

## Existing Method of Farm Waste Management in Ayodhya District of Uttar Pradesh, India

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### ABSTRACT

Agricultural waste management is a critical issue affecting environmental sustainability and rural livelihoods. This study investigates the current practices and awareness levels of farm waste management among farmers in Ayodhya district, Uttar Pradesh. A total of 120 farmers were surveyed using structured interviews and a self-structured questionnaire to collect data on socio-economic factors, waste management practices, and motivational drivers for adopting sustainable methods. Results indicate that 59.17% of respondents are aware of sustainable waste management practices and 95.84% prefer adopting

such methods, with 93.33% motivated primarily by economic benefits. While 100% of respondents prefer composting farm waste, 64.17% still rely on burning practices, and 57.5% use landfilling as a disposal method. The study also reveals no utilization of biogas plants among respondents. These findings underscore the need for targeted educational programs, policy interventions, and infrastructure development to promote sustainable and efficient farm waste management in the region, reduce environmental hazards, and support sustainable agricultural development.

**Keywords** Farm waste, Farm waste management, Waste management process, Utilization of waste, Sustainable farm waste.

### INTRODUCTION

Agriculture plays a vital role in ensuring food security and sustaining rural economies, yet it also generates large quantities of waste such as crop residues, livestock manure, agrochemical packaging, wastewater, and plastic materials. When not managed properly, this waste can lead to serious environmental problems including soil and water contamination, air pollution, and increased greenhouse gas emissions, all of which adversely affect human and animal health. Sorathiya *et al.* (2014) stated that the shift from traditional mixed farming to intensive dairy operations particularly Confined Animal Feeding Operations (CAFOs) has concentrated livestock in limited spaces, resulting in the production of massive amounts of waste that require efficient management. Similarly, Alfadlli *et al.*

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(2018) observed that the intensification of agriculture without corresponding improvements in waste treatment infrastructure has heightened environmental risks in many regions. Although various organic waste recycling technologies exist, their adoption remains limited. Case *et al.* (2017) reported that farmers often face barriers such as lack of technical knowledge, regulatory constraints, and doubts about the benefits of sustainable waste practices. Among the major waste types, crop residues are frequently burned or left unmanaged, contributing to land degradation and pollution. However, studies by Maurya *et al.* (2020) and Raza *et al.* (2022) highlighted that when managed effectively, these residues can enhance soil fertility, improve nutrient cycling, and support sustainable agriculture. Nigussie *et al.* (2015) pointed out that smallholder farmers' adoption of composting strategies depends not only on the availability of resources but also on their awareness of the environmental and economic benefits. Current farm waste management methods include composting, which converts organic material into fertilizer, vermicomposting, a zero-waste method using earthworms to decompose organic matter. Sharma & Garg (2019) stated that vermicomposting is an efficient and environmentally friendly strategy for recycling agricultural waste, contributing to sustainable resource recovery. Anaerobic digestion is also widely used, producing biogas and organic slurry from biodegradable materials. Practices such as mulching with crop residues are common, though many farmers still rely on environmentally harmful methods like open burning and indiscriminate dumping, particularly in areas lacking proper infrastructure. Recycling and reusing materials such as plastic are gradually gaining attention through sustainable agriculture programs. In this context, the present study aims to examine the current state of farm waste management by identifying the types of waste produced, evaluating how farmers manage and dispose of it, and assessing their awareness of the associated environmental impacts.

## MATERIALS AND METHODS

To achieve the objectives of the present study, Ayodhya district in the state of Uttar Pradesh was purposively selected as the study area. Respondents were selected randomly for the study. A total of 120 farmer

respondents were selected for the present study. A self-structured questionnaire was prepared to collect information relevant to the study's objectives. For the collection of offline data, a structured interview schedule was prepared to obtain responses from the respondents.

