CASE STUDY

CONTROL OF ODOUR IN A MANURE STORAGE LAGOON THROUGH THE ADDITION OF BCP80 AND STIMULUS

INTRODUCTION

Given the large number of manure storage lagoons that exist or are being planned worldwide, there is naturally an interest by producers in the use of biological materials that are purported to reduce or eliminate the odours associated with these lagoons. Under the appropriate environmental and management conditions, biologicals may be effective for reducing odour intensity and/or improving odour quality.

Most objectionable odours from livestock operations are the result of volatile compounds generated during the decomposition of manure. More than 200 of these odour-generating compounds have been identified. The wide range of odourous compounds from manure adds to the complexity of odour control solutions. Commonly reported odourous compounds associated with manure and wastewaters are those containing sulfur (e.g., hydrogen sulfide and mercaptans), those containing nitrogen (e.g., ammonia and amines), volatile organic acids, phenols, and alcohols.

Many of the odourous compounds are a result of biological reactions occurring primarily in an anaerobic environment. Many odourous compounds commonly found in fresh manure become more concentrated during anaerobic decomposition. More objectionable odours are associated with stored manure rather than manure that is spread daily.

METHOD

The purpose of this experiment was to demonstrate the use of Bionetix biologicals BCP80 and trace amounts of STIMULUS and their effect on manure management and reduction in odour in storage lagoons.

MANURE CONTENT ANALYSIS*

LAGOON	EC	DM	CONTENT RATIO OF MANURE COMPONENT			
			T-N Nitrogen	P_2O_5 Phosphoric Acid	K_2O Potassium	NH_4-N Ammonia Nitrogen
1	10.99	8.7	0.44	0.19	0.45	0.21
2	12.03	8.2	0.46	0.19	0.48	0.23
3	8.65	8.3	0.36	0.17	0.37	0.16
Standard	-	6.5	0.28	0.14	0.33	0.13

*Analysis by the National Institute of Agro-Environmental Science

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Three slurry lagoons, composed of 30% rainwater, were chosen for this study. When rainwater is present in this concentration in a lagoon, separation occurs relatively quickly. When five kilograms of Bionetix BCP80 and 20 liters of STIMULUS were deposited in the lagoons, dissolution of surface scum and digestion of sludge were observed.

RESULTS

Seven days after the addition of the microbes to the lagoon, a portion of the surface scum had dissolved. Within fourteen days, only 10% of the scum remained and shortly thereafter the remainder disappeared with no subsequent reoccurrence.

The digestion of sludge was also surveyed. It was confirmed five months later that no sedimentation of sludge in the lagoon had occurred.

The addition of BCP80 and STIMULUS to the manure lagoon also led to a decrease in odour. Within two days after the addition there was a marked reduction in odour, and one week later the odour had disappeared.

The relationship between odour intensity and concentrations of odourous compounds was established as follows:

Odour Intensity	0 Odourless	1 Slight odour	2 Weak odour	3 Detectable odour	4 Strong odour	5 Intense odour
Hydrogen sulfide	0	0.0005	0.0006	0.06	0.7	8
Ammonia	0	0.1	0.6	2	10	40
Trimethylamine	0	0.0001	0.001	0.02	0.2	3
Methyl mercaptan	0	0.0001	0.0007	0.004	0.03	0.2

ODOUR CONCENTRATION BEFORE TREATMENT

	Concentration	Odour Intensity
Hydrogen sulfide	10.1ppm	5
Methyl mercaptan	0.2ppm	5
Ammonia	45.0ppm	5

ODOUR CONCENTRATION THREE DAYS AFTER TREATMENT

	Concentration	Odour Intensity
Hydrogen sulfide	0.04ppm	2.5
Methyl mercaptan	0 ppm	0
Ammonia	8ppm	3.5

Concentration of odourous compounds was significantly reduced and hence odour intensity was significantly reduced. Detailed results are available in Appendix I.

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CONCLUSIONS

The selected biologicals are capable of efficient degradation of odourous compounds including ammonia, hydrogen sulfide and methyl mercaptan. This degradation led to a reduced concentration of these compounds in the lagoon. Scum was removed from the surface of the lagoon and digestion of the sludge also took place. A reduction in the concentration level of these odourous compounds led to a reduction in the level of odour intensity in the manure stored in these lagoons. The addition of BCP800 and BCL4000 led to effective management of manure storage lagoons and to the reduction in odour associated with them.

APPENDIX 1 - PROPERTIES OF MANURE LAGOONS

Before and After Treatment with BCP80 and STIMULUS

Processing Time	0 hr	0.5 hr	12 hr	24 hr	48 hr	72 hr	96 hr	168 hr	384 hr	504hr
Change of odour and physical properties through intermittent aeration 6 hr. on/6 hr. off before treatment										
Odour Index	44	-	-	-	-	-	-	40	39	39
Ammonia (ppm)	13	15	-	14	16	45	15	25	40	12.5
Hydrogen sulfide (ppm)	10.12	10.953	-	9.623	9.527	9.669	19.2	10.1	0.96	0.115
Methyl mercaptan (ppm)	0	0.2	-	0	0	0	0.192	0.225	0	0
Methyl sulfide (ppm)	0	0.046	-	0	0	0	0	0	0	0
Methyl disulfide (ppm)	0	0	-	0	0	0	0	0	0	0
Slurry	-	-	-	-	-	-	-	-	-	-
Moisture (%)	-	93.2	-	93.2	93.2	93.2	93	93	93	93
pH	-	7.6	-	7.6	7.9	7.9	7.9	8	8.2	8.3
Change of odour and physical properties through intermittent aeration 6 hr.on/6 hr.off after treatment										
Odour Index	44	-	23.5	14.6	12.4	12.2	-	-	-	12.1
Ammonia (ppm)	13	14	-	16	47	8	8	8.1	8	8.2
Hydrogen sulfide (ppm)	10.8	10.949	10.07	4.781	0.279	0.041	0.04	-	-	0.04
Methyl mercaptan (ppm)	0.034	0	0	0	0	0	0	0	0	0
Methyl sulfide (ppm)	0	0	0	0	0	0	0	0	0	0
Methyl disulfide (ppm)	0	0	-	0	0	0	0	0	0	0
Slurry	-	-	-	-	-	-	-	-	-	-
Moisture (%)	94.1	-	94.2	93.8	93.9	94.2	94.6	94.8	94.9	94.8
pH	7.6	7.6	7.7	7.9	8	8.2	8.3	8.2	7.6	7.1