VEGETABLE FARMERS' PERCEPTION OF WASTEWATER USE IN OJOO LOCAL GOVERNMENT AREA (LGA) OF LAGOS STATE

Fawole O. Pipy
Department of Agricultural Extension and Rural Development, University of Ibaban, Nigeria
Email: opfawole@yahoo.com

ABSTRACT

In Nigeria, as in many other countries, wastewater use in agricultural production by farming households is on the rise and there is a need to draw the attention of key players and urban authorities in fostering appropriate planning initiatives. For this reason, the perception and knowledge of vegetable farmers becomes necessary to improve their production activities and yield. While previous studies have confirmed limited or no awareness, information and education to vegetable farmers that engage in wastewater dependent activities there has been less attention to the perception and knowledge of vegetable farmers' use of wastewater. The purpose of this study was to examine wastewater use in vegetable production as perceived by 200 randomly selected farmers in Ojoo LGA in Lagos State. Results indicate significant relationship between farmers' perception and knowledge of wastewater use across 32 perceptual and 22 knowledge dimensions. Respondents' have high perception (96.3%) and knowledge (53.0%) of wastewater use in vegetable production. Regular challenges experienced by these farmers are environmental pollution, fire and disease outbreaks, disputes, and pest infestation while occasional ones include drought, erosion, flood, climatic fluctuations, and unstable market prices.

Key words: Vegetable, farmers, wastewater, use, Nigeria.

INTRODUCTION

There is a growing trend of urban production of vegetables. In Ojoo LGA in Lagos state, many farmers ' that produce vegetables are known as urban farmers, who are not recent migrants due to the fact that they have been able to dominate a particular section of Lagos State for this practice, along road sides and un-developed land.

Urban farming entails the growing of plants and raising of animals for food and other uses within the urban areas or boundaries and related activities such as the production and delivery of inputs, processing and marketing of products (De Zeeuw, 2004). It is a dynamic concept that comprises different forms of farming systems ranging from subsistence production and processing of household level of full commercialized agriculture (ETC-RUAF, 2004).Urban agriculture comprises different types of farming systems such as floriculture, horticulture, aquaculture, orchard keeping, vegetable and cereal production within the urban areas using wastewater. Wastewater is a resource that can be applied for production uses since it contains nutrients that have potentials for use in agriculture, aquaculture, and other human activities (Hussan, *et al, 2002)*. The quantities of wastewater produced by cities in Nigeria are rising steadily with urban growth (Scott, *et al*, 2006). The sources of wastewater include sewage drains, used sewage channels, surface water sources like rivers, lakes, and streams which are mostly polluted with waste water from the city sewage and drainage channels.

In the area under consideration, wastewater in canals run through the Lagos State University and the Military Barracks is useful for farmers. The wastewater runs through their farms thereby making the wastewater readily available means to use in watering their vegetables. This water also mostly polluted by domestic wastes, drainage channel, human and animal excreta and illegal refuse dump by members of the communities (Brown, 2003).

The composition of wastewater varies according to its origin, the stream water, and other urban run-offs, grey water (domestic water that is wastewater with urine and faeces), industrial wastewater and other commercial establishment and others. The use of wastewater is important because of increasing volumes of fresh water are being converted into domestic, hospital, industries, roadways and others (UNDP, 1998). As cities grow, the water supply to these cities also grows, resulting in ever –increasing quantities of wastewater produced by urban residents and industries (Buechler and Scott, 2006).Currently, groundwater is used for agriculture, however within increasing competition between agriculture, industry, and domestic demand, agriculture is beginning to receive less water (Brown, 2003).

It has been observed that majority of the farmers do not know the environmental impacts

and health risks of using wastewater. The major threat to farmers and consumers is from intestinal parasite, most often worms living in the small intestine (Ensink, *et al*, 2002). Danso *et al* (2002) noted that 60% of the farmers using raw wastewater were infected with roundworms which cause ascariasis. The farmers who used a combination of wastewater and ground water had a lower infection rate of 40% (Faruqui and Mukherje, 1998). In terms of environmental impact, wastewater use over a long period of time can result in heavy metals accumulation especially with industrial wastewater sources (Yuani, 1993).

Non-the-less, the long term use of wastewater can become self limiting due to soil damage. Although the organic matter in wastewater can help improve soil texture, wastewater has harmful effects in arid environments by causing soil salinisation, blocking with oil and grease.

Wastewater use in urban agriculture, particularly in vegetable production contains the full spectrum of pathogens found in the wastewater. Many of these can survive for several weeks when discharged into fields. The most common threats come from high concentration of bacteria and from intestinal worms, which pose a high risk to farming community and their consumers. Contamination of produce can also occur at point of sales, when vendors use dirty water to freshen-up their produce and slow wilting. It is also observed that there none or little awareness, information, and education to the vegetable farmers that engage in wastewater dependent activities.