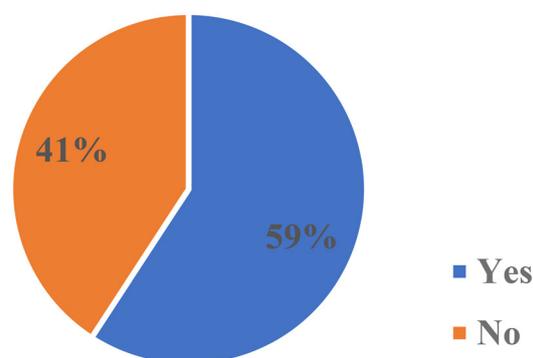
## RESULTS AND DISCUSSION

### Existing method of farm waste management

The data revealed that 59.17% of respondents are aware of sustainable farm waste management practices, while 40.83% are not (Table 1, Fig. 1). This indicates that although a majority of respondents recognize sustainable waste management methods, a significant portion still lacks awareness. Similarly, Singh *et al.* (2024) emphasized the role of educational programs in increasing awareness of sustainable practices, highlighting that areas with well-structured training initiatives tend to have higher adoption rates. The relatively lower awareness observed in the present study suggests the need for targeted educational campaigns and policy interventions to bridge the

**Table 1.** Distribution of respondents according to their awareness level regarding sustainable farm waste management practices.

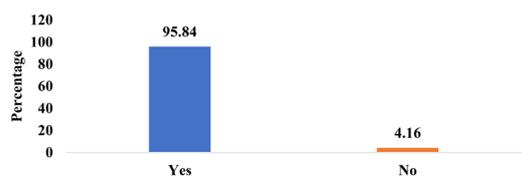
N=120		
Awareness of sustainable farm waste management	Frequency (n)	Percent %
Yes	71	59.17
No	49	40.83



**Fig. 1.** Distribution of respondents according to their awareness level regarding sustainable farm waste management practices.

**Table 2.** Distribution of respondents according to their preference on adopting sustainable management practices.

N=120		
Preference for adoption	Frequency (n)	Per cent (%)
Yes	115	95.84
No	05	4.16

**Fig. 2.** Distribution of respondents according to their preference on adopting sustainable management practices.

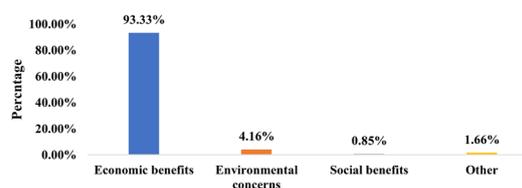
knowledge gap and promote sustainable waste management among farmers.

The data showed that 95.83% of respondents reported adopting sustainable farm waste management practices, while only 4.17% indicated they did not (Table 2, Fig. 2). This high adoption rate suggests a growing commitment to sustainability among farmers, potentially influenced by awareness of long-term benefits, regulatory frameworks, and support from agricultural extension services. Similarly, Han *et al.* (2023) identified various adopter typologies and found that approximately 70% of farmers were classified as active adopters, driven by motivations such as improved yields and cost efficiency. The findings of the present study reinforce the importance of on going support and policy measures to sustain and further enhance adoption levels across farming communities.

The data showed that 93.33% of respondents were primarily motivated by economic benefits

**Table 3.** Distribution of respondents according to their motivational factor adopt sustainable practice.

N=120		
Factor adopt sustainable practice	Frequency (n)	Percent %
Economic benefits	112	93.33
Environmental concerns	05	4.16
Social benefits	01	0.85
Other	02	1.66

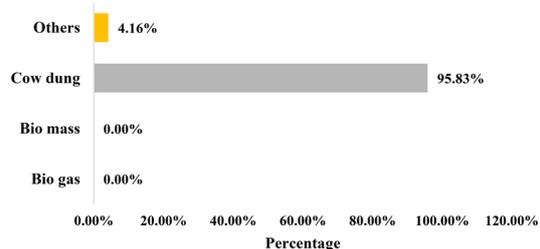
**Fig. 3.** Distribution of respondents according to their motivational factor adopting sustainable practice.

when adopting sustainable farm waste management practices, while 4.16% cited environmental concerns, and only 0.85% were influenced by social benefits (Table 3, Fig. 3). An additional 1.66% of respondents indicated other motivating factors. This distribution highlights that financial considerations play a central role in shaping farmers' decisions toward sustainability. Similarly, previous studies have emphasized that economic incentives, such as increased productivity and cost savings, are key drivers of sustainable behavior in agricultural settings. The findings of the present study underscore the need for policies and programs that align environmental goals with economic benefits to further encourage sustainable practices among farming communities.

