

Waste Generated and Adoption of Waste Management Practices among Rural Households in Haryana

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KEYWORDS Vermi-Composting. Bio-Gas. Mushroom Cultivation. *Durrie* Making. Agri-Waste. Animal Waste. Household Waste. Waste Management. Self Help Group

ABSTRACT The technologies recommended for waste management for rural areas are vermi-composting, bio-gas, mushroom cultivation and *durrie* making. A sample of 100 rural women practicing any one of these four recommended technologies was drawn from villages of Hisar district, Haryana state. The objective of the study was to assess the nature, extent and utilization of waste generated among rural households, and management practices followed. Waste generated 'daily' included vegetable peels, animal dung and urine, 'frequently' polythene bags, fruit peels, tins, bottles, old clothes, dried twigs and weeds, 'occasionally' but in larger quantity was agri-waste in the form of stalk and straw. Utilization pattern revealed that old clothes, cut pieces, animal dung, fruit and vegetable peels, wheat straw, cotton stalk were extensively reused while decorative items were prepared from plastics bottles, polythene bags and empty bottles. Many women had received formal training in vermi-composting, some in mushroom production while all received subsidy for installing biogas plant. Majority of respondents were practicing the recommended waste management practices recommended by scientists and government departments mainly from last 2-5 years, had used personal savings for starting these micro enterprises, had high economic motivation, mushrooms were grown only for market sale, vermin compost was sold also used in own field, biogas was for household use and *durrie* was prepared mainly for household use.

INTRODUCTION

Any material unused and rejected as worthless or unwanted is referred as waste. Waste gets generated at the level of household, industries, hospital and agricultural farm. This has been classified as organic waste, toxic waste, recyclable waste and soiled waste (ceo.mse.ac.in/kidssolid.asp). The volume of waste and their composition, as well as the options for their disposal, depend upon life style of population and this has changed dramatically over time. Over the years due to increase in population, consumerism, urbanization, industrialization, increased agricultural production and other related factors, waste generated has increased substantially. Earth's ecosystem has limited capacity to recycle waste while different type of waste take varied time to degenerate. Garbage generated in households can be recycled and reused to prevent creation of waste at source (edu.green.teri.res.in). Besides second highest human population, India has the highest cattle population and being an agricultural country, the quantum of waste generated per annum is high. In agricultural societies substantial amount of agri and animal waste is recycled to meet the needs of feed, fodder and fuel. The type, quality and

quantity of waste generated in rural and urban areas differ and so do the recommendations for waste management.

The concept of waste as a material "which has no use" is changing to that of "a resource" by converting into secondary material with modification. Waste can thus be converted in to wealth and used at home or even sold. In India cities, it is a common practice to sell household waste as newspaper, magazines and bottles to waste recyclists while if throw this is often picked up by rag pickers. In many Indian homes much waste is reused in various forms while there are traditional practices associated with specific waste in certain locations and communities. It has been suggested that the best option for waste management is to follow the golden rule of 3 R's philosophy viz. Reduce, Reuse and Recycle whereby the waste generated is not only minimized but converted into an asset for reuse (Sabri, 1999; Sinha and Sinha, 2000). Seventy per cent of Indian population is living in the villages and about 80.0 per cent energy need for domestic purposes (i.e. for cooking, lighting and water pumping etc) is fulfilled by cow dung, fire wood and agricultural waste (GEDA, 2003). Household waste like plastics, bucket, tin/ghee container polybags, old garments, tyre-tube and wooden

items are being reused (Dhingra, 2000). The technologies recommended for waste management for rural areas include vermi-composting, bio-gas, mushroom cultivation and *durrie* making/utility items (Malhi 1982, Malhan 1991, Madan and Singh 1999, Behl 2001, Sinha and Sinha 2000, Package of Practices in Home Science 2004). The utilization of waste is necessary for ecological sustainability, environmental safety, economic stability and well being of human society. The ever growing economic needs and unemployment necessitates people to set up small units at household level. Self Help Group approach is emerging as a powerful approach for empowerment of poor and marginalized women (Pandey 2005, Paul 2006, Sharma and Ananthan 2006). The present study was conducted with the objective to assess the nature, extent and utilization pattern of waste in rural households and to investigate the adoption pattern of recommended waste management practices.

