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Soil fertility has improved in Punjab: study

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CHANDIGARH: Contrary to opinion articulated through various quarters, empirical evidence and various studies have shown that the agronomic practices since the Green Revolution, especially dependence on the wheat-paddy cycle, had only improved the soil fertility in Punjab, where cropping intensity has reached 190 per cent. A reduction in fertilizer consumption notwithstanding, soil properties, presence of micro-nutrients and yields of crops have seen major improvement.

While, noted economist, H.S. Shergill, has collated scattered evidence, the finding on improved fertility has been made in research conducted by two scientists D.K. Benbi and J.S. Brar at the Department of Soils in the Punjab Agricultural University. They analysed more than three lakh plough level soil samples taken from various parts of Punjab over 25 years since 1980.

Though for some reasons the study by the two scientists was rejected by experts and the State government as it was not considered in the "interests of Punjab's farm economy," their findings were published by an international journal, *Agronomy for Sustainable Development*.

The paper titled "A 25-year record for carbon sequestration and soil properties in intensive agriculture" highlighted that from 1980 to 2005, while the organic matter had increased by 38 per cent, phosphorous content went up from 19.9 to 29.2 kg per hectare and potassium remained steady between 108 to 123 mg per kg, and soil salinity came down by at least 0.8 pH points from 8.5.

> "Post-Green Revolution agronomic practices have increased soil organic carbon"

While studies have established that soil organic carbon (SOC) went down considerably in intensively cropped temperate as well as tropical regions of the world, the post-Green Revolution agronomic practices have resulted in SOC increasing from 2.9 to 4.0 mg per kg of soil in Punjab. The ploughing in of farm residue and flooding of fields during paddy cultivation, ameliorated soil salinity as well as increased availability of nitrogen, phosphorous, zinc, iron and manganese. Data indicated that the crops could uptake only 30 per cent of the phosphorous from the fertilizer applied.

Other studies have indicated that the practice of burning paddy straw, which creates a major environment issue every harvest, actually benefited the soil as the residual ash contained 10 per cent potassium and one per cent phosphorous. Heavy application of phosphate fertilizers has also resulted in the build of the mineral. Use of tube-well water for irrigation has helped maintain potassium levels.

An analysis, of various crops cultivated between 1980 and 1999, by Prof. Karam Singh from PAU's Department of Economics has found that yield of wheat in the wheat-paddy rotation remained the highest. It rose from 29.97 to 44.87 quintals per hectare. In a subsequent study, Prof. Shergill established that the yields of wheat and rice, were increasing even after 40 years of introduction of high yielding variety (HYV) seeds. However, the rate of increase in yields during the post-1990 era, has declined.

Prof. Shergill said data during the triennium beginning 1992-93 indicated that fertilizer used to produce a quintal of rice had reduced from 3.76 to 2.98 kg, while for wheat the same went down 5.38 to 5.33 kg. Collating other studies, he also argued that the fall in ground water table, which is attributed to the wheat-paddy cycle had also solved the water logging problems in many parts of Punjab.