. Such plant can effectively be used as indicators and pollutant scavangers. Present study gives account of such tolerate species of plant which having high pollution tolerance capacity. In present study the susceptibility levels of different plants have been determined on the basis of their Air Pollution Tolerance Indices. The plants with low index value were sensitive to air pollution and vice versa. Where the former can be planted as indicator species and the later as tolerant sink to mitigate pollution.

MATERIALS AND METHOD:

Fresh leaves of plants *Butea monosperma*, *Mucuna pruruiens*, *Boswellia serrata, Azadirachta indica, sterculia urens, Tinospora cardifolia* were collected in various season at different six sites Jarivav, Chikhla, Jetwas, Kumbhariya, koteshwar and control(Agriculrure botanical garden) of Danta taluka.

Measurement of Air Pollution Tolerance Index

Air pollution tolerance index (APTI) was determined by the method given by Singh and Rao, 1983. The samples were estimated for Leaf-extract pH (Singh and Rao, 1983), relative moisture content (Wealtherly, 1965), total chlorophyll (Arnon, 1949) and ascorbic acid (Abida begum et al., 2010). The fully expanded leaves from all the sites were collected in the poly-thene bags and transported to the laboratory. The leaves were washed out thoroughly with distilled water. Three replicates were used for each plant. Estimation of Leaf-extract pH (Singh and Rao, 1983): 0.5 g of leaf material was ground to paste and dissolved in 50 ml of distilled water and Leaf extract pH was measured by using calibrated digital pH meter. Relative moisture content (Wealtherly, 1965): Estimation of relative moisture content: Fresh leaf samples collected from the study area and were brought immediately to the laboratory and washed thoroughly.

Total Chlorophyll content was measured by the method of Arnon (1949).

Ascorbic acid content (AA) (mg/g) was measured using spectrophotemetric method. 1 g of the fresh foliage was put in a test-tube, 4 mL oxalic acid - EDTA extracting solution was added, then 1 mL of orthophosphoric acid and then 1 mL 5% tetraoxosulphate(VI) acid added to this mixture, 2 mL of ammonium molybdate was added and then 3 mL of water. The solution was then allowed to stand for 15 minutes. After which the absorbance at 760 nm was measured with a spectrophotometer (Abida Begum and Krishna, 2010).

APTI given as:

$$APTI = \frac{[AA\,(T + P) + R]}{10}$$

(Where AA is the ascorbic acid in mg/g, T is the total chlorophyll in mg/g, P is pH of leaf sample and R is relative water content in mg/g).

RESULT AND DISCUSSION:

Air pollution tolerant index is an index denotes capability of a plant to combat against air pollution. Plants which have higher index value are tolerant to air pollution and can be caused as sink to mitigate pollution, while plants with low index value show less tolerance and can be used to indicate levels of air pollution (Singh and Rao, 1983).

The present investigation of air pollution tolerance index was carried during winter season. For this study, changes in parameters such as ascorbic acid, total chlorophyll, pH of leaf extract, relative water content were used in evaluating the degree of tolerance to air pollution by the plant species.

Chlorophyll content

As mention earlier in the experiment of chlorophyll pigments, chlorophyll content of plants signifies its photosynthetic activity as well as the growth and development of biomass. It is well evident that chlorophyll content of plants varies from species to species; age of leaf and also with the pollution level as well as with other biotic and abiotic conditions (Katiyar and Dubey, 2001).

Present study revealed that chlorophyll content in all the plants varies with the pollution status of the area i.e. higher the pollution level in the form of vehicular exhausts lower the chlorophyll content. It also varies with the tolerance as well as sensitivity of the plant species i.e. higher the sensitive nature of the plant species lower the chlorophyll content. Irrespective of study sites, higher levels of total chlorophyll was observed in *Mucuna pruriens*, and this higher levels of total chlorophyll observed may be due to its tolerance nature (Beg et al., 1990 and Jyothi and Jaya, 2010).

Changes in Ascorbic acid content:

Ascorbic acid is a strong reluctant and it activates many physiological and defence mechanism. Its reducing power is directly proportional to its concentration (Raza and Murthy, 1988; Lewis, 1978). Being a very important reducing agent, ascorbic acid also plays a vital role in cell wall synthesis, defense and cell division (Conklin, 2001). Present study showed elevation in the concentration of ascorbic acid with respect to the control site in *B.monosperma*, *M.pruriens* and *B.serrata*. Pollution load dependent increase in ascorbic acid content of all the plant species may be due to the increased rate of production of reactive oxygen species (ROS) during photo-oxidation of SO2 to 101 SO3 where sulphites are generated from SO2 absorbed.

