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Policy Review: Humanure Application in Agriculture: Emerging Policy Concerns and Recommendations

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HUMANURE APPLICATION IN AGRICULTURE: EMERGING POLICY CONCERNS AND RECOMMENDATIONS

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This Policy brief highlights the challenges in agriculture and provides recommendations with respect to the identified problem – hurdles in reusing humanure in agriculture. It presents evidence and experience, through research results and findings from the field on application of human excreta-based soil inputs in agriculture in order to make informed decisions.

> "Well balanced loop – A human being excretes the same amount of nutrients that he/she takes up in his/her diet. It takes the same amount of fertilizer required to grow food for a person as the amount of nutrients a person excretes"
>
> *– Jönsson et al. 2004*

1. An Overview of Agriculture Sector in India

Decreased agricultural productivity in India is due to water scarcity, deficient rainfall, increasing cost of inputs, nutrient deficiency and poor soil quality. Despite the growing use of fertilizers, the country is experiencing stagnation in agricultural productivity and degradation of soil quality. It is, therefore, critical to optimize soil productivity and yield, in order to meet growing food demand with decreasing cultivable land. Organic matter is vital for good soil productivity as it improves physical, chemical and biological properties of soil; it is therefore, referred to as 'Life of Soil'. The most common organic matter sources are farmyard manure, crop residues, and vermicompost. Some of these organic matter sources are dwindling, resulting in the need to choose alternate sources. Humanure (compost from human faecal material and urine) could be considered as an alternate organic matter source (Girija, et al., 2019).

Many cities in India still depend on on-site sanitation infrastructure, such as septic tanks and pit latrines for sewage disposal, which require periodic emptying. However, the lack of designated places for disposing faecal sludge (FS) leads to unsafe dumping on land and in water bodies, which in turn leads to a negative impact on the environment and public health. If we can safely recover nutrients from human waste by reusing in agriculture, a lot of money spent on fertilizers could be saved, especially the cost of the import of phosphorous fertilizers. This can only be achieved by giving back to soil, nutrients consumed and then excreted by humans and animals — or releasing back into the environment by reusing in agriculture as soil amendments by closing the nutrient loop. However, the main concern are the health risks associated with reuse. The risk groups are farmers, who through usage, come into direct contact

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with the untreated FS on their farmlands; and the consumers consuming the contaminated produce. The WHO 2006 Sanitation Safety Planning process provides an incremental improvement plan for safe reuse of wastewater, excreta and greywater, which would help in mitigating the risks associated with human waste application in agriculture.

2. Policy Concerns of Reusing Humanure (co-composted faecal sludge) in Agriculture

Many farmers in peri-urban towns of India are using human excreta as manure and the main problem faced by them is that the food produced using human waste is not considered as "Organic". The compost quality standards provided by Fertiliser Control Order (FCO) are for organic compost and for Phosphate Rich Organic Manure (PROM) made from the feedstock, wet waste - vegetable market waste and yard waste. There are no set standards for manures originating from human faeces. There are differences between national and international norms for application of humanure in organic farming. The standard requirements of the National Programme for Organic Production (NPOP) of the Ministry of Commerce and Industry state that "Manures containing human excreta (faeces and urine) shall not be used for organic farming". NPOP further states that if treated wastewater or faecal sludge is used for fertigation or as a soil conditioner, then the product is no longer 'organic'. The International Federation of Organic Agriculture Movements (IFOAM) state that 'organic soil fertility management does not use human excrement on crops for human consumption without measures to protect humans from pathogens'. Under one of the requirements for soil fertilization, IFOM also states that 'Human excrement shall be handled in a way that reduces the risk of pathogens and parasites and shall not be applied within six months of the harvest of annual crops for human consumption with edible portions in contact with the soil'.

If we interpret the above norms, the international norms (please refer the underlined) allow the use of humanure in organic farming, provided necessary safety measures are taken at each level of operation. In this context, a study was conducted to evaluate the application of humanure or co-composted faecal sludge in agriculture as an alternative. This study provides scientific evidences through field experiments about the potential for co-compost application in agriculture while ensuring safety.

