

IMPACT OF EXPLOITING HUMAN EXCRETA ON CROPS PRODUCTION IN RWANDA: CASE STUDY OF RULINDO DISTRICT

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ABSTRACT

The main objective of this study was to analyse the impact of exploiting human excreta on crops production. Both primary and secondary data were collected through experimentation, questionnaire, interview and observation supported by data from desk study. The data obtained from the field were entered and analysed using Microsoft Excel and SPSS.

The study has shown that the farmers of Rulindo are users of human excreta but the number of users is still low only 26%. About the productivity of crops using human excreta, the study has revealed that there is a positive impact of using human excreta on crops production.

The experiment done from 2012 to 2013 on five farmers of Rukoza and Cyungo sectors of Rulindo district showed that human excreta was more productive on beans and Irishpotatoes as follows the average productivity of climbing beans was increased from 940 kg/ha to 1440 kg/ha with a relative improved productivity of 1.51 and that of irish potatoes from 5100 kg/ha to 15400 kg/ha with a relative improvement of 3.1. However some challenges have been revealed like lack of Knowledge, infrastructures, adequate intruments to deal with human excreta for their application in soil.

Key words: Human excreta, crop production

Introduction

Rwanda is a country where agriculture plays an important and vital role both for sustaining the economy and feeding the

population of more than 10, 5 million which is growing at 2.6 per cent annually (NISR, 2012). Furthermore, the major portion of

this population 83.5% lives in rural areas and depends especially on agriculture.

For that reason, the Government of Rwanda has set many strategies to increase agricultural productivity, a critical component of the nation's "Vision 2020" and economic development plan (MINECOFIN, 2000). As a result, the Government has extensively committed its time and resources to develop the fertilizer market, support fertilizer utilization in Rwanda for instances by one cow per one family, small livestock, domestic waste management, but all are not enough for providing sufficient nutrients to the plants cultivated especially for poor and small farmers, Kayitesi (2008).

From limited resources for fertilizing their lands, some farmers have taken initiatives to exploit human excreta (faeces and urine) as fertilizer for food production and have produced more than using other fertilisers and some researchers have proved that human excreta can be a good alternative of fertiliser. As said Helvi Heinonen et al. (2005), one of the ways to increase food production is exploiting human excreta which are natural resources, rich sources of nitrogen and other nutrients necessary for

plant growth always available in all societies. In addition, they are only "waste" when we discard them. When recycled, they are resources, and are often referred to as manures, but never as waste, by the people who do the recycling." Sridevi, et al. (2009). The use of sanitised human excreta as a fertiliser stimulates crop growth and, as a result increases nutrition for those who depend on subsistence farming, or helps to generate or supplement income for those who sell the products they grow (Anna et al., 2010; Luo Shiming 2002). It may not only have the direct benefits of protecting and improving natural resources such as water and soils, and enable households to increase food crops, but also have indirect benefit of improved food security, resulting in improved health of the individual, greater productivity, increased economic output and opportunities, and a decreasing burden on social services (Jönsson et al., 2004; Morgan, 2003).

Considering the availability of human excreta in all households, its related management cost, high price and negative environmental impact of chemical fertilisers, we have chosen to make a research on the

impact of human excreta on food production in Rwanda particularly in Rulindo District.

Materials and Methodology

The target population of this study were farmers living in the study area represented by heads of households who use human excreta for food crops production. Other people who were contacted during our study were the people charged of agriculture from the sector to national level and the local administrative authorities and governmental institutions like REMA, RBS, MINAGRI, MINALOC and MINISANTE for future perspectives of using human excreta for food production and purposive sampling technique was used as the number of people who use human excreta is still low and a total number of 105 people were used to collect data among them 5 were used for experiment.

A meeting with the population at sector level has been done for explaining the purpose of the study and 95 households' representatives have accepted themselves to fulfill the questionnaire. For a follow-up

and collecting questionnaires fulfilled, 6 local assistants were trained.

