Journal of International Scientific Publications: Ecology and Safety

Volume 8, ISSN 1314-7234 (Online), Published at: http://www.scientific-publications.net

BORAX AND KEROSENE TREATMENT REDUCES ODOUR PRODUCING BACTERIA POPULATION IN PIG DUNG

C. G. Okoli[1], K. U. Anukam[2], M. C. Uchegbu[3] and I. C. Okoli[3]

[1]Department of Enviromental Technology, Federal University of Technology Owerri, Nigeria

[2]Department of Animal Production and Health Technology, Imo State Polytechnic, Umuagwo, Ohaji, PMB 1472 Owerri, Nigeria

[3]Department of Animal Science and Technology, Federal University of Technology, PMB 1526, Owerri, Nigeria

Abstract

The obnoxious odour and pathogenic agents emanating from pig dung or slurry are threats to human and animal health, in Nigeria. In this study, dung was collected from local pig farms, mixed properly and allowed to stand for two day pre-treatment period to allow for bacterial activities. Thereafter, borax and kerosene application at 0, 50, 100 and 150 g per two kilograms of dung in seven litre plastic buckets were set up. Bacteria load change in the pig dung was analysed on the 2nd, 4th and 6th day post treatments. Borax at 150 g application eliminated all the bacteria by the 4th day of treatment, while kerosene could not eliminate clostridium species by the 6th day of treatment even at 330 ml application.

Key words: *Borax, Kerosene, bacteria population*

INTRODUCTION

The obnoxious odour and pathogenic agents emanating from pig dung or slurry is becoming a serious threat to human and animal health in Nigeria. This is because many bacteria in livestock waste are pathogenic and zoonotic; thereby posing threats to human health in pig production environments. Thus, there are strict regulations being considered by governments including possible closes of piggery farms due to the fear of environmental pollution (Okoli *et al.*, 2004). The high cost of equipment and chemicals that could be used to ameliorate the pig dung malady has been a teething and challenging problem in the pig industry in Nigeria, which is currently made up of mostly small-scale producers.

Closure of some pig farms due to environmental pollution would lead to shortage of animal protein and its associated malnutrition problems. There is therefore the need to research practicable local technologies for odor control in the Nigerian pig industry.

This study reports the effects of borax and kerosene treatment as simple technologies for reducing odour producing bacteria populations in pig dung.

MATERIALS AND METHODS

The experiment was carried out at the School of Agriculture and Agricultural Technology, Federal University of Technology, Owerri, Imo State, Nigeria. Dung was collected from local pig farms, mixed properly and allowed to stand for a two day pre-treatment period after collection to allow for bacterial activities.

The treatment involved borax and kerosene application at three concentration levels of 0, 50, 100 and 150 g and 0, 110, 220 and 330 ml respectively to two kilograms of pig dung in seven litre calibrated plastic buckets. Each treatment was replicated three times in a Completely Randomized Design (CRD). The bacteria load change in the pig dung was analysed on the 2nd, 4th and 6th day after the treatments.

Samples from each treatment bucket were collected using sterile bottles and subjected to bacterial culture. Ten-fold serial dilution of the homogenized samples were prepared by adding 5 g of the dung sample in 45 ml of sterile deionized water and mixing thoroughly after which 0.1 ml aliquot of the appropriate dilution was drawn and inoculated unto nutrient agar. After overnight incubation, at 37^{O}C the bacterial load was enumerated using a colony counter (Suntex^{R}) to count the colony forming units (CFU). Discrete colonies of organisms on the nutrient agar plates were purified by repeatedly sub-culturing them onto fresh plates of nutrient agar to obtain pure isolates. Each pure culture was then transferred unto nutrient agar slant and incubated at 37^{O}C for 24 hours.