Inspite of these, farmers continue to use wastewater for vegetable production. While there is a need to determine farmers' knowledge of wastewater in vegetable production, the perception of the farmers on different aspects of wastewater use in urban agriculture, the personal characteristics of the farmers to the use of wastewater, and the measures the vegetable farmers put in place to protect themselves against the adverse effects of the use of wastewater on their health become necessary. Based on these issues, this study thus conducted to determine:

1. personal characteristics of the vegetable farmer on the use of wastewater
2. perception of vegetable farmers towards the health risks that can emanate from the use of wastewater
3. Knowledge of the health risk associated with wastewater use.

RESULTS

Table 1. Personal characteristics of vegetable farmers

Variable/Categories	Frequency/Percent
Age	
30 and below	126(53.5)*
31 – 40	52(26)
41 – 50	11(5.5)
51 – above	11(5.5)
Sex	
Male	166(83)
Female	34(17)
Marital Status	
Single	47(23.5)
Married	135(67.5)
Divorced	6(3.0)
Widowed	12(6.0)
Religion	
Christianity	51(25.5)
Islam	147(73.5)
Traditional	2(1.0)
Number of years in school	
Never attended	73(36.5)
4 – 6 years	88(44)
7 – 9 years	3(1.5)
10 – 12 years	36(18)
Household size	
1 – 6	137(68.5)
6 – 10	45(22.5)
Above 10	34(17.5)
Residency	
Domiciled	57(28.5)
Not domiciled	143(71.5)
Farms location	
One location	80(40)
More than one	120(60)
Farming experience	40(20)
Less than 6 years	60(30)
6 – 10 years	26(13)
11 – 15 years	55(27.5)
16 years and above	
Land ownership	
Yes	9(4.5)
No	191(95.5)

*Figures in parenthesis are percentages

Many (53.5%) of the vegetable farmers are 30 years and below, with 37% being over 30 years. These farmers are mostly males (83%), married (67.5%) and are largely Muslims (73.5%). The results indicated that the vegetable farmers have some years of education; a majority had 4-6 years of schooling, while 36.5% of them had no form of education.

The vegetable farmers' family size distribution is positively skewed. A majority

(68.5%) have 6 or less persons (children plus husband and wives) in a family. While this fairly small family size may be advantageous given the current economic meltdown, the age distribution of the family members has implications for labour during agricultural operations.

Many (71.5%) vegetable farmers, this study indicates, do not reside where their farms are located and 60% of them have vegetable farms in more than one location. A majority (95.5%) are tenants as they do not own the land they farm. Their years of farming ranges from less than 6 years (20%) to 16 years and above (27.5%) with a majority (30%) of them having 6-10 years farming experience.

Table 2. Respondents' perception of wastewater use in vegetable production

Perception	X	SD
Wastewater causes pollution	4.24	1.06
There is no technical knowhow to wastewater use among farmers	4.23	1.39
Seasonality is a great problem for wastewater use	4.02	0.75
Wastewater can cause loss of income to farmers	3.95	0.91
Wastewater encourages the recycling of resources	3.93	1.46
The income is higher using wastewater in dry season than in rainy season	3.72	1.58
Exposure to water health risk can be reduced by bed and furrow cultivation	3.72	1.58
Wastewater causes incontinences such as loss of leisure and sleep	3.62	1.17
Health risk is high during dry season because of accumulation of waste in polluted water	3.60	1.76
Health risk from wastewater can be reduced by protective clothing	3.55	1.66
Wastewater improves environmental sanitation	3.35	1.82
Wastewater increased medical cost of urban agricultural farmers	3.32	1.67
Wastewater affects land suitability in the long-run	3.29	1.21
Human diseases transferred from vectors attracted by agric activity	3.20	1.52
Wastewater influences property value around it	3.20	1.47
Wastewater reduces aquatic biodiversity	3.17	1.56
Wastewater reduces aquatic biodiversity	3.17	1.56
Wastewater is a source of occupational health risk	2.82	1.71
Wastewater encourages transmission of diseases to people	2.75	1.74
Contamination of crops with pathogenic organisms	2.70	1.66
Wastewater leads to high incidence of disease	2.62	1.73
Wastewater makes farmers vulnerable to diseases	2.59	1.62
Wastewater use is not affected by taboos and religious beliefs	2.47	1.80
My religion does not allow consumption of vegetables from wastewater	2.13	1.45
Wastewater reduces the need for chemical fertilizer.	2.12	1.44
Wastewater use does not encourage children participation in urban agriculture	2.10	1.64
Wastewater is a rich source of plant nutrient	1.93	1.41
Wastewater gives high yield than ordinary water	1.87	1.25

Note. Scale used was strongly agreed=5; Agreed=4; Undecided=3; Disagree=2; Strongly Disagreed=1

The survey instrument contained 32 statements designed to determine the perception of vegetable farmers of wastewater use. Perception scores obtained were grouped as high (3.5 and above), average (2-3.5) and low (less than 2). 39.2% and 57.1% of the vegetable farmers have high and average perception of wastewater use respectively. Only about 1% of them have low perception of wastewater use (Table 2). These findings indicate that the vegetable farmers' perception of wastewater use in vegetable production is high.

