

Wastewater generation

its scope in Indian agriculture

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Despite water being an existential base for life, it is one of the most under prioritized and over abused commodities. With the increase in population, greater volumes of surface and groundwater are being diverted to supply burgeoning cities and concomitantly a substantial volume of urban wastewater is being produced. In order to fulfil food demand of growing population as well as the present scenario of water crisis, the farmers are inclining towards wastewater utilisation in agriculture. India is primarily an agriculture-based country and its economy largely depends upon agriculture. Therefore, the safe use of wastewater in agriculture is an important issue that needs to be addressed. National policies should be devised to provide guidelines and practices regarding safe use of wastewater in agriculture.

Key words: Indian Agriculture, Wastewater

GLOBALLY, two third of human population i.e. about 4.0 billion people live under severe water scarcity at least for a month in a year. Water scarcity, a rising global concern, critically links to localized grass root phenomenon of anthropological origin viz. explosion in human and cattle population, intensive agriculture and industrialization and urbanization. In India, urbanization is taking place at one of the fastest rates in world and new economic policy and industrialization are supporting it. Indian urban population (280 million in 2008) may toll to 590 million in 2030 and this can almost double the peri-urban area, water use and waste water generation. Global share of India in total land area, water resources and human population is 2.45, 4.0 and 16%, respectively which itself depicts a very high demographic pressure on land and water resources. There is a changing sectorial water use in agriculture, household supply, energy and industry in India but as usual share of agriculture in total water use

is maximum (>80%). India's total water use may correspond 1,447 km³ in 2050 of which 74% is expected to be used in agriculture while share of drinking water, industry, energy and others miscellaneous uses may be to tune of 7, 4, 9 and 6%, respectively. Paradoxically, total utilisable water resource in India is only 1086 km³ and we are currently short of 361 km³ of water resources against 2050 projections. As such, water scarcity issue needs to be comprehensively addressed by developing and implementing suitable work/action plans. Water scarcity can appreciably enhance abstraction of ground and surface water and can cause shrinking of water resources in country. Water scarcity situations can therefore be partly mitigated by use and reuse of water (utilizing waste water) especially in urban and peri-urban agriculture but ensuring minimum/no adverse effect on environment, soil, crop quality and human/livestock health is necessary for securing a safe environment and sustainable agriculture.

Potential of waste water use in Indian agriculture

Utilization of nutrient and organic matter rich waste water in agriculture can enhance crop yields provided minimum safe standards of major chunk of pollutants in not only waste water but also in surface water resources including rivers/streams is maintained for avoiding recycling of toxic and harmful pollutants in agricultural soils and food chain. Sewage water increases yield of grain crops and vegetable over ground water apart from increasing N, P, K and organic carbon status of soils. Wastewater utilization is tedious and challenging since its indiscriminate use can cause serious health and environmental hazards that can extend from providing breeding grounds for mosquitoes and other disease vectors to diseases themselves (diarrhoea, dysentery, cholera, typhoid, acute skin and gastric disorders etc.) and nematode infections. Untreated wastewater can carry harmful and toxic chemicals potent to deteriorate water quality of water bodies and underground



aquifers. Heavy metal (Cd, Cr and Cu) contamination of Sabarmati river at Ahmedabad has resulted in elevated levels of Cr and Cu in nearby water in wells and caused high Pb level in wheat irrigated with polluted groundwater. Indiscriminate and long term use of sewage effluent in agriculture can cause contamination up to phytotoxic levels or build up of heavy metal levels in food stuffs beyond standards enumerated in Prevention of Food Adulteration Act. One such example includes high heavy metal levels in commonly eaten vegetables irrigated with sewage water in Delhi. Instances of heavy metal contamination (Cu, Cd, Cr, Fe, Mn, Ni, Pb and Zn) of agricultural soils are there if wastewater is a discharge from small-scale industries e.g. in Kanpur and Delhi. In heavily industrialised cities like Ahmedabad and Kanpur, human health hazards are being countered on consuming vegetables raised by using wastewater.

Sewage water treatment in India

Treatment capacity of existing sewage treatment plants (STPs) in India is much lower than total wastewater generation. Inefficient performance of existing STPs due to operation and maintenance problems together with inability of nearly 39% STPs to meet required general prescribed standards described under Environmental (Protection) Rules are further aggravating the pollution of water bodies in India. Among different states, Maharashtra has maximum contribution in total national wastewater generation (about 23%) while contribution of states in Ganga river basin is about 31%. Hill states generate comparatively less wastewater than

states in plains. With rapid urban growth in 498 Class-I cities and 410 Class-II towns, current water supply (48,00 million litre/day or MLD) is further projected to increase. In 2011, wastewater generation in class-I cities and class-II towns was more than 38,000 MLD, out of which only 35% was treated. Further, cities located in major river basin catchments extract freshwater but discharge wastewater back into river which is polluting irrigation canals and making wastewater management more challenging for urban and rural planners. About 122,000 MLD wastewater generation is projected by 2050 and its treatment in country requires substantial attention on strategies and investment plans. India has 35 metropolitan cities with more than 10 Lakh human population but they have only 51% treatment capacity (8040 MLD). Delhi has maximum treatment capacity (2330 MLD) but it just constitutes only 10.5% of total national sewage water generation. Similarly, Mumbai has treatment capacity of 2130 MLD but again it corresponds to just 9.1% of total sewage water generation. Fortunately, cities like Hyderabad, Vadodara, Ahmedabad, Ludhiana and Chennai have 100% sewage water treatment capacity where it is fully safe to use wastewater in agriculture.

According to International Water Management Institute (2013), irrigation potential of municipal wastewater generated from class I and class II cities in India is about 11.01 lakh ha of agricultural land out of which share of treated waste water is just 0.71 lakh ha. Total water use in Indian agriculture was 688 trillion litres in 2010 while waste water generation in class I and II cities

corresponded to 14 trillion litres. As such, municipal wastewater reuse in agriculture though has a limited significance but under water stressed situations in peri-urban agriculture it can be important. However, with increasing human population municipal wastewater generation is expected to register an increase of 50% by 2050, therefore, its reuse in urban and peri-urban agriculture can be of significance in near future. Central Pollution Control Board estimates for 2050 say that sewage generation from Class I and II cities will exceed 100,000 MLD, so by improving agricultural water use efficiency through use of sprinkler and drip irrigation systems in future, municipal wastewater can be a potential resource.

SUMMARY

A brief appraisal of waste water generation, treatment and its present and possible use in Indian agriculture furnished above depicts that waste water can act as an alternative source of cheaper irrigation water over undergroundwater. Waste water has potential to maintain declining fertility of Indian soils in urban and peri-urban agriculture apart from reducing use of fertilisers and both these aspects needs to be precisely studied on agro-climate basis in different crops. However, ensuring cent per cent treatment of waste water for safeguarding our land and water resources, keeping healthy our human and livestock population and securing a safe environment is necessary.

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