Pure isolates of bacteria were presumptuously identified on the basis of their cultural and morphological characteristics. Each isolate was then subjected to standard biochemical tests according to methods described by Cheesbrough (2000) such as Gram's reaction, motility test, citrate utilization test, catalase reaction, indole production, oxidase reduction potential, nitrate reduction, urease test as well as pigmentation. The carbohydrate utilization and fermentation tests were carried out for glucose, sucrose, lactose, maltose, xylose, arabinose, mannitol, inositol and sorbitol. Data generated were represented in tables.

RESULTS AND DISCUSSION

The results in tables 1 and 2 showed that both borax and kerosene had the ability to eliminate bacteria from the pig dung indicating elimination of odorous gases produced by the activities of these bacteria.

Borax at 150 g treatment eliminated all the bacteria by the 4th day of treatment (Table 1), while kerosene could not eliminate clostridium species by the 6th day of treatment even at 330 ml application. Kerosene may therefore be serving more as an odour masking agent in the present study than a strong bactericide. Masking agents such as kerosene, which is a hydrocarbon, are liable to degradation by microbes in livestock slurry (Udebuani, 2011), which may explain why their use is only appropriate for short-term odour reduction as explained by Smith *et al.* (1980).

Table 1: Frequency of isolation of an array of eight bacterial organisms from borax treated pig dung

		2ND Day				*4TH Day*				*6TH Day*			
S/NO	Bacteria	0g	50g	100g	150g	0g	50g	100g	150g	0g	50g	100g	150g
1	Staphylococcus	+	+	-	-	+	-	-	-	+	-	-	-
2	Streptococcus	+	+	-	-	+	-	-	-	+	-	-	-
3	Bacillus	+	+	+	-	+	+	-	-	+	-	-	
4	Proteus	+	+	+	-	+	-	-	-	+	-	-	-
5	Pseudomonas	+	+	+	-	+	-	-	-	+	-	-	-
6	Salmonella	+	+	+	+	+	+	+	-	+	+	+	-
7	Escherichia	+	+	+	-	+	-	-	-	+	-	-	-
8	Clostridium	+	+	+	+	+	+	+	-	+	+	+	-

Key: + = Present; - = Absent

Table 2: Frequency of isolation of an array of eight bacterial organisms from Kerosene treated pig dung

		2ND Day				*4TH Day*				*6TH Day*			
S/NO	Bacteria	0 ml	110 Ml	220 Ml	330 ml	0 ml	110 ml	220 ml	330 ml	0 ml	110 ml	220 ml	330 ml
1	Staphylococcus	+	+	-	-	+	-	-	-	+	-	-	-
2	Streptococcus	+	+	+	-	+	-	-	-	+	-	-	-
3	Bacillus	+	+	+	+	+		-	-	+	-	-	-
4	Proteus	+	+	+	+	+	-	-	-	+	-	-	-
5	Pseudomonas	+	+	+	+	+	+	-	-	+	-	-	-
6	Salmonella	+	+	+	+	+	+	+	+	+	+	+	-
7	Escherichia	+	+	+	-	+	+	-	-	+	-	-	-
8	Clostridium	+	+	+	+	+	+	+	+	+	+	+	+

Key: + = Present; - = Absent

REFERENCES

Cheesbrough, M. (2000). Microbiological tests. In: *District laboratory practice in tropical countries, Part 2*. Cambridge University Press, Cambridge, UK.

Okoli, I. C., Alaehie, D. A., Okoli, C. G., Akano, E. C., Ogundu, U. E., Akujobi, C. T., Onyicha, I. D. and. Chinweze, C. E. (2006). Aerial pollutant gases concentrations in tropical pig pen environment in Nigeria. *Nature and Science*, 4(4): 1 - 5.

Smith, K., Drysdale, A. and Saville, D. (1980). An investigation into the effectiveness of some odour control treatments in stored pig manure. Project Rep. 24., New Zealand.

Udebuani, A. C. (2011). Bioremediation of spent engine oil polluted soils of Nekede mechanic village using animal dung. PhD Thesis, Federal University of Technology, Owerri, Nigeria.