



## A REVIEW OF INDIRECT IMPACT OF HAZARDOUS RADIOACTIVE AND CHEMICAL MATERIALS ON ECONOMIC CONDITIONS OF FARMERS IN 'MALWA' ZONE OF PUNJAB (INDIA)

### Physics

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### ABSTRACT

Selenium & Radon with hard chemicals shows the major impact on soil & Ground water found in data collection from villages from Malwa zone of Punjab (India). Some other chemical ingredients like SiO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub> and K<sub>2</sub>O observed in researches. Naturally radioactive nuclei's <sup>226</sup>Ra, <sup>232</sup>Th & <sup>40</sup>K found with effective activity in soil & water. These materials put a hazardous impact when came in contact with human body for long time and ultimately causing the serious health issues. Results from the research resemble the large number of the health problems rising in the region. Since major part of the economy is agriculture in the region, hence impact of the health problems on human and crops has been observed on economic conditions of the local farmers. Lack of the scientific research is also a factor in the problems.

### KEYWORDS

Radioactivity, Agriculture, Chemical pesticides, Malwa region Punjab, Economic and health of Punjab farmers

#### 1. Introduction.

Malwa zone of Punjab (India) exits in southwest part of the state. Major part of economy depends upon the agriculture as the rest of the state. In modern time also known as the Cancer belt of the Punjab. Cause behind it the large number of the Cancer disease has been found in last few decades in malwa zone. Researches show the toxic concentration of the hazardous radioactive and chemical materials found in soil & water. Toxic concentration of Selenium, Radon, SiO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub>, K<sub>2</sub>O etc<sup>[1][2]</sup>, found during research in the region. There has been increasing incidence of various types of cancer in and around Malwa zone. It is attributed to the presence of polluting industries and the indiscriminate use of modern pesticides and other toxic materials in farming. A 2007 epidemiological study found that the surface waters of Malwa zone are contaminated with arsenic, cadmium, chromium, selenium and mercury primarily due to the discharge of untreated waste water from surrounding industries. Unscientific farming practices, that emerged after the introduction of Green Revolution, are also alleged to be a reason for growing incidence of not just cancer but also, high rates of spontaneous abortions, reproductive ailments, genetic deformities, anaemia, diarrhoea, vomiting, fluorosis and a host of skin ailments including rashes and boils. Many young couples are also reported to be migrating out to save their children from adverse effects. Hence the government has completely banned the use of ground water in the city for drinking purposes<sup>[3]</sup>. Naturally radioactive nuclei's <sup>226</sup>Ra, <sup>232</sup>Th & <sup>40</sup>K found with effective activity in soil & water is 0.11 mSv. Such dose cause serious problems like abnormal cell division ultimately converted in to cancer<sup>[4]</sup>. Traces of DDT and Benzene Hexachloride (BHC) were found in the canal-based drinking water supply some time ago when the Pollution Control Board conducted test of water samples<sup>[5]</sup>.

The number of cancer patients has steeply multiplied during the past couple of years in the Malwa belt and the common people attribute it to excessive use of pesticides that has contaminated the underground water that they consume. People spend thousands of their earning on cancer treatment reported in case studies of the region. Formerly known the cotton belt has now come to be known as the cancer belt of Punjab due to the increasing cases of the cancer in region. Economy of the Malwa region is significantly based upon agriculture in the region, hence impact of the health problems on human and crops has been observed on economic conditions of the local farmers.

#### 2. Data Interpretation.

Total absorbed radiation dose with average values over the Malwa region of Punjab 79.11 n Gy h<sup>-1</sup> corresponding to the hazardous index (H<sub>ex</sub>) of the soil sample ranges from 0.35 to 0.79 approaching to the dangerous value of one suggested by the WHO. Some other chemical ingredients like SiO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub> and K<sub>2</sub>O observed in researches. Naturally radioactive nuclei's <sup>226</sup>Ra, <sup>232</sup>Th & <sup>40</sup>K found with effective activity in soil & water. These materials put a hazardous impact when came in contact with human body for long time and ultimately causing the serious health issues. Results from the research resemble the large number of the health problems rising in the region.

Total hardness (TH) and total dissolved solids at numerous places

indicate the unsuitability of groundwater for drinking and irrigation<sup>[10]</sup>. The microanalysis of uranium content in drinking water with significant dose and heavy toxic elements found to vary between 0.5–579 µg l<sup>-1</sup> with an average of 73.5 µg l<sup>-1</sup><sup>[11]</sup>.

There are 23,874 cancer patients in the state (main in malwa zone) and 33,318 lives have been lost in cancer-related deaths during last few years. Malwa region having highest cancer cases with 14,682 of the 33,318 deaths. The unusually high incidence, especially with highest cotton growing districts of south-western Punjab, has been linked to the use of pesticides by cotton farmers, with other factors on same issue.<sup>[6,7]</sup>

It also impacts the fertility of the soil. As the production of the crops per thousand metric tons per hectare 11717 (1980-81) once increases to 29075 (2011-12), but decreases to 26696 (2014-15). Agriculture part in sate price index decreases from the 19.7%(2011-12) to the 15.60% (2016-17). State agriculture shows worst trends since last few years in 2014-15 fall from 6.76 to 0.64 in 2015-16. GSVA in agriculture of Punjab with growth rate -0.64%. It include over 5000 farmer suicides in last 10 years.<sup>[8,9]</sup>.

#### 3. Conclusions

Results from the research resemble the large number of the health problems rising in the region. Since major part of the economy is agriculture in the region, hence impact of the health problems on human and crops has been observed on economic conditions of the local farmers. From review of literature it has been found the lack of scientific research also responsible for increasing magnitude of the problems in health, economics status of the famers in the region.

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