3. Application of Co-Composted Faecal Sludge in Agriculture

The study was launched at the Faecal Sludge Treatment Plant (FSTP) in Devanahalli, Bengaluru, in order to recover and reuse nutrients from treated FS to agriculture. Under the study, a field experiment was conducted, and the methodology followed was 'Randomised Block Design' (RBD). This study conducted by the agricultural trials, therefore, aims at assessing the impact of co-compost application in comparison with other treatments/nutrient sources like faecal sludge, farmyard manure, chemical fertilizers and control on crop growth and development and yield parameters. The study involved co-composting of faecal sludge (FS) with Municipal Wet Waste (MWW) producing nutrient balanced co-compost/humanure, which is one of the inputs used for the field experiment conducted in the study area. The windrow method of co-composting dewatered faecal sludge (FS) with organic solid waste will eliminate pathogen contamination (Koné, et al., 2007). The sample test results showed that the final matured compost produced by co-composting dewatered faecal sludge (FS) with organic

solid waste meet most of the Fertilizer Control Order (FCO) standards. The final co-compost was able to maintain the nutrient balance - C: N ratio - and is free from pathogen contamination.

The field trial included cultivating two crops – field beans during Kharif season followed by sweet potato during the Rabi season. The first crop, field beans, was grown under different nutrient sources - as mentioned above, through RBD. Field bean is a high growing crop, which grows above the ground; its edible parts will not come in contact with humanure. The second crop, Sweet Potato, is a residual crop, hence the treatments were not imposed again. Sweet potato is a root crop in which the edible parts will come in contact with the applied humanure (Girija, et al, 2019). Hence, these two crops were selected for the experiment i.e. to assess the pathogen contamination in both - high growing and root crops. Post-intervention, the final produce was assessed for pathogen contamination.

