

ABSTRACT

The fundamental aim of this study is to monitor the arsenic (As) concentration in irrigation wells and its accumulation on soil and subsequently uptake in rice in selected areas of southern Punjab. The ground water of Punjab is highly contaminated with As and has been using for paddy rice cultivation. In this study, we investigate the rice fields of District Muzaffargarh and Multan irrigated with As contaminated wells. The sample collection started from January 2016 to March 2016. Water and soil samples were tested in the field and collected for analysis where as rice samples was collected from each field. Overall 18 rice fields were selected for detailed investigation. The soil and water samples were analysed by field kit and Atomic Absorption Spectrometry (AAS) and shows the positive correlation for water $r^2= 0.65946$ and for soil $r^2=0.699$. The spatial distribution of arsenic contents in the study area for water shows most of the samples had concentration more than 50ug/L near the river Chenab flood plain and the similar trend was observed for soil As. In the individual rice field, however, the soil As strongly decrease from inlet to the opposite side of the field but overall about 67% of soil samples exceeds the 5mg/kg. The persistent As distribution due to unchanged cultivation practices shows net arsenic accumulation of 3.465 mg/kg in the field and ideally soil accumulates 0.486 mg/kg of arsenic every year. Considering the gain and loss of arsenic mass in study sites, in next 12 years this concentration will increase to the threshold level (15mg/kg). In case of rice, overall 44% of samples exceeds recently established EU limit of 0.2 mg/kg. There is a continuous installation of shallow wells in the study area and also in the nearby area of Punjab, an approach to thoroughly test the wells and their effects on soil is needed at larger scale to cover the majority of population.

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