Applied Tropical Agriculture
Volume 21, No. 3, 102-111, 2016.

Physical Status and Infiltration Dynamics of Tropical Alfisol of South-Western Nigeria as Affected by Poultry Manure

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ABSTRACT

The importance of organic manure in the improvement and stabilization of soil structure and its physical properties is well documented. However, the influence of poultry manure and its optimal application rate on different soil class for improvement of soil physical condition has not received adequate research attention. A field study was conducted on two soil textural class at different locations (sandy clay loam and clay loam) during the 2014/2015 cropping season, investigating the effect of split application of different rates of poultry manure on soil physical properties of an alfisol in Akure, southwestern Nigeria. Different rates of poultry manure (0, 2, 4, 6, 8 and 10 t/ha) were applied in splits over twelve weeks and soil physical properties such as bulk density, total porosity, moisture content, temperature, dispersion ratio, infiltration rates and sorptivity were determined at 3, 6, 9 and 12 weeks after initial application (WAIA) of poultry manure. In both soil class, poultry manure significantly ($P < 0.05$) reduced soil bulk density with values reducing from 1.51g/cm^3 – 1.39g/cm^3 for sandy clay loam and 1.45g/cm^3 – 1.28g/cm^3 for clay loam. Total porosity increased from 44% - 47.47% for sandy clay loam and 45.43 % - 51.77 % for clay loam while soil temperature was increased however with no significant difference observed in the different soil class. Application of poultry manure at 10t/ha exerted significant effect on soil dispersion ratio (DR), reducing DR values from 0.53 – 0.34 for sandy clay loam and 0.76 – 0.53 for clay loam soil types. Poultry manure application significantly increased soil moisture contents in both soil class, 20.50 % - 22.40 % for sandy clay loam and 13.07 % - 16.90 % for clay loam soil type. Application of manure at 9 and 12 WAIA reduced infiltration parameters on the sandy clay loam soil and an increase was observed in the clay loam soil. It is concluded that poultry manure at application rate of 10 t/ha can be used in the improvement and stabilization of physical attributes of degraded alfisols in southwestern Nigeria.

Key words: soil physical status, poultry manure, infiltration rates, soil class.

INTRODUCTION

Soil is an often overlooked and abused natural resource which plays a vital role in the ecosystem, without which human life would be very difficult. Soil is subject to alteration and can be either degraded or wisely managed, it is prone to degradation or decline in its quality due to misuse and mismanagement with agricultural uses, contamination with industrial uses, and pollution with disposal of urban wastes. Sustainable use of soil resources, therefore, requires a thorough understanding of properties and processes that govern soil quality to satisfactorily perform its functions of value to humans. A thorough understanding of the ecology of the soil ecosystem is a key part of designing and managing agro-ecosystems in which the long-term fertility and productive capacity of the soil is maintained or improved (Gliessman, 1998). Like all physical bodies, soils have unique properties that define them, physical properties such as soil structure, texture, consistence, strength, color, permeability and temperature are important factors which determines soil quality and productivity. Major soils of the tropics are the alfisols, oxisols, ultisols and inceptisols which contain low activity clays (Lal, 1986). The low activity clay soils classified as clayey skeletal oxic-paleustaif (USDA, 2003) are predominant in Southwestern Nigeria. Soils in this region are often acidic, containing low activity clays and generally low in nutrient composition. Furthermore, crop growth and yield in the region are also limited by physical factors such as poor structural stability, compaction and erosion (Oyedele et al., 1995). In tropical alfisols and ultisols, degradation in soil physical quality as indicated by loss of structuring stability and compaction, loss of organic matter and increase in aggregate dispersion ratio leads to enhanced soil water erosion (Tenge et al., 1998). Furthermore, tropical alfisols subjected to continuous cropping with application of inorganic fertilizers alone are prone to physical degradation and the major reason for this high degradation observed in most tropical soils is the decline in their organic matter contents (Okoye, 2005). The weak structure, compaction, crusting, low water retention which are attributes of alfisols can be tackled by supplying organic manure which also builds up the organic matter content of the soil (Lal, 1986). It is therefore essential to build up the organic matter status of the soil through application of organic manure. The use of poultry manure (PM) has been encouraged due to its potential to modify physical condition of soils by improving its water holding capacity, aeration, drainage, friability and its ability to provide energy for microbial activity (Goladi and Agbenin, 1997). Previous field studies on alfisols in Nigeria focused interest mainly on effect of poultry manure on soil fertility and crop performance, whereas there is a dearth of information on the potential use of poultry manures in stabilizing soil structure and controlling physical degradation of tropical alfisols in Nigeria. Hence it is essential to focus research studies on role of poultry manure in improving and stabilizing soil physical properties in tropical alfisols of southwestern Nigeria. The objective of this study was to investigate effect of poultry manure application on physical attributes of tropical alfisol of southwestern Nigeria.

