# STUDY OF METAL IONS PRESENT IN VEGETATION AND SOIL SAMPLES AT VATVA GIDC (PHASE -1) INDUSTRIAL ZONE

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**ABSTRACT:**

Renaissance brought an Industrial revolution in Europe which ultimately spread over the globe. It provides lavish living for human beings, yet the price we and our next generations will have to pay. The possible pollutants in the effluents are sulphate, sulphide, dissolved and suspended solids and heavy metals like Zinc and Iron. Cyanide also occurs in seeds of apples, apricots, cherries, peaches and plums in plants. Nickel reduces the total chlorophyll content in leaves of plants, thus reducing photosynthetic activity of plants. Industrial effluents are highly toxic to the seed germination and seedling growth. In the nearly 400-km stretch between Vapi in Southern Gujarat and Vatva in Northern Gujarat called the Golden corridor, an industrialist's dreams come true. In Gujarat, during the monsoon effluents overflow from the rivulet and destroy farms.

**KEY WORDS:** *Effluents, Industrial belt, Toxicants.*

**INTRODUCTION:**

**VATVA-GIDC=INDUSTRIAL HUB**
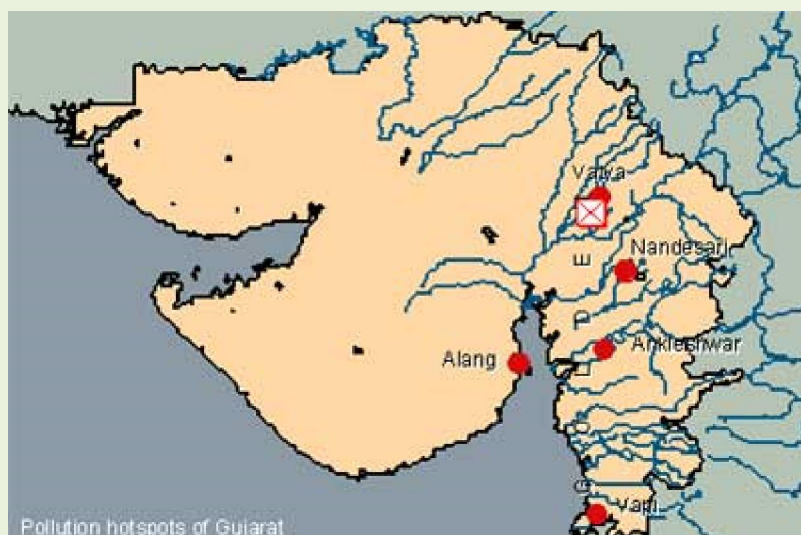

Pollution hotspots of Gujarat

In the nearly 400-km stretch between Vapi in southern Gujarat and Vatva in northern Gujarat, called the golden corridor, an industrialist's dream come true. This stretch has become a hot bed of pollution. Growing Industrial establishments without proper attention on pollution control measures has adverse impact on the local Environment in the city.

A common practice is to discharge untreated industrial effluents directly into neighbouring water bodies or into agricultural land. As a result the quality of some local streams and rivers has been degraded to the point, where the water is not safe for human or livestock use or for irrigation. However due to the unavailability of better alternatives many farmers use the polluted river water or even the industrial effluent water to irrigate their crop field. Some of the industries were potential source of inorganic as well as organic toxicants (Ghimire, Bajracharya, 1996).

The problem of Environmental pollution on account of essential industrial growth is the problem of disposal of industrial water, whether solid, liquid or gaseous. Polluted water, in addition to other effects, directly effects, soil not only in industrial areas but also in agricultural fields (Nagajyoti, 2008).

