

## ACID-RAINS ITS CAUSES AND IMPACTS ON CROPS IN NCR REGION

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**Abstract:** Most recently (2014-2015) the author has gone through vigorous survey of the literature and observed a very challenging natural climatic havoc, hazards to disturb the environment which may cause discomfort to whole of the humanity through out the world. The investigator who recently studied the composition of rainwater from 5 selected locations, the result is worried that it is pouring 'acid rain', caused by vehicular, industrial pollution and frenetic urbanisation. "In Pune and Nagpur, the amount of acid in rainwater has gone up five times since 1995," said V.K. Soni<sup>1</sup>, a senior meteorologist with the Indian Meteorological Department (IMD) who conducted the study with colleague Jayant Sarkar, Former director of the IMD's air pollution unit. The researchers also collaborated with the World Meteorological Organisation.

**Keywords:** Acid rains, Crops, NCR region

## INTRODUCTION

Samples of rainwater from Pune, Nagpur, Vishakhapatnam, Srinagar, Allahabad, Jodhpur, Kodaikanal, Minicoy (Lakshadweep) Mohanbari and Port Blair were tested at the IMD, Pune. The results indicated high amounts of sulphur dioxide and nitrogen oxide-major contents of acid rain-that are emitted into the atmosphere from vehicles, coal-fired power plants and industries.

The US Environmental Protection Agency (EPA) website says pollutants in acid rain interact in the atmosphere to form fine sulphate and nitrate particles that can be "transported long distances by winds and inhaled deep into people's lungs. Some particles can also penetrate indoors." Some medical practitioners say acid rain is linked to the neurodegenerative Alzheimer's Disease.

"Drinking acidic rainwater directly or consuming vegetables grown on water containing acidic or metallic element can cause Alzheimer's disease," maintained Nagpur-based neurologist Rajeev Deshpande.

"When there is a decline of 1 pH, it means acidity has gone up by 10 times," said Soni. "In Nagpur, acidic elements in rainwater were 4.7 pH during 2005-06 as against 5.6 in 1995."

More recently the scientists of Indian Institute of Tropical Metrology (IIMT) Puna have carried out the research on the acid rains. During the years 2003-2005, the eight places of National Capital Region (NCR). Bulandsahr, Garh Mukteshwar, Murad nagar, Saradhana, Panipat Charkhi-Dadri, Hodal and Behrod were selected and 355 Samples of rainy water at the height of 10-15 meters from earth surface were collected with the help of the instruments borrowed from Stockholm University Sweedan during monsoon season. Scientists, **Suresh Tiwari et al.**<sup>2</sup> Observed that out of the eight places, only in three places Panipat 31, Sardhana 29 and Murad Nagar 12 Percent the rainy-water

contaminated with acid. The presence of acid in rainy-water is due to the high quantity of sulphate and nitrate in the air. Surprisingly, the NCR rainy-water also contains sea salt inspite of the fact that the distance between NCR and the sea-shore is 1100 meter.

**Causes of acid-rain**

The rainy-clouds are present at a height of about 5.0 Kilometers from the surface of the earth, whilst the layers of particles suspended in the atmosphere are about 2-3 kilometers. In the rain, these suspended particles assimilate in the rainy-drops and the Sulphate particles form sulphuric acid and nitrate particles form nitric acid in the atmosphere in more and then gradually decreases. The rate of rise of the sulphate particles in the air is due to the smoke of combustion of coal coming out from the chimneys of the factorises and brick-kilns and that of nitrate particles is caused by the vehicular smoke, besides these sources, the author is of the view that in the N.C.R. region, the thermal powerplants, small scale industries, brick kilns are also responsible for the production of these gases.

**RESULT AND DISCUSSION**

The author selected 5 locations, Faridpur, Dankaur, kasana, Dadri and Arthala spread over N.C.R. region. Samples of Soil and Water from traditional wells and ponds were collected employing the suitable methods as described in the literature before first monsoon showers during the period May 2016 to June 2016 and after heavy rains during the period July to September 2016. The investigator observed that before first monsoon shower the pH of the Soil found in the range of 9-10.0 and that of water from traditional wells and ponds in the range of 7.2 to 6.8. Contrary to these observations the values of pH during the rainy Season August to September 2016 change abruptly indicating an increase in hydrogen