MATERIALS AND METHODS

Description of Experimental Site

Field experiments were conducted at the Federal University of Technology Akure, Nigeria Teaching and Research Farm (FUTA TRF) and a replicate trial at a farmer's field at Apatapiti in Akure, Ondo state southwest Nigeria. Akure lies between Lat. 7o20'N and Long. 5o30'E with a bimodal rainfall pattern consisting of long rainy season, usually between March and July and a short rainy season extending from September to early November, after a short dry spell in August and a longer dry period from December to February. The Soils at the experimental site are of the soil order alfisol classified as clayey skeletal oxic-paleustalf (USDA, 2003). Annual daily average minimum and maximum temperature are 24.80˚C and 28.10˚C, while the relative humidity is about 85 %.

Sample collections and preparation

Bulk soil samples were collected for this study with the aid of a soil auger at a depth of 0-15 cm in two locations. The soil that falls in clay loam textural class was collected from the Teaching and Research Farm of the Federal University of Technology, Akure (FUTA), while sandy clay loam soil was collected from Apatapiti (farmer's field trial) Akure. They were analyzed prior to experimentation for physical properties.

Experimental Procedure and Land Preparation

The experiment was a Randomized Complete Block design (RCBD) with six plots and three replicates, making a total of 18 plots. Six treatments of moderately weathered poultry manure were applied at 0, 2, 4, 6, 8 and 10 t/ha-1 to the soil by incorporating into the top soil at 2, 4 and 8 weeks from the initial application.

Determination of Soil Physical Properties

The particle size analysis was done using standard hydrometer method described by Gee and Bander (1986), while the particle fraction was calculated using the formulae and the textural classes described by Okalebo et al., (2002). Soil temperature was measured using soil thermometer placed 0-5 cm into the soil at 15:00 hrs. All soil readings were taken at 3 weeks interval after initial manure application (WAIA) for a period of 12 weeks. Infiltrometer was used to measure the infiltration rate at which water infiltrates downwards through the sediment/soil profile which is a function of vertical hydraulic conductivity. The method employed was that of the falling-head condition, whereby water is added to reach a target level in the infiltrometer, after which the subsequent decline in water level, was recorded as infiltration occurred. The infiltrometer was driven 5 cm into the soil for a period of thirty minutes. The vertical movement of water into the soil through the ring was recorded at two minutes interval every 3, 6, 9 and 12 weeks after application of poultry manure to the soil. Infiltration rate has the dimensions of velocity, LT-1, where L= length and T = time. The Initial Infiltration rate was measured as the amount of water that enters into the soil in the first two minutes of water being in contact with the soil. This is done by calculating the horizontal distance in the first two minutes per time taken to move the distance. The basic Infiltration Rate was measure as more water replaced the air in the soil pores; the water from the soil surface infiltrated more slowly and eventually reached a steady rate called the basic infiltration rate. The cumulative infiltration rate was measured as the total quantity of water that entered into the soil in thirty minutes. The Volumetric infiltration rate is the volume of water that entered into the soil in a period of thirty minutes, and this was calculated using the formula; V/t=(πr^(2) h)/t

Where V/t is the volumetric infiltration rate (volume of water per time) in cm^3/hr; t is the time in hr; r^2 is the square of radius of the ring in cm2; h is the total vertical amount of water that entered into the soil during each procedure in hour basis and π is a unit-less constant whose value is 3.143. Sorptivity was measured from cumulative infiltration as function of square root of time for period of thirty minutes as described by (Philip, 1969), using S = It1/2