METHODOLOGY

The study was conducted through field survey in Hisar district, Haryana state. A sample of 100 rural women from nine villages, 10 each for biogas and mushroom cultivation (as these technologies are adopted by few families) and 40 each for vermi-composting and *durrie* weaving (using old clothing) were selected purposively. The villages selected purposively were Balsamand, Rawalwas and Kirtan for vermi-composting, Singhran and Aryanagar for *durrie* weaving, Umra and Rawalwas for mushroom cultivation, Kaimari, Mangali, Bandaheri, Rawalwas Balsamand for Biogas. The data were collected through well structured interview schedule using appropriate tools. Details were collected in relation to age, literacy level, marital status, caste, risk orientation, extension contact, scientific temper, herd size, nature and extent of waste generated, uses of waste generated, formal training received in waste management, nature of waste management enterprise and sources of capital on schedule developed for the study. The data were tabulated and statistically analyzed as per standard procedure.

FINDINGS AND DISCUSSION

Profile of Respondents

Profile of respondents revealed that maximum

were of middle age (45.0%), illiterate (59.0%), married (93.0%), belonged to high caste (52.0%), had nuclear medium sized family (42.0%), involved in farming (43.0%), had medium extension contact (46.0), medium risk orientation (54.0%), medium economic motivation (63.0%) and medium scientific temper (50.0%). Further, 60 per cent of those who had biogas had four plus cattle, while 87.5 and 60 per cent those who practiced vermi-composting and mushroom cultivation had two-three cattle, respectively.

Nature and Extent of Waste Generated

Table 1 shows that nature, extent and use of waste generated at the household level, from animals and agri-waste. Waste generated daily, frequently, occasionally and rarely were assigned a score of 4, 3, 2 and 1, respectively and weighted mean score (WMS) was calculated. Data reveals that at household level vegetable peels were generated daily (WMS 4.00 and rank I), followed by polythene bags (WMS 2.61), old clothes (WMS 2.35), cut pieces (2.31), plastic bottles and containers (WMS 2.15), tin containers (WMS 1.89), paper and cardboard (WMS 1.10), with ranks II to X, respectively. Further, animal dung and urine were generated daily in 92 per cent of households (WMS 3.68 for both). Regarding agri-waste, it is noted that this is in the form of straw, stalk, dried twigs, weeds etc., generated seasonally or frequently (WMS 1.80 and 1.98), respectively. However, straw and stalk though generated occasionally on a seasonal basis are generated in large quantities. The findings are in line with study of Dhingra (2000) that document the multiple nature of waste generated in rural households.

Uses of Waste Generated

Table 2 reveals that under store and sell category 81, 57, 15, 16, 10 and 10 per cent, store and sell plastic bottles, glass bottles, tin containers, straw, old clothes and cut pieces of cloth. Under store and reuse category 100 per cent reuse old clothes and cut pieces of clothes, 90 per cent reuse tin containers, 96 per cent reuse animal dung, 80 per cent each reuse vegetable and fruit peels, 79 per cent reuse wheat straw and cotton stalk, 46 per cent reuse polythene bags, 36 per cent reuse glass bottles, 24 per cent reuse plastic bottles and containers and 8 per cent reuse animal urine. Vegetable and fruit peels were mainly

Table 1: Nature and extent of waste generated (%)

S. No.	Waste	Daily (4)	Frequently (3)	Occasionally (2)	Rarely (1)	Weighted Mean Score	Rank
<i>I</i>	<i>Household</i>						
	Plastic bottles and containers	0.0	39.0	50.0	10.0	2.27	VII
	Polythene bags	39.0	55.0	6.0	0.0	3.33	III
	Glass bottles	0.0	26.0	63.0	11.0	2.15	VIII
	Tin containers	0.0	20.0	49.0	31.0	1.89	IX
	Fruit peels	1.0	63.0	32.0	4.0	2.61	IV
	Vegetable peels	100.0	0.0	0.0	0.0	4.00	I
	Paper and cardboard	0.0	0.0	10.0	90.0	1.10	XII
	Old clothes	0.0	35.0	65.0	0.0	2.35	V
	Cut pieces	0.0	32.0	65.0	5.0	2.31	VI
<i>II</i>	<i>Animal waste</i>						
	Dung	92.0	0.0	0.0	0.0	3.68	II
	Urine	92.0	0.0	0.0	0.0	3.68	II
<i>III</i>	<i>Agricultural Waste</i>						
	Straw and stalks	0.0	22.0	57.0*	0.0	1.80	XI
	Dried twigs & weeds etc.	0.0	40.0	39.0	0.0	1.98	X