Changes in Relative water content:

Relative Water Content (RWC) of a leaf is the water present in it relative to its full turgidity. Relative water content is associated with protoplasmic permeability in cells cause loss of water and dissolved nutrients, resulting in early senescence of leaves (Agrawal and Tiwari, 1997).

Present study showed higher relative water content with respect to the control site in *B.monosperma*, *M.pruriens* and *B. serrata*. The plants with high relative water content under polluted conditions may be tolerant to pollutants. Similar result was obtained by Jyothi and Jaya, 2010.

Air pollution tolerance index:

The results of air pollution tolerance index [APTI] calculated for each plant species studied at different sites is mentioned in the above Table 1. M.pruriens exhibited the highest APTI value at all the sites followed by *B.monosperma*> *B.serrata* followed by *Azadirachta indica* >*T.cardifloia* >*S.urens*. Different plant species shows considerable variation in their susceptibility to air pollution. The plants with high and low APTI can serve as tolerant and sensitive species respectively.

CONCLUSION:

In the present study, *M.pruriens*, with highest air pollution tolerance index was found to show tolerant response to automobile and mining pollutants where as *B.monosperma*> *B.serrata*, can be considered to show intermediate response and lastly *Azadiract indica>T.cardifloia>S.urens* can be considered to show sensitive response

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TABLE-1: SHOWS THE RESULT OF STUDY

Sr. No.	Tree Species	Total Chlorophyll mg/ml	Ascorbic acid mg/g	pH	Relative water content %	Air Pollution Tolerance Index (APTI)
			JARIVAV			
01	*Butea monosperma*	3.42	18.5	5.6	71.22	23
02	*Mucuna pruriens*	3.1	24.8	4.3	74.36	25
03	*Boswellia serrata*	1.38	25.7	5.1	72.88	23
04	*Azadirachta indica*	1.11	9.9	4.8	79.52	13
05	*Sterculia urens.*	2.32	9.6	4.6	72.56	13
06	*Tinospora cardifolia*	1.34	8.7	5.0	67.05	12
			CHIKHLA			
01	*Butea monosperma*	3.4	20.56	5.7	50.89	23
02	*Mucuna pruriens*	3.2	22.24	5.9	67.32	26
03	*Boswellia serrata*	1.42	25.4	6.2	62.3	25
04	*Azadirachta indica*	0.99	1.72	4.4	90.82	10
05	*Sterculia urens.*	2.12	9.98	4.2	63.67	12
06	*Tinospora cardifolia*	1.45	8.9	5.3	68.1	13
			JETWAS			
01	*Butea monosperma*	3.21	19.6	6.4	60.54	24
02	*Mucuna pruriens*	3.3	18.9	6.2	72.66	25
03	*Boswellia serrata*	3.06	19.4	5.9	74.68	23
04	*Azadirachta indica*	1.37	8.9	4.5	80.22	12
05	*Sterculia urens.*	2.49	8.5	4.8	82.55	14
06	*Tinospora cardifolia*	1.2	7.6	5.2	67.32	14
			KUMBHARIYA			
01	*Butea monosperma*	2.79	21.3	5.7	69.35	25
02	*Mucuna pruriens*	2.9	22.8	5.9	70.88	27
03	*Boswellia serrata*	1.48	23.4	6.4	74.85	25
04	*Azadirachta indica*	0.83	9.1	5.6	81.35	13
05	*Sterculia urens.*	2.4	7.3	4.1	62.32	10
06	*Tinospora cardifolia*	1.02	6.5	4.9	62.17	11
			KOTESHWAR			
01	*Butea monosperma*	1.62	26.3	5.9	65.83	26

02	*Mucuna pruriens*	2.5	24.1	6.7	74.55	29
03	*Boswellia serrata*	1.3	30.8	5.6	68.25	28
04	*Azadirachta indica*	0.51	7.8	5.2	62.85	10
05	*Sterculia urens.*	2.06	6.9	3.9	56.85	9
06	*Tinospora cardifolia*	*1.17*	*6.7*	*4.7*	*59.54*	*10*
CONTROL						
01	*Butea monosperma*	3.77	16.1	6.2	59.33	21
02	*Mucuna pruriens*	4.4	14.9	6.5	70.5	23
03	*Boswellia serrata*	3.1	13.6	6	68.52	19
04	*Azadirachta indica*	1.92	9.9	6.1	80	15
05	*Sterculia urens.*	2.56	10.4	5.9	80.63	16
06	*Tinospora cardifolia*	1.21	7.8	5.6	60.12	12