

CHEMICAL ANALYSIS OF THE IMPACT OF AMBIENT AIR POLLUTANTS ON WHEAT PLANTS IN THE VINDHYA REGION

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Abstract

For most of the people specially belong to the Northern India, wheat is a very important crop because their main flooding depend upon wheat, there are several eatable food products prepared by wheat. Wheat is cultivated mostly in Punjab, Haryana, Uttar Pradesh, Bihar, West Bengal and Madhya Pradesh. Recently in these states industrialization and infrastructural development work are going very fast causing huge amounts of pollutants and particulates entering into the atmosphere. Pollutants are mainly oxide of carbon, oxide of nitrogen, oxide of sulphur, oxide of chlorine, chloride ions, ammonia, organic acids and aldehydes whereas particulates are dust, smoke, mist and fog particulates are deposited on the surface of wheat some of these particulates are hydroscopic in nature. They absorb pollutants and form acids. These acids in turn develop micro electrochemical cell with flower of wheat which destroy flowering of wheat. Other factors are acid rain; global warming and depletion of ozone layer also affect the production of wheat crops.

Keywords: Pollutant, Particulates, Electrochemical cell, Wheat flower, Acid Rain, Ozone depletion and Global warming.

Introduction:

The Vindhya Region of Eastern Madhya Pradesh includes district Sidhi, Rewa, Stana and Shohdol. The larger area of this region known as "Ganga Basin" where several rivers like Son, Gopad, Banash, Bichhiya, Beehar and Tones are contributing substantially towards cultivation of wheat to meet the demand of people of this region at large.

Presently these areas are flooding with industries, like chemical, coal, fertilizer, cement, food processing. Paper and pulp, transport, thermal power generation, hydrolytic power generation, drug, paint and dyes, sugar industry, wine industry, water boiling plants, juice factory, milk processing etc.

These industries release huge amount of pollutants, like inorganic, organic, and particulates material. They pollute air and that polluted air produces several problems for living and non-living things.

Inorganic pollutants are oxides of carbon such as CO, CO₂, oxides of nitrogen such as NO, N₂O, NO₂, oxides of sulphur such as SO₂, SO₃ oxides of chlorine, chloride ion, ammonia and oxides of metals. Organic pollutants are organic acids, aldehydes, ketones, amines etc. particulates are dust, smoke, mist, pollen, bacteria and fog. Wheat flowering period starts from December to February. Particulates are scattered

into the atmosphere which are deposited on the surface of wheat crop. Some of these particulates are hygroscopic in nature. They absorb moisture from the atmosphere. The moist particulate absorbs oxides of carbon, oxides of nitrogen, oxides of sulphur, oxide of chlorine, and chlorine ion to form carbonic acid, nitric acid, sulphuric acids, hypochlorous acid and hydrochloric acid. These acids are highly corrosive in nature, they create a hostile environment for wheat flowers. The corrosive acids produce a micro-electrochemical cell with wheat flowers. Thus an electrochemical reaction occurs on the surface of wheat flowers in this way flower of wheat gets destroyed and conversion of flowers into wheat is decreased.

Methodology:

For this work certain wheat growing areas were selected in district Singrauli, Shahdol, Satna, Rewa and Sidhi of Vindhya Region of eastern M.P. The study of the characteristic behaviors of inorganic, organic and particulate pollutants and their effect on wheat flowers were done in detail. Monitoring works started during the period of December to February (2012-13) corrosive gases and their acidic character were determined with the help of pH meter.

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Table 1 : PH values of corrosive Pollutants in studied area

Studied Area	PH Value
Rewa	5.9
Satna	6.5
Shahdol	5.5
Singrauli	6.7
Sidhi	5.01

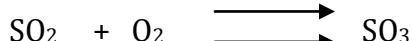
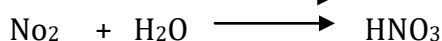
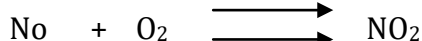
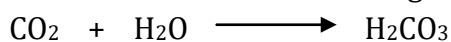
Result and Discussion:

Wheat is main food of human being and apart from nature; man creates its own environments. Due to infrastructural development in several sectors like, industry, agriculture, power generation cement industry construction work etc. the environment of the area surrounding these sectors are being polluted.