Heavy metal pollution in the Environment is quite relevant to its deleterious effect on human health via food chain. Biosphere pollution by heavy metals has accelerated dramatically during the last few decades as a result of discharge of effluents from various industries and urban population. The consumption of plants grown in heavy metal rich soil, results in introduction of substantial amount of potentially toxic metals into the food chain (Naaz, Pandey,2010)

Toxicity of a metal depends on the inherent capacity of a metal to affect adversely biological activity. Toxic metal changes the biological structures and systems of the living organisms and also causes deformity in the body or finally even death (Gupta, 2010). Indiscriminate dumping of untreated or inadequately treated domestic and industrial wastes on land is an important source of soil pollution (Dara, 2008). Sulphur dioxide is injurious to plants. Exposure to high levels of the gas causes destruction of leaf tissue (De, 1987) .

**MATERIAL AND METHODS:**

Soil samples were collected from different sites at Vatva GIDC-phase-1 in March, 2011, July, 2011 and August, 2011 respectively. Plant species were collected from the same sites as soil samples were collected. Soil samples were analyzed using 'Flame photometer'. Plant samples were also weighed and analyzed using 'Flame photometer'. It consists of many components such as burner, monochromator, slit system, detector system and recording output of the detector (Agarwala, Lal, 2011).
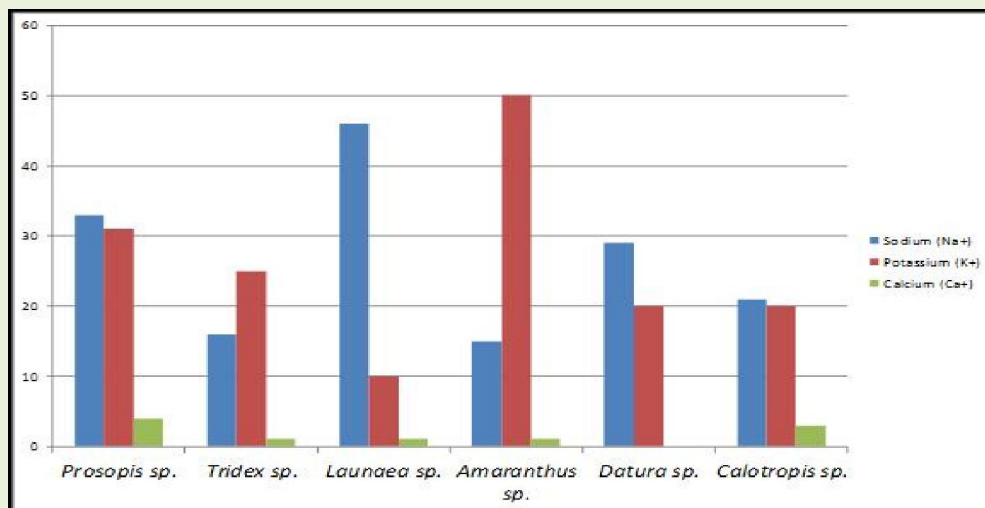
**OBSERVATION:**

**TABLE -1 PRESENCE OF METAL IONS IN PLANT SPECIES.**

| Sr.no | Sample no (Plant extract) | Name of plant species | Sodium (Na+) ppm | Potassium (K+) ppm | Calcium (Ca+) ppm |
|-------|---------------------------|-----------------------|------------------|--------------------|--------------------|
| 1. | 1 | *Prosopis* sp. | 33 | 31 | 04 |
| 2. | 2 | *Tridax* sp. | 16 | 25 | 01 |
| 3. | 3 | *Launaea* sp. | 46 | 10 | 01 |

| 4. | 4 | *Amarantus* sp. | 15 | 50 | 01 |
| 5. | 5 | *Datura* sp. | 29 | 20 | 00 |
| 6. | 6 | *Calotropis* sp. | 21 | 20 | 03 |