Multiple response * Seasonal in nature and generated in large quantity

Table 2: Use of wastes generated (%)

S. No.	Wastes	Store and Sell	Store and reuse	Preparation of utility items	Preparation of decorative items	Throw away
<i>I</i>	<i>Household Inorganic Waste</i>					
	Plastic bottles and containers	81.0	24.0	10.0	11.0	3.0
	Polythene bags	0.0	46.0	8.0	13.0	44.0
	Glass bottles	57.0	36.0	0.0	5.0	5.0
	Tin containers	16.0	90.0	0.0	0.0	0.0
	Old clothes	10.0	100.0	100.0	0.0	0.0
	Cut pieces	10.0	100.0	100.0	10.0	0.0
	Fruit peels	0.0	80.0	0.0	0.0	12.0
	Vegetable peels	0.0	80.0	0.0	0.0	10.0
	Paper and cardboard	90.0	10.0	0.0	0.0	5.0
<i>II</i>	<i>Animal Waste</i>					
	Dung	0.0	96.0	0.0	0.0	0.0
	Urine	0.0	8.0	0.0	0.0	0.0
<i>III</i>	<i>Agricultural Waste</i>					
	Wheat straw	15.0	79.0	10.0	0.0	0.0
	Cotton Stalk	0.0	79.0	0.0	0.0	0.0

used as addition to animal feed, in preparation of vermi- compost while few respondents use selected fruit peels as of oranges, lemon and pomegranate for preparing face pack and medicines. Wheat straw had multiple uses, mainly as animal feed, animal bedding and in mushroom cultivation, while cotton stalk was mainly used as fuel. Animal dung was mainly used in preparing cow dung cakes by women while other uses were in vermi-compost, biogas plant, and heap manure. Few respondents prepared organic spray from animal urine by addition of leaves of *neem* and *dhatura* in urine and kept this in an earthen pot and stored for 1-2 months by covering its mouth with a cotton cloth.

Under the category of preparation of utility

items it is evident from the table that both old clothes and cut pieces were used by cent per cent respondents for preparing utility items and these included *durrie*, door mats, cot weaving, smaller garments, cover for animals, shelf and kitchen napkins, and wipers. Further, 10 and 8 per cent prepared decorative items from plastic bottles and containers, respectively while 5 per cent reused glass bottles for the same purpose. It is also noted that under the throw away category mainly polythene bags were thrown by 44 per cent, while 12 and 10 per cent threw fruit and vegetable peels and 3 per cent threw plastic bottles and containers.

Accordingly, it can be inferred that in rural households substantial amount of waste

generated at household, farm and from animals gets reused in various forms depending on the nature of waste while the rural families besides practicing traditional methods of waste management are also adopting recommendations of scientists and government departments.

Formal Trainings Received in Waste Management Techniques

From table 3 it is noted that 58 per cent respondents had received 1-2 training in vermi-composting while 58 and 30 per cent had received these trainings in the village and in town, respectively. At the same time 21 and 3 per cent respondents had received training in mushroom cultivation in the village and town, respectively while no respondent had received any formal training in bio-gas and *durrie* weaving. It is added that a large number of trainings in vermi-composting and mushroom had been organized by staff of CCS Haryana Agriculture University, Hisar mainly under Central Sector scheme – Women in Agriculture and National Agriculture Technology Project on, Empowerment of Women in Agriculture. Regarding bio-gas it was found that families receive instructions on installation

from state government officials while the art of *durrie* weaving is being learnt by younger generation from older generation women in the household and the neighbourhood.

Nature of Waste Management Micro-Enterprise

From table 4 it is noted that 92.5 per cent of the respondents were practicing vermi-composting for the past 2-5 years, 80 per cent of produce prepared was for market, sale was done mainly through individual efforts (75%) and through Self Help Group and this is an activity carried out throughout the year. It is evident that vermi-composting is fairly a new waste management initiative in this area and has a reasonable market. *Durrie* weaving is a traditional art of rural Haryana and majority of the respondents (92.5%) were making use of old clothing for the same for the last more than five years, *durrie* was mainly produced for home use (72.5%) while 25 per cent respondents found a market for this, sale was done at individual level and this activity carried out throughout the year by 95 per cent of the respondents. Regarding mushroom cultivation cent per cent respondents were in this enterprise for last 2-5 years, they were