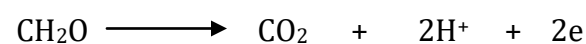
The main features of wheat depend upon temperature, humidity and nature of surrounding environment during its flowering period. The concentration of corrosive gases, particulate materials and humidity are high so they form H_2CO_3 , H_2SO_4 , HNO_3 , HClO and HCl . These acids produce H^+ ion that ion starts electrochemical reaction with wheat flower. Due to this reaction flower's connectivity becomes weaker and finally they are detached with main branch of wheat plant. During the formation of acids exothermic

reaction occurs and heat is evolved which increases the temperature of surrounding of wheat flowers thus flowers are easily separated from its main branch.

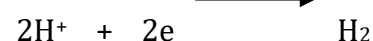
The chemical reactions among them are as follows -



The above produced acids are dissociated and released H^+ ion that ions in the presence of electrolyte develop an electrochemical cell causing oxidation and reduction reactions to start on the surface of wheat flowers. The electrochemical reaction is expressed as- Half oxidation reaction -



Half reduction reaction -



The Chemical reaction indicates that corrosive pollutants are corroding the wheat flowers. The PH values of above mentioned studied area recorded in table 1 and bar graph plots between the PH values of corrosive pollutants and its concentration and with different studied are in fig. 1

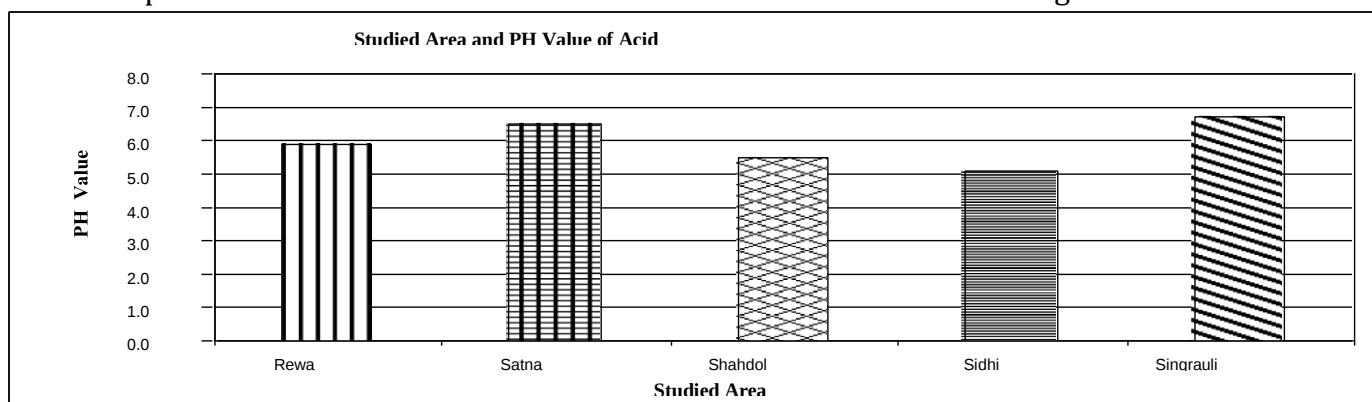


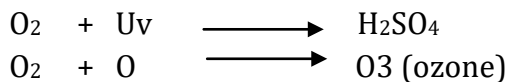
Fig. 1 Plot between studied area and PH value of acids

The result of table 1 and fig. 1 shows that the concentration of H^+ ion in Shahdol is higher than that of Satna and Rewa likewise the concentration of H^+ ion in Satna is greater than Singrouli and Wheat crops of these areas are badly affected by pollutants.

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Chemical Studies on Impact of Air Pollution on Wheat Crops of Vindhya Region of Madhya Pradesh, The concentration of CO_2 and methane gases increases in atmosphere due to deforestation, industrialization and human waste decomposition. These gases produce global warming effect thus

temperature of atmosphere is increased which exhibit bad effect on the wheat flowers. In lower level of atmosphere ozone is formed that ozone also disturbs wheat flowers.



Conclusion:

Pollutants are very harmful for wheat Flowers, they decrease its production. If its evolvement is not controlled at proper times our country will become major loser of wheat crops. It is moral responsibility of the industrialist, scientists, Intellectuals, social workers to provide good technology and public awareness against pollution.

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