The interview also has been used and has been administrated to other key informants who were not farmers such as agronomists and local government authorities, senior managers in Ministries. Another method used was the observation which helped the researcher to observe the soil types, toilet exploited for this purpose and other method used for composting human excreta. In addition experiments were done on 5 farmers who used different types of fertilisers including human excreta in order to make comparison of production from those fields using various types of fertilisers, after data collection, the analysis was made through SPSS and Excel to produce various figures, tables and required calculations.

Study area decription

The study was conducted in one district of Rwanda, Rulindo Ditriect, in Rukozo and Cyungo sectors where the researcher met the users of human excreta. Detailed information of these sectors is provided in the table 1.

Table 1. The area covered during Field survey

Sectors	Cells	Villages
RUKOZO	Mbuye	Nyarusebeya ,Musave, Kibare
	Bwimo	Gatiba, Kadengeli, Bushyana, Gatwa
	Mberuka	Gakubo
	Buraro	Kabgayi
Cyungo	Burehe	Kibogora, Nturo, Save, Karambo, Nyagatovu

Source: primary data, 2014

Results and discussion

Both primary and secondary data from respondents and various

documents are going to be presented in the forms of figures or tables, then commented and analysed .

Table 2. Percentage of farmers who use human excreta in the study area

Villages	Total of Households	Farmers households	Households known as users of human excreta	Percentage of households users of human excreta
Nyarusebeya	123	94	21	22.5
Gatiba	160	132	34	25.5
Gakubo	191	168	48	28.5
Kabgayi	113	81	17	21.0
Kibogora	123	101	29	28.5
Total	710	576	149	26.0

Source: primary data & District data , 2014

From table 2 the households who use human excreta were 26% of the total farmers households in area of study. In other words,

the farmers are using human excreta in their farmlands but the number is still low.

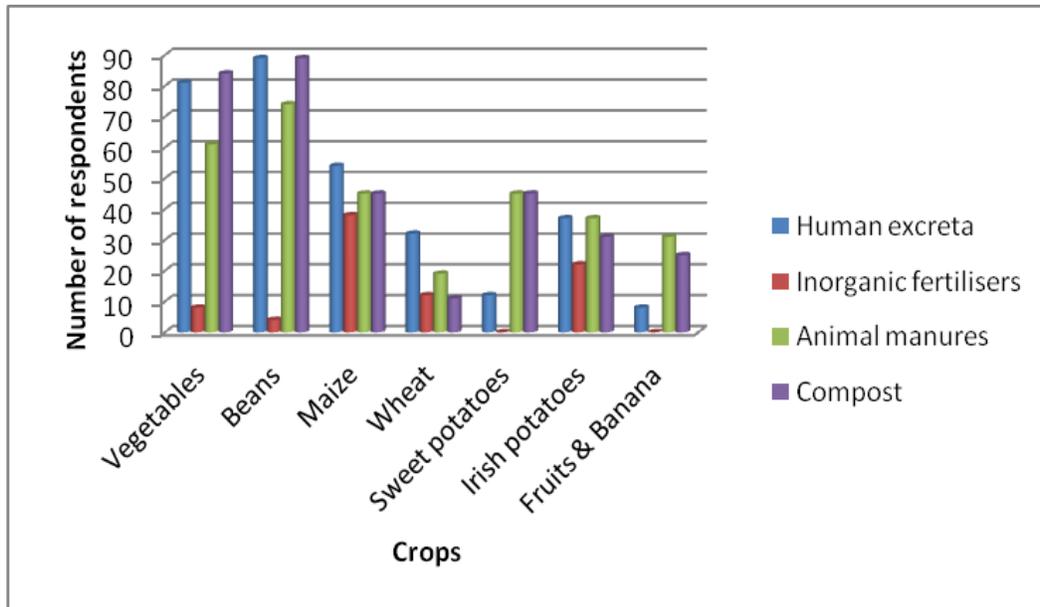


Figure 1: Types of fertilizers used on different crops in Rukozo and Cyungo sectors

Source: primary data, 2014

From the figure 1, the farmers utilise differently fertilisers on various crops. For example, human excreta as fertilisers are used by a big number of farmers to grow beans, Vegetables, maize and Irish potatoes. The animal manure and compost are also utilised by more farmers to support human excreta. Inorganic fertilizers are utilized in low proportion except on Maize and Irish potatoes. During the researcher ‘visit in the area of study a farmer of Rukozo sector has said that “Human excreta once sanitized and composted are more productive on beans, Irish potatoes and vegetables”

Expenditure (in thousand Rwfs) on buying fertilizers (Season B 2014)

From the figure 2, the majority of the farmers have not expended much money for buying fertilizers. The explanation was that they were poor and human excreta have been an alternative.