## FIGURE – 1 DATA SHOWING METAL IONS IN PLANT SPECIES



## OBSERVATION TABLE -2 PRESENCE OF METAL IONS IN SOIL SAMPLES

| Sr.no | Sample no | Name of month | Sodium (Na+) ppm | Potassium (K+) ppm | Calcium (Ca+) ppm |
|-------|-----------|---------------|------------------|--------------------|--------------------|
| 1. | 1 | March – 2011 | 14 | 08 | 06 |
| 2. | 2 | March – 2011 | 23 | 06 | 25 |
| 3. | 3 | March – 2011 | 14 | 05 | 02 |
| 4. | 4 | March – 2011 | 21 | 04 | 11 |
| 5. | 5 | June – 2011 | 77 | 06 | 05 |
| 6. | 6 | June – 2011 | 11 | 03 | 03 |
| 7. | 7 | June – 2011 | Above 200 | 45 | 06 |
| 8. | 8 | June – 2011 | 26 | 02 | 05 |
| 9. | 9 | August – 2011 | 64 | 03 | 01 |
| 10. | 10 | August – 2011 | 110 | 05 | 01 |
| 11. | 11 | August – 2011 | 27 | 04 | 01 |
| 12. | 12 | August – 2011 | 23 | 02 | 03 |

## FIGURE – 2  DATA SHOWING METAL IONS IN SOIL SAMPLES
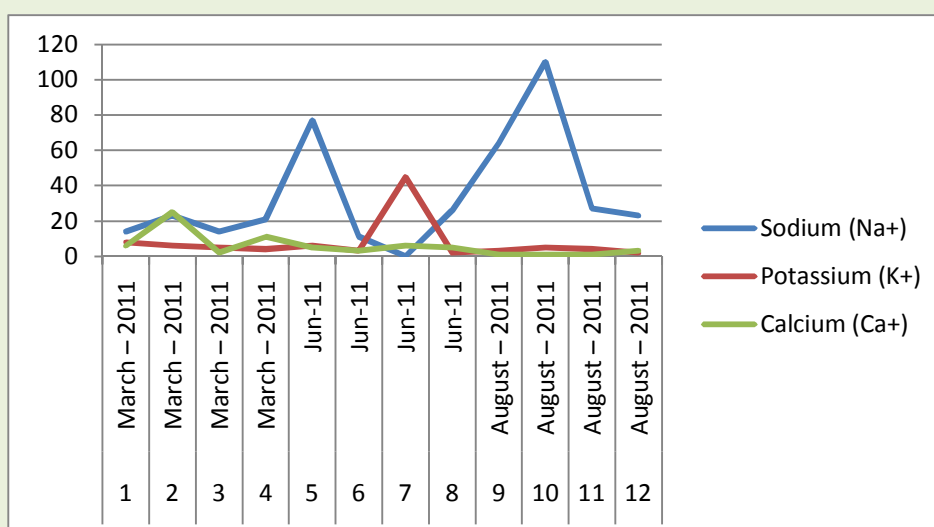
**RESULT AND DISCUSSION:**

The observations from table – 1 explains that the plant species collected belonged to families Poaceae, Mimosaceae, Solanaceae, Asclepiadaceae and Amarantaceae. The plant collected showed different values of Sodium, Potassium and Calcium ions respectively.

The data – 1 explains that Sodium ions are highest in *Launaea* species. The Potassium ions are highest in *Amarantus* species. The Calcium ions are highest in *Prosopis* species.

The observation table – 2 shows twelve different soil samples collected in March – 2011, June – 2011 and August – 2011respectively. These samples were collected on the basis of onset of monsoon and afterwards.

The data – 2 explains the Sodium ions are highest in months of June – 2011 and August – 2011.The presence of Sodium ions are lowest in month of March – 2011. The presence of Potassium ions are highest in month of June – 2011 and lowest in months March – 2011 and August – 2011 respectively. The presence of Calcium ions are highest in month of March – 2011 and lowest in months of June- 2011 and August – 2011 respectively.

Soil is the receptor of large quantities of waste products from domestic, industrial and agriculture (De, 1987).

**CONCLUSION:**

The presence of Sodium, Potassium and Calcium ions in the soil samples disturb the physiological phenomenon in plants. The amount of Sodium, Potassium and Calcium ions are useful up to a certain limit and when excess hinders the growth of plants. Vatva industrial zone is turning out to be a major area of concern in years ahead. Implementation of strict rules and regulation is the need of the hour.

**ACKNOWLEDGEMENT:**

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