The data revealed that 95.83% of respondents preferred using cow dung as a source of energy generation from farm waste, while a smaller proportion 4.16% opted for other sources (Table 4, Fig. 4). Notably, none of the respondents selected biogas or biomass, as both categories recorded 0% preference. This indicates that cow dung is the most favored option for energy generation among respondents, likely due to its local availability, familiarity, and ease of application in rural farming contexts. In contrast, Dabas *et al.* (2018) reported that 100% of surveyed farmers utilized cow dung for biogas production, with around 90% favoring small-scale biogas plants (3.0

**Table 4.** Distribution of respondents according to preference generate energy from farm waste.

N=120		
Preferred energy source	Frequency (n)	Percent %
Bio gas	00	00
Bio mass	00	00
Cow dung	115	95.83
Others	05	4.16



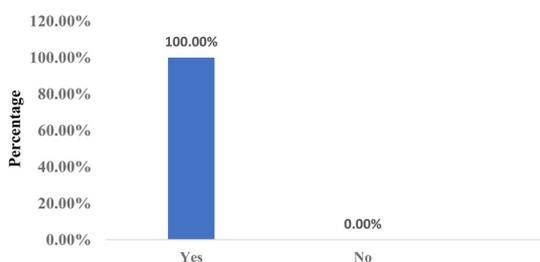
**Fig. 4.** Distribution of respondents according to preference generating energy from farm waste.

m<sup>3</sup> capacity). Their findings highlighted the substantial economic benefits of biogas systems, showing a 120% increase in net profit during the first year and up to 200% in the years that followed. The present study, therefore, reflects a continued reliance on traditional uses of cow dung, suggesting that greater awareness and technical support may be needed to expand the adoption of modern bioenergy solutions.

The data revealed that 100% of respondents preferred composting as a method for managing farm waste (Table 5, Fig. 5). This complete adoption suggests a strong commitment to sustainable waste management practices among the surveyed farmers. In contrast, Dabas *et al.* (2018) reported an 85% com-

**Table 5.** Distribution of respondents according to their preference to composting the farm waste.

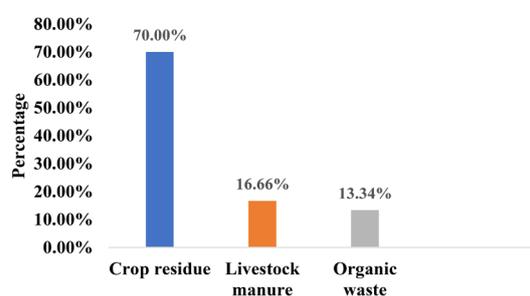
N= 120		
Preference for composting	Frequency (n)	Percent %
Yes	120	100
No	00	00



**Fig. 5.** Distribution of respondent according to their preference to composting the farm waste.

**Table 6.** Distribution of respondents according to materials they use for composting processes.

N=120		
Materials for composting processes	Frequency (n)	Percent %
Crop residue	84	70.00
Livestock manure	20	16.66
Organic waste	16	13.34
Food waste	00	00
Other's	00	00



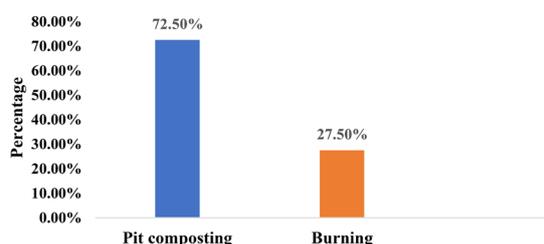
**Fig. 6.** Distribution of respondents according to materials they use for composting processes.

posting adoption rate among farmers in Rajasthan, Haryana and Uttar Pradesh, with the remaining 15% relying on less sustainable methods such as burning or landfill disposal. The full preference for composting observed in the present study may reflect higher awareness levels, improved access to composting infrastructure, or effective policy interventions promoting environmentally responsible waste management.