For inorganic fertilizers the authorities impose the farmers their utilization. Animal manure was bought for supporting other fertilizers specifically for its transport facility vis-à-vis human excreta.

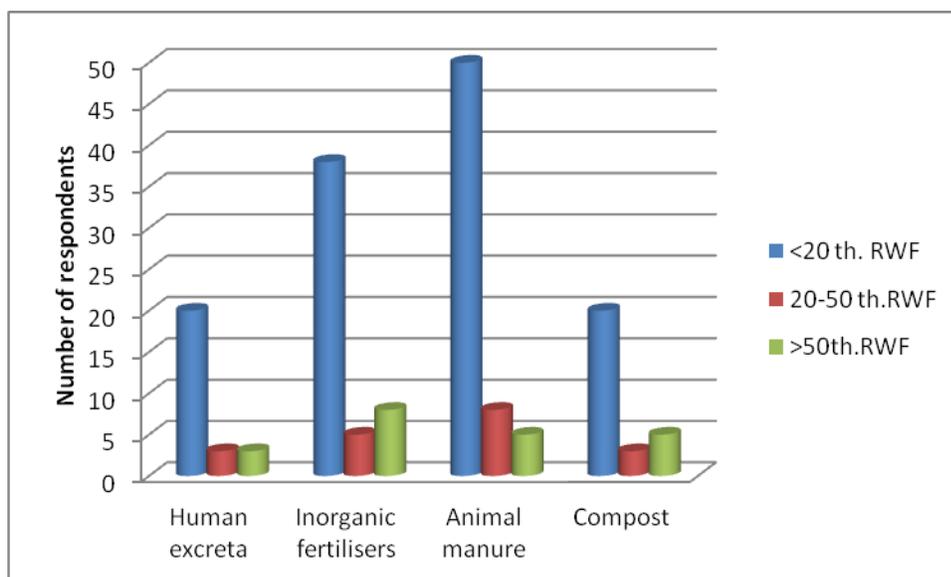


Figure 1: Expenditure (thousand RWF) on buying fertilizers (Season B 2014)

Source: primary data, 2014

Productivity of food crops using human excreta: Cases of beans and Irish potatoes

The aim of the study was to analyze the impact of exploiting human excreta for food crops production. From the field data collection, the researcher has analyzed the data of five farmers A, B, C, D, E who cultivated climbing beans and Irish potatoes. The researcher has chosen climbing beans which were cultivated by many households and Irish potatoes for their commercial aspect in the area of study. The variability of productivity before and after using human excreta and when compared with other

fertilizers talked themselves about the impact of using human excreta for food crops production in Rwanda especially in Rulindo District.

Productivity of beans before and after using human excreta

The productivity of climbing beans before and after using human excreta is presented in the table 3. Considering the average of the maximum productivity from experiments, the results showed that the productivity of climbing beans were increased after using human excreta. The production has been

increased from 940 kg/ha to 1440 kg/ha with a relative improved productivity of 1.51.

Table 3. Productivity of beans before and after using human excreta

Sample	Productivity before using Human excreta (Kg/ha)	Productivity after using human excreta (Kg/ha)	Relative improved productivity (x)
Farmer A	1000	1500	1.5
Farmer B	800	1000	1.25
Farmer C	800	1200	1.5
Farmer D	1200	1800	1.5
Farmer E	900	1700	1.8
Total	4700	7200	7,55
Average	940	1440	1,51

Source: Primary data , 2014

Productivity of Irish potatoes before and after using human excreta

As a commercial crop in the area of study the farmers tried their best to increase the productivity of Irish potatoes using human excreta as fertiliser. Table 4 is showing the differences before and after using human excreta.

