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Short Communication

Effect of cassava effluent on Okada natural water

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The study investigated the effect of cassava effluent on Okada natural water. It was observed that the colour, taste and odour of the water changed after cassava effluent had been discharched into it. This was an indication of pollution. The physico-chemical analysis showed that the characteristics of water analysed varied and higher than federal environmental protection agency of Nigeria (FEPA). The BOD was in the range of 115 - 240 mg/l, salinity in the range of 20 – 40 mg/l, COD 325 – 735 mg/l, alkalinity 20 mg/l, total hardness 30 – 140 mg/l, nitrate 68 – 98 mg/l, sulphate 170 – 204 mg/l, TSS 38 – 53 mg/l, TDS 126 – 156 mg/l, TS 164 – 209 mg/l. The pH of 5.62 mg/l is within FEPA limit. The temperature range was 24.02 - 26.05°C, which is generally the temperature trend in water bodies in the tropical forest areas.

Key words: Receiving water body, cassava effluent, Okada, natural water.

INTRODUCTION

The cassava (*Manihot esculenta* Crantz*)* is a woody shrub of Euphorbiaceae. It is extensively cultivated as annual crop in tropical and subtropical regions of the world for its enable starchy tuberous root, a major source of carbohydrates. It is the third largest source of carbohydrates for human food in the world with Africa being its largest centre of production (Claude and Denis, 1990).

Effluent from cassava is discharged as waste water. It contains cyanide (Arguedes and Cook, 1982), either in expressed juice or wash water spray (Cooke and Maduagwu, 1987). Environmental problems from cyanide may occur; for example, young stages of plants including vegetables may be negatively affected, and sensitive stages of fish may also be negatively affected (Bengtsson and Trient, 1994). The purpose of this study was to investigate the effect of cassava effluent on Okada water bodies into which the effluent was discharged.

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Abbreviations: DO, dissolved oxygen; **COD**, chemical oxygen demand; **BOD**, biological oxygen demand; **TS**, total solids; **TSS**, total suspended solid; and **TDS**, total dissolved solids.

MATERIALS AND METHODS

Water samples were collected in plastic jars 10 L each at 3 points in the morning after the cassava effluent had been discharged into the natural water body taking cognisance of the taste, colour and odor. Temperatures and its variations were monitored across the wet and dry periods. The samples were taken to Edo State Environmental Science Laboratory behind the secretariat in Benin City for analysis using standard Laboratory methods and procedures. The results were compared with (FEPA) standard. Results were analysed and generally discussed in line with these standards.

RESULTS AND DISCUSSION

The pH obtained from this study was 5.6 - 5.8 mg/l (Table 1). The acceptable pH range for drinking water is between 7.0 - 8.3 (WHO, 1983), 6.5 - 8.5 (FEPA, 1991), (WHO, 2006) 6.0 - 7.0. The implication of the pH from this study is that there is no risk since it falls within FEPA limit. For best fish production, Ayodele and Ajani (1999) recommended a pH ofrange of 6.5 - 9 while Okunle (2000) recommended a pH range of 6.5 and 8.5.

BOD is a measure of biological oxygen demand needed by bacteria to decompose organic matter in water bodies. High BOD as reported by Boyd and Lichkopler (1979) has undesirable consequence on aquatic life. The

Table 1. Mean properties of physico-chemical characteristics of water.

Parameter	Sample A	Sample B	Sample C	FEPA limit
pH	5.68	5.85	5.62	6 - 9
DO (mg/l)	20.30	15.24	15.42	Not Less than 2
COD (mg/l)	735.20	352.89	353.52	
BOD (mg/l)	240.51	115.63	116.09	30
Alkalinity (ppm)	0.00	20.00	20.00	NI
Salinity (mg/l)	20.00	30.00	40.00	NI
Total hardness (mg/l)	30.00	40.00	140.00	NI
Nitrate (mg/l)	96.01	68.06	98.04	20
Sulphate (mg/l)	186.25	204.04	170.65	300
TSS (mg/l)	44.60	53.12	38.46	30
TDS (mg/l)	146.00	156.20	126.01	NI
TS (mg/l)	190.60	209.32	164.47	NI
Conductivity (µs/cm)	192	186	189	NI
Cd (mg/l)	0.12	0.1	0.13	NI
Fe (mg/l)	0.43	0.55	0.53	NI

NI – Not indicated.

BOD obtained was higher than the acceptable FEPA standard. This implied that the water from the body receiving cassava effluent is not portable. Furthermore, high BOD can lead to the production of ammonia and hydrogen sulphide (Boyd and Lichkopler, 1979). This affects fish negatively in various ways.

Observation in the study area showed that various methods of cassava effluent disposal were into rivers and ponds. Change of colour of water was noticed during sampling. The total suspended solid (TSS) was higher than FEPA standard. The implication of this as reported by Muoghalu and Omocho (2000) is that the TSS can absorb heat from the sun and transfer same to the stream or water body thereby raising the temperature. Turbidity of water can be increased by TSS and this has the capacity to depress light penetration into a given body of water, thus negatively affecting the fish feeding habit and the growth of phytoplankton. Also, the higher values of sulphate can cause intestinal irritation.

The increased demand for cassava on domestic and international has corresponding increase in the negative impact of cassava production especially on the environment. Furthermore, Goodley (2004) reported that the residual starch from cassava effluent can cause rapid growth of bacteria resulting in oxygen depletion and detrimental effect on aquatic life. Toxicity effect of cyanide on organisms has been reported (Wade et al., 2002; Osunbokun, 1994; Okafor, 1998; Oboh, 2004). Oboh and Akindahunsi (2003) reported that water from cassava kill fish and other aquatic organisms. Various undesirable consequences can result from the discharge of untreated cassava effluent.

Conclusion

The disposal of cassava effluent in Okada and indeed the whole State should be addressed with all the seriousness and commitment on the part of Local and State governments. To save the local community from water borne diseases, bore holes with water should be provided.

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