The data showed that 70% of respondents utilized crop residues for farm waste management, followed by 16.66% who used livestock manure. A smaller proportion, 13.34%, utilized organic waste, while food waste and other materials were not used at all, with 0.00% of respondents reporting their use (Table 6, Fig. 6). In comparison, Nigussie *et al.* (2015) found that the use of compostable materials among smallholder farmers was largely influenced by factors such as accessibility and awareness. Their study identified livestock manure and crop residues as the most commonly used materials, whereas food and household organic waste remained significantly underutilized. These findings align with the present study, which similarly highlights the limited adoption

**Table 7.** Distribution of respondents according to composting method they use for farm waste management.

N=120		
Composting method for farm waste management	Frequency (n)	Percent %
Pit composting	87	72.5
Vermicomposting	00	00
Burning	33	27.5

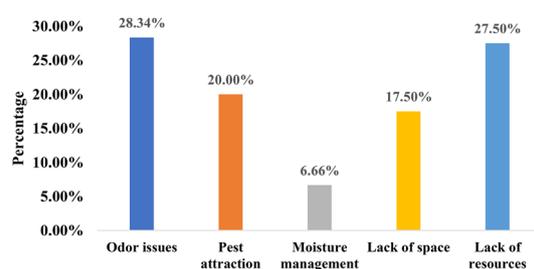
**Fig. 7.** Distribution of respondents according to composting method they use for farm waste management.

of food and organic waste. This suggests that despite the potential of diverse biodegradable inputs, their use remains constrained due to barriers such as lack of awareness, poor waste segregation practices, and insufficient supporting infrastructure.

The data indicated that pit composting is the most widely used method for farm waste management, with 72.5% of respondents adopting this technique (Table 7, Fig. 7). In contrast, 27.5% of respondents reported burning farm waste, while vermicomposting was not practiced at all, with 0.00% indicating its use. This suggests that although composting is relatively common, alternative sustainable methods such as vermicomposting remain unadopted among the respondents. These findings are consistent with Bhuvaneshwari *et al.* (2019) reported that 25–35% of agricultural waste in India is burned due to limited access to composting technologies and a general lack of awareness. Their study emphasized the environmental risks associated with burning and underscored the importance of policy interventions, farmer education, and subsidies to encourage sustainable waste management. The absence of vermicomposting in the present study supports their argument that limited resources and infrastructure hinder the adoption of more

**Table 8.** Distribution of respondents according to challenges faced by them in composting process.

N=120		
Challenges faced in composting process	Frequency (n)	Percent %
Odor issues	34	28.34
Pest attraction	24	20.00
Moisture management	08	6.66
Lack of space	21	17.5
Lack of resources	33	27.5

**Fig. 8.** Distribution of respondents according to challenges faced by them in composting process.

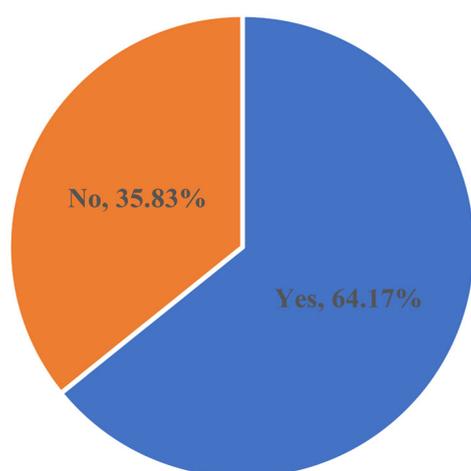
advanced and sustainable practices, highlighting the need for targeted government support and improved technological access.

The data revealed that the most common challenge faced by respondents in the composting process was odour problems, reported by 28.34% of respondents, followed closely by a lack of resources at 27.5%. Pest attraction was another significant concern, experienced by 20% of respondents, indicating issues related to hygiene and pest control. Additionally, 17.5% of respondents cited lack of space as a barrier, while moisture management was the least reported issue at 6.66% (Table 8, Fig. 8). Similarly, Ayilara *et al.* (2020) reported that odour issues 35% and pest attraction 25% were among the most common complaints from farmers engaged in composting. These findings align with the present study, emphasizing the need for targeted interventions to address practical challenges and enhance the effectiveness of composting as a sustainable farm waste management practice.