Table 4 . Productivity of Irish potatoes before and after using human excreta

Sample	Productivity before using Human excreta (kg/ha)	Productivity after using human excreta (kg/ha)	Relative improved productivity
Farmer A	4,000	1300	3,3
Farmer B	6,000	1700	2.7
Farmer C	3,500	1400	4,0
Farmer D	5,000	1500	3,0
Farmer E	7,000	1800	2,5
Total	25,500	7700	15,5
Average	5,100	15,400	3,1

Source: Primary data , 2014

Table 4 shows that before using human excreta the productivity of Irish potatoes were low at an average of 5, 100 kg/ha but with using them the productivity was increased at an average of 15,400 kg/ha..

Productivity of climbing beans compared with other fertilizers

The estimation of production given by five farmers using different fertilisers in Rukozo and Cyungo Sectors, prented in table 5 shows that using human excreta as a fertiliser on growing climbing beans had a significance on the increasing of production.

Table 5. Comparison of Productivity of beans using human excreta and other fertilisers

Sample	Productivity human excreta (kg/ha)	Productivity using chemical fertiliser (kg/ha)	Productivity using animal manure (kg/ha)	Productivity using compost (kg/ha)
Farmer A	1500	1500	1200	800
Farmer B	1000	1000	800	700
Farmer C	1200	1400	1200	900
Farmer D	1800	1700	1200	1000
Farmer E	1700	1700	1500	1200
Total	7200	7300	5900	4600
Average	1440	1460	1180	920

Source: Primary data, 2014

From the table 5, statistically there is no difference using human excreta and chemical fertilisers, the average of productivity was 1 440 kg/ha using human excreta while it was 1460 kg /ha using chemical fertilisers. The productivity was low when using animal manure and compost with 1180 kg /ha and 920 kg /ha respectively.

In the same way, Simons and Clemens (2004), comparing the productivity of beans fertilized with human urine and cattle urine, the productivity is respectively 1 420 kg/ha and 1 250kg /ha. The quantity of human urine and cattle urine applied to supply recommended dose of nitrogen was different 8333 l/ha from human urine and 12500 l/ha from cattle.

Productivity of Irish potatoes comparing using human excreta and other fertilisers

The productivity of Irish potatoes using human excreta vis-à-vis chemical fertilizers, animal manure and compost is significant as table 6 shows.

Table 6. Comparison of Productivity of Irish potatoes using human excreta and other fertilisers

Sample	Productivity human excreta (Kg/ha)	Productivity using chemical fertiliser (kg/ha)	Productivity using animal manure (kg/ha)	Productivity using compost (kg/ha)
Farmer A	13000	16000	10000	8000
Farmer B	17000	18000	12000	6000
Farmer C	14000	14000	9000	9000
Farmer	15000	16000	11000	7000

D				
Farmer E	18000	17000	12000	9000
Total	77000	81000	54000	39000
Average	15400	16200	10800	7800

Source: Primary data, 2014

From the table 6, the productivity of Irish potatoes using human excreta is better than their productivity from using chemical fertiliser at the range of 15400 kg/ha and 16200 kg/ha.

Conclusion

Human excreta has increased dramatically the average productivity of climbing beans from 940 kg/ha to 1440 kg/ha with a relative improved productivity of 1.51 and that of irish potatoes from 5, 100 kg/ha to 15,400 kg/ha with a relative improvement of 3.1.

Recommendations

In collaboration with different research institutions, there is a need for the Ministry in charge of agriculture to establish collect techniques and effective composting system of human excreta to protect the health of farmers. This ministry is also requested to make a research on the real composition of human excreta before using them and

educate the farmers how to apply sanitized human excreta on crops.

Also it is needed to sensitise the user communities to change their mind and on the resourcefulness of human excrements towards food security through the recycling of sanitised faeces and urine in agriculture as soil conditioners and source of plant nutrients.

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