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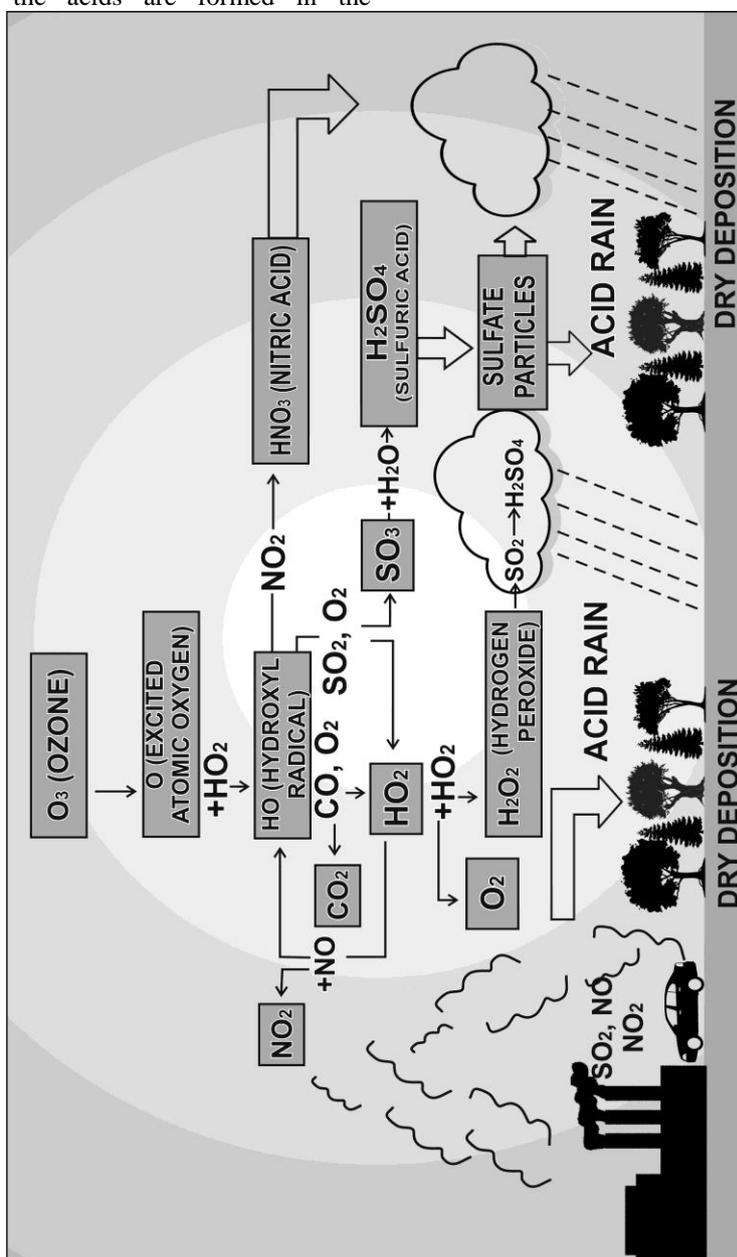
ion concentration in the soil and water. The results are tabulated in Table -1.

**Table 1.** pH values of Soil and Water in N.C.R. Region.

Locations	Pre Monsoon May- June 2016			Post Mansoon July-September 2016		
	Soil	Traditional Wells	Ponds	Soil	Traditional Wells	Ponds
1. Faridpur	9-10	7.2	7.5	6.8	4.7	4.5
2. Dankaur	8.5-9	6.8	7.8	6.2	5.2	5.8
3. Kasama	8-9.2	7.6	7.6	5.95	4.2	4.6
4. Dadri	8.5-9.2	7.9	7.8	5.5	5.5	4.8
5. Arthala	9.2-10	7.5	9.0	6.3	4.6	4.2

The results show that pre-monsoon season the nature of soils is basic and that of traditional wells and ponds are some what neutral where as post mansoon season, soils appear to be acidic and that of traditional wells and ponds are more acidic in nature. The plausible explanation may be put forth as during monsoon, the acids are formed in the

atmosphere which penetrate in the earth crest and the soil becomes acidic and that the composition of water of traditional wells and ponds changes and becomes acidic A schemetic diagram of acid rain, the formation of  $H_2SO_4$ ,  $HNO_3$  and Sulphate particles in the atmosphere is given in Fig. 1.



**Fig. 1**

**Impact of acid-rain on crops and health**

The acid rains may cause the following painful results.

1. When the percentage of acid in rainy-water is more than 2-3, then the grains of the standing crops in the fields may damage, as they become black-spotted and delayed.
2. If it is raining for a long period, the soil becomes more acidic causing there by a decrease in the soil fertility, which may affect the germination of the seeds and crops-yields to a great extent and thus the soil will tend to become gradually, acidic affecting fertility of the soil.
3. The author has collected a report from the farmers of the said region regarding the impacts of acid rains on kharif crops. The majority views are the germination of seeds is not upto the mark, the leaves of the plants are found to be black spotted and weak. Because of these impacts, the yields are poor and hence adversely may affect the economic conditions of the farmers.
4. There is a possibility of some skin diseases particularly in taking bath and wet with acid-rains.
5. Acid-rains pollute the water of traditional wells, ponds and canals which may be harmful for

drinking and may cause the infections in the lungs and intestine.

6. The regions which are affected with the acid-rains, the climate<sup>4</sup> may be rich in sulphate and nitrate elements, the inhabitants may suffer many diseases like Asthama, Cancer and other related to breathing. Also, If the soil contaminated with acid-rains is used for the manufacture of bricks, then the structures built with these bricks will be weak.

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