The data revealed that 64.17% of respondents prefer burning as a method of farm waste disposal,

**Table 9.** Distribution of respondents according to their preference to burning the farm waste.

N=120		
Preference for burning	Frequency(n)	Percent %
Yes	77	64.17
No	43	35.83

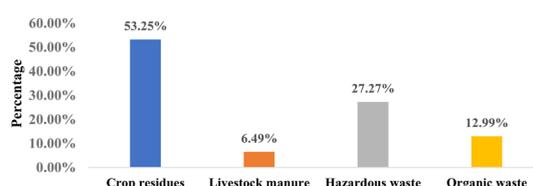
**Fig. 9.** Distribution of respondents according to their preference to burning the farm waste.

while 35.83% choose alternative methods (Table 9, Fig. 9). This indicates that a significant portion of respondents still rely on burning, despite the known environmental and health concerns associated with the practice. Similarly, Obame *et al.* (2024) reported that 58% of farmers in their study preferred burning waste due to limited alternatives, while 42% adopted more sustainable approaches such as composting or recycling. Ayilara *et al.* (2020) also found that 50% of farmers engaged in burning, though the prevalence was lower in regions with greater waste management awareness. The continued reliance on burning observed in the present study underscores the urgent need for awareness programs, infrastructure development, and policy initiatives to promote sustainable waste management practices among farming communities.

The data revealed that among the 120 respondents surveyed, 77 reported engaging in farm waste burning of these, 53.25% primarily burned crop

**Table 10.** Distribution of respondents according to material they burn farm waste.

N=120		
Material burned	Frequency (n)	Percent %
Crop residues	41	53.25
Livestock manure	05	6.49
Hazardous waste	21	27.27
Organic waste	10	12.99

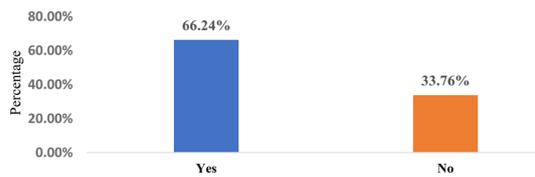
**Fig. 10.** Distribution of respondents according to their material they burn farm waste.

residues, a common field-clearing practice despite its adverse environmental and health effects. Additionally, 27.27% reported burning hazardous waste, contributing to toxic emissions and air pollution. Organic waste burning was noted by 12.99% of respondents, reflecting a lack of composting or recycling initiatives, while 6.49% burned livestock manure, a practice associated with methane release a potent greenhouse gas (Table 10, Fig. 10). These findings highlight the continued dependence on harmful disposal methods and the urgent need for awareness campaigns, policy interventions, and access to sustainable waste management alternatives. Similarly, Grover *et al.* (2015) found that 96% of farmers practiced crop residue burning (CRB), primarily to prepare fields for the next planting season and to control pests and weeds. The present study reinforces the necessity of shifting away from burning through education and support for environmentally responsible practices.

The data revealed that out of the 77 respondents who reported burning farm waste, 66.24% indicated they have a designated area for burning, while 33.76% reported not having a specific location for the activity (Table 11, Fig. 11). The presence of a designated area may suggest an effort to manage the burning process in a more controlled and organized manner. However, the absence of designated spaces among a significant proportion of respondents raises concerns about the

**Table 11.** Distribution of respondents according to the availability area for burning the waste.

N=120		
Availability of area for burning the farm waste	Frequency (n)	Percent %
Yes	51	66.24
No	26	33.76

**Fig. 11.** Distribution of respondents according to their preferred area for burning.

potential for uncontrolled or unsafe burning practices. These findings point to the need for proper waste disposal infrastructure and guidelines to ensure that even when burning occurs, it is done with minimal environmental and health risks.