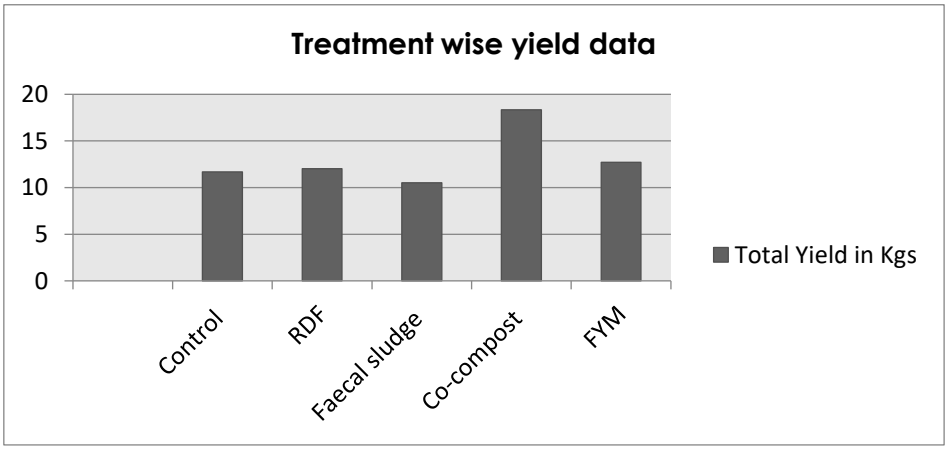

Figure 1: Treatment wise yield data of Field beans

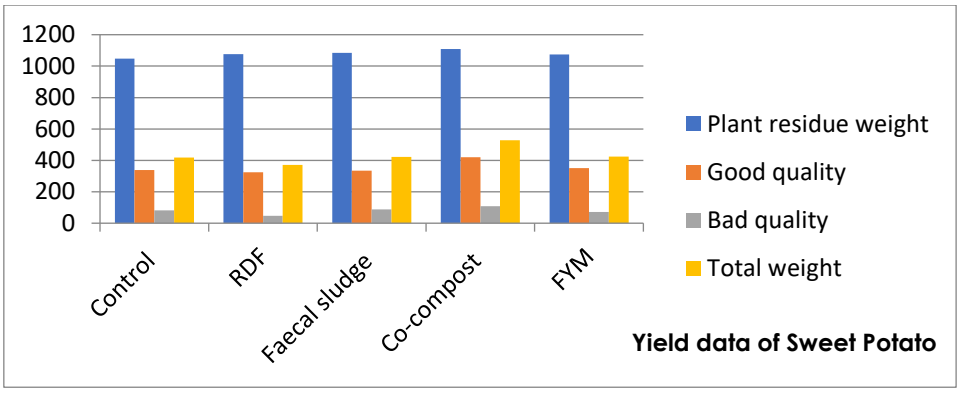

Figure 2: Treatment wise yield data of sweet potato

The findings from the field experiment showed that the differences in yield for both the crops among different sources of nutrients were slightly significant (Figure 1 and 2 – Source: Girija et. Al, 2019). The yield difference due to co-compost application was higher compared to other sources. But, the results for crop growth and development were not statistically significant. The final produce, field beans from all the five treatments were tested for pathogen contamination. The results showed that the produce was free of E. coli and Faecal Coliforms. The Sweet Potato sample was also tested for pathogen contamination. The test report results showed negative for Helminths Egg presence both in the pulp part and the edible portion with skin. The study also

proposes to repeat the field experiment for few more cropping seasons to come to a definitive conclusion of the above findings (Girija et. Al, 2019).

4. Conclusions and Recommendations

Overall, it was found that the use of human excreta-based soil inputs in agriculture is an important alternative in farming as it enriches the nutrient content of the compost. Safe reuse of humanure in agriculture by following health protection measures will greatly benefit the farming community by enhancing soil productivity thereby increasing crop production. These will, in turn, have significant economic benefits, by reducing expenses on public health and environmental protection. The contents of the pits can be turned into valuable fertilizer, thereby a family's waste turns from being a liability in a septic tank to a growing asset. Human excreta-based soil inputs should be promoted for application in agriculture considering their nutrient significance. The paper proposes to repeat the field experiment for a few more cropping seasons to generate more evidence to support the argument.

Below are some of the recommendations from the study:

- The study findings showed that the final matured co-compost meets most of the Fertiliser Control Order (FCO) standards and is free from pathogens. Hence, this study would recommend including faecal sludge as one of the feedstocks under compost quality standards provided by FCO for organic compost.
- Providing Marketing Development Assistance for the direct sale of humanure by compost manufacturers to farmers will make it more economical.
- Humanure should also be co-marketed by tagging of cities with fertilizer marketing companies.
- The study findings showed that the humanure/co-compost reuse is safe for application in agriculture as the final produce (both high growing and root crops) is free from pathogen contamination. Hence, the study would recommend including humanure as an organic source under IFOAM organic soil fertility management and the produce grown by using humanure should be considered as ‘Organic’. This would encourage farmers to use human excreta-based soil inputs as it increases crop yield.
- Promote humanure application on the lines of city compost marketing, this would encourage famers to use humanure in agriculture.
- There is a need to take measures to popularise humanure by providing the direct incentive or subsidy on use of co-compost to farmers. The available assistance (subsidy) on the sale of compost from municipal solid waste should be considered for the sale of humanure.
- Sanitation and food are very often treated and practiced as two unrelated topics, but they are equally relevant to issues of under-nourishment and malnutrition. Closing the nutrient loop by reusing human waste in food production has great potential in addressing sanitation and agriculture issues. Mainstreaming nutrition in the WASH (Water, sanitation, and hygiene) discourse is thus the need of the hour.

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Disclaimer

This Policy Brief is a working draft that represents the views and recommendations of the author. The author alone is responsible for the views expressed in this paper. It should be noted that the document is being published for comments on its substantive merit and policy implications.

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