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Odour and fly score analysis of composting of poultry farm waste

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Abstract

The present study was conducted in the Division of Livestock Production and Management, Faculty of Veterinary Sciences and Animal Husbandry (SKUAST- Kashmir) to analyze the odour and fly score cards while composting of poultry farm waste during winter and summer seasons during the year 2016 (January-March for winter trail and May-July for summer trail) under the agro climatic conditions of Kashmir Valley. The duration of each trail was 3 months. The odour and fly score card evaluation was done at every 15 days interval (stage) till the end of the trial (three months). The odour score varied between 6.25 (90th day) and 6.75 (75th day) during winter and 6.00 (45th day) and 6.75 (90th day) during summer seasons. Similarly fly score card of composting process recorded was 6.25 (60th day) and 6.75 (45th) was recorded during winter and 6.00 (60th) and 6.60 (90th day) during summer season. Season had no significant ($P \leq 0.05$) effect on the odour/score cards. It was concluded that satisfactory results of odour and fly scores were observed while composting of poultry farm waste.

Keywords: Score card, composting, seasons, poultry waste

Introduction

Poultry sector has shown a tremendous growth rate in the last few decades due to more concentrated production and commercialization [1]. India has a huge poultry population of around 729 million during the year 2016-17 an obvious reason for generation of more quantum of waste [2]. Also with intensification in poultry production there has been a sideways increase in mortalities, courtesy different diseases, accidents, catastrophes, and natural calamities. Prompt removal and disposal of poultry farm waste is essential for effective bio-security of poultry birds and general public [3]. Conventional methods of waste disposal like incineration, burial and burning although seem economical and easy but in the long run are associated with environmental and other issues [4]. Dead birds are generally thrown out on the roads, open spaces and farm premises, thus causing ground water contamination, air pollution, nauseating odor and fly menace. Economical, social and bio-security issues are also associated with these methods as well [5]. Disposal of dead birds and litter by composting is more bio-secure and environment friendly besides it is innovative, socially accepted, economical, easy to operative, effective in use and menace less as well [6]. There is always a fear of odour and fly problem due to different disposal methods causing different types of environmental problems. Such type of problems has some social issues also associated with it unless it is not proper and effectively managed [7]. There is always a need to look in to these issues by formulating different analytical tools like fly and score cards to assess the odour and fly problems associated with poultry waste composting. This will help in devising a scale for the estimation of approximate environmental indicators for composting or any other disposal methods as well. The objective of this study was to assess the quantum of odour and fly menace occurrence due to decomposition of organic matter present in the poultry farm waste.

Materials and Methods

In this present study two separate experiments of composting were conducted one in winter (December- February) and another in summer (March-May) during the year 2017 in the Division of Livestock Production and Management, Faculty of Veterinary Sciences and Animal Husbandry (SKUAST- Kashmir) under the agro climatic conditions of Kashmir Valley to analyze the odour and fly score cards while composting of poultry farm waste during winter and summer seasons during the year 2016 (January-March for winter trail and May-July for summer trail) under the agro climatic conditions of Kashmir Valley. Poultry farm waste

selected for the composting process was dead birds and poultry litter and was collected from the local poultry farms in the vicinity of the Faculty campus. The composting was done in wooden boxes of 2.5 inch (length) x 2.5 inch (breadth) x 2.5 inch (height) dimension [8]. The filling of poultry waste was done by layering of poultry birds and poultry litter in a repeated manner.

A score card with hedonic scale was designed as indicated in Table: 1, based on the score points of 1-8 varying from extremely undesirable to extremely desirable score values for both odour and fly score cards. The evaluation for the estimation of odour and fly scores were carried out at 15 days interval basis (15th, 30th, 45th, 60th, 75th and 90th day). For this a score card panel consisting head members were formulated, who conducted the examination of the compost pile at the desired times.

Statistical analysis

The data was analyzed as per the method suggested by Snedecor and Cochran [9] using Chi Square Test. The SPSS soft ware was used.

Table 1: Odour/Fly Score Card

Attributes	Season	
	Score	Marks
Extremely Undesirable	1	
Highly undesirable	2	
Moderately Undesirable	3	
Undesirable	4	
Desirable	5	
Moderately Desirable	6	
Highly Desirable	7	
Extremely Desirable	8	

Results

The odour score varied between 6.25 at 90th day and 6.75 at 75th day of composting during winter and 6.00 at 45th day and 6.75 at 90th day during summer seasons. Similarly fly score card of composting process recorded was 6.25 at 60th day and 6.75 at 45th day during winter and 6.00 at 60th day and 6.60 at 90th day during summer season. There was no significant ($P \leq 0.05$) effect of different stages and seasons of composting on the odour and score cards.

Discussion

Odour score is an effective and simple indicator of an efficient composting [10]. Strong putrid odour develops if anaerobic conditions are created during composting particularly when accompanied by low temperature (USDA-NRCS) [11]. The fly score card also has the same significance as flies are attracted by the odour if created during composting. At the site of experimentation good results of odour and fly score card were observed in the range of 6.4-6.7 indicating a desirable odour and fly scores (Table.2). Season had no effect on the odour and fly score card. The results obtained are in agreement with the reports of Murphy [12] and Leon [3].

No putrefied or obnoxious odour was noticed during different seasons of composting indicated that the addition of different layers of poultry litter and dead birds acted as very good bio-filter [4]. No noxious odour from dead bird compost was observed. Similar results were also recorded for fly score card as none of the composting bins attracted flies. The high temperature generated while composting might have prevented the attraction of flies [13]. This indicated that the sufficient amount of carbon in the form of dead birds and

poultry litter were more efficient in prevention of odour and fly menace. The results were in agreement with the findings of Mukhtar *et al.* [14] who stated that presence of sufficient amount of carbon source act as a bio-filter which enhance the microbial activity by maintaining proper conditions of moisture, pH and temperature and deodorizes the gases released at ground level from the carcass compost piles and also prevent access by insects and birds and this minimizes transmission of disease agents from mortalities to livestock or human [15]. Sivakumar *et al.*, [16] observed similar types of results for odour and fly score cards while composting of poultry birds and cage layer manure under the tropical agro climatic condition. However Macklin [17] observed obnoxious and undesirable smell due to composting of waste in closed pits.

Table 2: Odour and fly score card during different seasons of composting.

Stage	Odour Score card		Fly Score Card	
	Winter	Summer	Winter	Summer
15 th day	6.75	6.50	6.50	6.40
30 th day	6.25	6.50	6.50	6.50
45 th day	6.70	6.00	6.75	6.25
60 th day	6.00	6.25	6.25	6.00
75 th day	6.75	6.25	6.50	6.25
90 th day	6.25	6.75	6.50	6.60
Chi-square values	8.89 ^{NS}	10.34 ^{NS}	2.00 ^{NS}	9.70 ^{NS}

The values are means of 5 readings

Conclusion

It was concluded that while composting of poultry farm waste there is steep rise of temperature, which is sufficient enough to discourage the growth of the flies, insects and purification of the organic matter. Further the layering of the poultry litter and dead birds in the compost act as a bio-filter for release of obnoxious gases and smell as well. Hence composting is an eco-friendly and socially acceptable method of waste disposal.

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