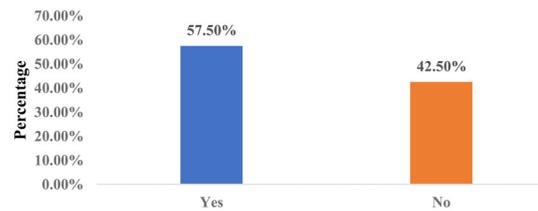
The data revealed that none of the respondents reported having access to a biogas plant, with 100% indicating its absence (Table 12, Fig. 12). This highlights the complete lack of biogas plant usage among

**Table 12.** Distribution of respondents according to their if they have any biogas plant.

N=120		
Biogas plant usage	Frequency (n)	Percent %
Yes	00	00
No	120	100

**Fig. 12.** Distribution of respondents according to their if they have any biogas plant.**Table 13.** Distribution of respondents according to their preference for landfilling farm waste.

N=120		
Landfilling farm waste	Frequency (n)	Percent %
Yes	69	57.50
No	51	42.50

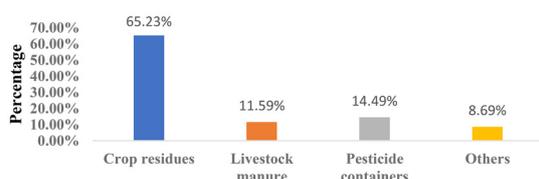
**Fig. 13.** Distribution of respondents according to their preference for landfilling farm waste.

the surveyed farmers, pointing to a significant gap in the adoption of renewable energy technologies in the study area. In comparison, Obame *et al.* (2024) found that 10% of farmers in their study had access to a biogas plant, indicating limited but existing adoption. The absence observed in the present study underscores the need for increased investment, awareness, and infrastructure development to promote biogas as a sustainable alternative for farm waste utilization.

The data revealed that 57.5% of respondents prefer landfilling as a method for disposing of farm waste, while 42.5% do not use this method (Table 13, Fig. 13). This preference may be driven by the ease of disposal, lack of access to alternative methods, or limited awareness of more sustainable waste management practices. Similarly, Oshima (2024) highlighted that in the absence of robust policy frameworks and farmer education, landfilling often becomes the default option for agricultural waste disposal. Rao *et al.* (2024) also noted in their review that in regions without access to advanced waste treatment technologies, landfilling remained the most commonly practiced method. The findings of the present study reinforce the need for targeted awareness campaigns and infrastructure development to promote more sustainable alternatives to landfilling in farm waste management.

**Table 14.** Distribution of respondents according to material they use for landfilling process.

N=120		
Materials used for landfilling	Frequency (n)	Percent %
Crop residues	45	65.23
Livestock manure	08	11.59
Pesticide container	10	14.49
Other's	06	8.69

**Fig. 14.** Distribution of respondents according to their material they use for landfilling process.

The data revealed that among the 120 respondents surveyed, 69 reported engaging in landfilling as a method of farm waste disposal. The most commonly landfilled material was crop residues, reported by 65.23% of respondents, followed by pesticide containers at 14.49%, livestock manure at 11.59% and other materials at 8.69% (Table 14, Fig. 14). These findings indicate that a large portion of waste disposed of through landfilling consists of organic matter, while a notable percentage involves hazardous materials such as pesticide containers. In comparison, Oshima (2024) found that crop residues accounted for 60% of landfilled material, which aligns with the present study. However, their study also reported a higher proportion 20% of pesticide containers being landfilled, suggesting varying degrees of hazardous waste exposure. The results highlight the need for better segregation practices and safe disposal mechanisms, especially for toxic agricultural waste.

## CONCLUSION

The study on farm waste management in Ayodhya district reveals that while many farmers prefer composting as a sustainable disposal method, there remains widespread reliance on burning and land filling, which pose significant environmental risks. The complete absence of biogas technology adoption

underscores challenges related to resource availability and infrastructure. Farmers' choices are largely driven by economic factors rather than environmental concerns, highlighting the need for a multifaceted approach involving government support, educational programs, and financial incentives. Promoting awareness and facilitating access to improved waste treatment technologies such as vermicomposting and anaerobic digestion will be essential to achieving effective farm waste management, environmental protection and sustainable agricultural development in the region.

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