Table 3. Frequencies for shocks and hazards and effects on farmers' vegetable

	Regularly	Occasionally	Rarely
Environmental pollution	127(63.5)	51(21.5)	0(0)
Fire outbreak	111(55.5)	62(31)	0(0)
Disease outbreak	89(44.5)	78(39)	9(4.5)
Conflict	66(33)	88(44)	8(4)
Pest infestation	54(27)	103(51.5)	0(0)
Drought	37(18.5)	137(68.5)	0(0)
Flood	37(18.5)	133(66.5)	6(3)
Erosion	35(17.5)	134(67)	6(3)
Unstable outlets	27(13.5)	140(70)	4(2)
Unstable prices	20(10)	130(65)	2(1)
Climatic fluctuations	19(9.5)	130(65)	2(1)

Table 4. Means of respondents' knowledge of the use of wastewater

Knowledge	Number who responded	Number of correct responses	Percentage correct responses
Wastewater is made up of industrial waste	198	191	95.5
Wastewater is made up of storm water	200	166	83
Wastewater leads to ground water contamination	200	166	83
Wastewater causes undesirable growth of aquatic species	194	159	79.5
Wastewater contains pathogenic organisms that are injurious to farmers	198	159	79.5
Wastewater is unsuitable irrigation	200	149	74.5
Wastewater causes nitrogen injury	192	137	68.5
Wastewater peak flow is influenced by festive occasion	198	135	68
Wastewater contains residual chlorine	169	126	68
Composition of water includes organic matter	196	129	64.5
Composition of wastewater includes toxic chemicals	200	126	63
Wastewater is made up of ground water from seepage	200	125	62.5
Wastewater induces the use of soil amendment	194	125	62
Composition of waste includes nutrients	197	118	59
Wastewater contains nutrient that will bust vegetable yield	198	118	59
Wastewater causes development of sludge deposit leading to anaerobic conditions	200	128	54
Composition of waste includes organic matter	197	102	51
Composition of wastewater includes pathogens	194	98	49
Direct contact with wastewater can cause skin disease	198	81	40.5
Wastewater causes odour hazards unsightliness	100	40	40
Wastewater causes plugging of irrigation equipment	200	72	36
Wastewater is a medium of heavy metal by man	198	65	32.5
Composition of wastewater contains biodegradable organisms	197	59	29.5
Wastewater can be used in restricted irrigation	196	55	27.5
Wastewater causes phyto-toxicity	196	51	25.5
Wastewater has diurnal flow	196	46	23.4
Wastewater induces soil alkalinity	194	44	22
Wastewater disease can be transmitted from infected vegetable to consumers	198	44	22
Wastewater can cause communicable diseases	200	38	19
Wastewater affects permeability and soil texture	195	37	18.5
Wastewater provides moisture necessary for plant growth	200	30	15.0
Wastewater contains heavy metals	126	24	12

Note: scale used is true or false

A three-point scale was used to determine the effects of shocks and hazards on famers' vegetables. The result on Table 3 indicates the hosts of challenges the vegetables encounter in the production activities. Environmental pollution (63.5%), fire outbreak (44.5%), disease outbreak (44.5%), conflict (33%) and pest infestation (27%) were indicated by the farmers as the regular challenges they encounter. Occasional hazards experienced by these farmers include unstable outlets (70%), drought (68.5%), erosion (67%), flood (66.5%), climatic fluctuations (65%), unstable prices (65%), and pest infestation (51.5%).

The percentage of correct responses were grouped as high (50% and above) and low (12% -49%) to determine vegetable farmers' knowledge of wastewater use in vegetable production. The results on Table 4 show over half (17) of the responses have scores ranging from 51% to 95.5%, indicating high knowledge of wastewater use in vegetable production among the farmers surveyed. However, the findings also indicate that slightly below half (16) of the responses have scores from 12% to49%, implying that there is a need to provide training to these farmers to correct certain misconception and improve their knowledge of wastewater use.

Table 5. Pearson correlation between vegetable farmers' perception and knowledge in wastewater use in vegetable production (n=200)

Variables	Mean	Std. Deviation	r	p	Remark
Perception	89.4100	13.1982	-	0.00	significant
Knowledge	70.3600	8.4467	280		

Analysis was conducted to determine if significant relationship exist between vegetable farmers' perception and knowledge of wastewater use in vegetable production (Table 5).The result of the analysis indicate a significant relationship exist between vegetable farmers' perception and knowledge of wastewater use in vegetable production.

CONCLUSION

The study indicates that the vegetable farmers are mainly young adult males, with low educational level, married and have average family size. They mostly tenants with multi-location vegetable farms and have years of experience in vegetable farming using wastewater. Some of the challenges these farmers encounter regularly include environmental pollution, fire and disease outbreaks, conflicts, and pest infestation; while occasional challenges they experience are drought, erosion, flood, climatic fluctuations, pest infestation and unstable market outlets. The findings of the study also revealed high perception and knowledge of wastewater use in vegetable production among the vegetable farmers. The perception of the vegetable farmers correlated significantly with their knowledge of wastewater use in vegetable production. Base on the positive correlation between the farmers' perception and knowledge, it is recommended that they should given formal training in the various aspects of wastewater use to enhance their knowledge base of wastewater use and improve their production levels.

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