Table 3: Formal trainings received by respondents

S. No.	Micro-enterprise	No. of training		Place of training	
		1-2	3+	Town	Village
1	Vermi-composting	58.0	1.0	30.0	58.0
2	<i>Durrie</i> weaving	-	-	-	-
3	Mushroom cultivation	21.0	-	3.0	21.0
4	Biogas plant	-	-	-	-

Table 4: Nature of micro-enterprises

S. No.	Attribute	Vermi-compost (n=40)		Durrie weaving (n=40)		Mush. Cultiv (n=10)		Biogas plant (n=10)		Total (n=100)	
		f	%	f	%	f	%	f	%	f	%
1.	<i>Duration</i>										
	Last 2 yrs	3	7.5	1	2.5	0	0.0	1	10.0	5	5.0
	2-5 yrs	37	92.5	20	5.0	10	100	8	80.0	75	75.0
	5 and above	0	0.0	19	92.5	0	0.0	1	10.0	20	20.0
2.	<i>Purpose</i>										
	Home	5	12.5	29	72.5	0	0.0	10	100.0	44	44.0
	Market	32	80.0	11	27.5	10	100.0	0	0.0	53	53.0
	Both	3	7.5	0	0.0	0	0.0	0	0.0	3	3.0
3.	<i>Level</i>										
	Individual	30	75.0	40	100.0	3	30.0	10	100	83	83.0
	Group	10	25.0	0	0.0	7	70.0	0	0.0	17	17.0
4.	<i>Form</i>										
	Annual	40	100.0	38	95.0	2	00.0	10	100.0	90	90.0
	Seasonal	0	0.0	2	5.0	8	100.0	0	0.0	10	10.0

Table 5: Sources of capital for starting micro-enterprises

Sources of capital	Vermi composting (n=40)	Durrie Weaving (n=40)	Mushroom Cultivation (n=10)	Biogas (n=10)
i. Personal saving	100.0	100.0	100.0	80.0
ii. Relatives	0.0	0.0	0.0	20.0
iii. Friends	0.0	0.0	0.0	10.0
iv. Bank	0.0	0.0	20.0	0.0
v. Money lender	0.0	0.0	20.0	0.0
vi. Subsidy	17.5	0.0	0.0	100.0

producing only for the market while sale was largely done by 70 per cent through group effort and this was a seasonal activity. In case of bio-gas 80 per cent had installed this during last 2-5 years, cent per cent were using bio-gas for home use and managing at individual level and using throughout the year. On the whole, 75 per cent had adopted the waste management techniques recommended by scientists for the last 2-5 years, were making use of products prepared at home and also selling in market place, largely efforts were carried out at individual level and except mushroom production other endeavours were of annual nature. Thus it can be inferred that women in the rural households by adopting various waste management techniques are making efficient use of waste in various forms by making products both for household use and sale in the market place. Self Help Groups being formed in case of vermin-compost are a boon for members. The findings get support from studies of Pandey (2005) and Paul (2006).

Sources of Capital for Enterprise

From table 5 it is noted that cent per cent of respondents used personal savings for starting micro enterprises of vermi-compost, *durrie* weaving and mushroom cultivation compared with 80 per cent in case of bio-gas while 20 and 10 per cent took capital from relatives and friends , respectively for installation of bio-gas. At the same time 100 and 17.5 per cent received subsidy at time of starting bio-gas and vermi –composting. It was found that in case bio-gas all respondents on getting subsidy were motivated on getting the biogas plant installed and arranged for the remaining finances from various sources. In case of mushroom cultivation it is noted that 20 per cent had taken loan from bank and another 20 per cent had taken money from money lenders. It can be inferred that generally personal money is invested in starting small scale micro-enterprises

while availability of subsidy is a motivational factor.

CONCLUSION

It is concluded that in the rural households though substantial amount of waste gets generated at household level, farm level and from animals in a variety of forms, majority of it is stored and reused in various forms. Vegetable peels and fruit peels are mainly used as in animal feed, decorative and utility items are prepared from cut pieces, plastic bags and bottles, old clothes and used in *durrie* weaving, straw is used in animal feed, mushroom production and animal bedding, cotton stalk and animal dung are used as fuel. The propagation of scientific waste management technologies and practices of vermi-composting, mushroom production, biogas along availability of subsidy for biogas and vermi-composting is encouraging women in rural households to manage, earn, save and have a better environment.

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