Where S is the Sorptivity; I is the cumulative infiltration and t1/2 is the time square root of time. Soil bulk density was determined from oven-dried undistributed core samples collected to the depth of 5 cm by core method (Blake and Hartage, 1986) at 3, 6, 9 and 12 weeks after application of poultry manure to the soil. Total porosity was calculated from bulk density assuming a particle density of 2.65 g cm-3, using the relationship between particle density and bulk density, total porosity was then derived using the formulae derived from (Nnabude and Mbagwu, 1999). The soil moisture content was determined gravimetrically. Dispersion ratio was determined using the values of the amounts of silt and clay in calgon-dispersed as well as water-dispersed samples using Bouyoucos hydrometer method of particle size analysis described by Gee and Bander (1986). All the physical attributes (The Initial, basic, cumulative, volumetric infiltration rate, sorptivity, bulk density, soil moisture contents and dispersion ratio) measured were derived at 3, 6, 9 and 12 weeks after application of poultry manure to the soil.

Data Analysis

All the data collected were subjected to analysis of variance as described by Snedecor and Cochran (1967). Duncan multiple range test (Duncan, 1955) was used to separate significant differences in the means of the treatments.

RESULTS

Effect of Poultry manure on soil physical properties

Application of poultry manure exerted significant effect on soil physical parameters in the different soil class. Non-manure treatment (control), bulk density at 3, 6, 9 and 12 WAIA of manure treatment varied between 1.51 to 1.52 g/cm3 and 1.44 to 1.46 g/cm3 for the first and second trial respectively which is high relative to 1.1 to 1.4 g/cm3 suggested for cultivated farms (Ofem and Esu, 2015). With poultry manure treatment, test soil in both trials was improved and soil bulk density reduced significantly ($P<0.05$) relative to the control at three, six, and nine WAIA when 6, 8 and 10 t/ha of poultry manure was applied (Table 2 and 3). The highest manure application rate of 10 t/ha recorded the least dry bulk density value (1.39 g/cm^3 and 1.28 g/cm^3) at 12 WAIA in both trials. A significant ($P < 0.05$) increase in soil total porosity relative to the control was observed with increasing rate of poultry manure application especially from 6 t/ha to 10 t/ha at three, six, nine and twelve WAIA in both trials. The highest manure application rate of 10 t/ha recorded the highest soil total porosity value of (47.47 % and 51.20 %) at 12 WAIA in both trials (Table 2 and 3). An increased trend of gravimetric moisture content was observed with increasing rate of poultry manure in both trials.

Table 1: Initial soil physical properties of the experimental site at the Teaching and Research Farm of the Federal university of Technology and at Apatapiti (farmers' field trial) site

Properties	APATAPITI	FUTA
Sand (mg kg^{-1})	227	677
Silt (mg kg^{-1})	401	112
Clay (mg kg^{-1})	372	211
Textural class	Clay Loam	Sandy Clay Loam
Bulk Density (gcm^{-3})	1.51	1.47
Total Porosity (%)	43.0	44.5
Moisture Content (%)	20.1	12.8
*CIR (cm/hr)	15.0	18.0
Sorptivity	0.18	0.21
Dispersion Ratio	0.79	0.55

*Cumulative Infiltration Rate = CIR

Table 2: Effects of poultry manure on soil physical properties at the Teaching and Research Farm, Federal University of Technology site

Poultry Manure (t/ha)	Dry Bulk Density (g/cm^3)	Total Porosity (%)	Moisture Content (%)	Temperature (^0C)	Dispersion Ratio (DR)
3 WAIA (1 WAP)					
0	1.51a	43.00c	20.50a	36.30c	0.53a
2	1.51a	43.00c	21.57a	34.40d	0.47b
4	1.45b	43.80b	21.37a	36.00c	0.55a
6	1.44b	43.87b	21.67a	35.80c	0.42c
8	1.46b	44.90b	20.73a	36.70b	0.52a
10	1.41c	44.80b	21.53a	36.80b	0.45bc
6 WAIA (4 WAP)					
0	1.53a	43.40d	20.23b	35.80c	0.53ab
2	1.52a	43.40d	21.70a	35.10d	0.47ab
4	1.50b	43.47c	21.60a	36.30c	0.54a
6	1.44c	43.67c	21.77a	36.30c	0.41b
8	1.46c	45.03b	21.07ab	37.80a	0.50ab
10	1.42d	46.56a	21.93a	37.00b	0.28c
9 WAIA (7 WAP)					
0	1.52a	42.73d	20.17b	36.00c	0.53a
2	1.50a	43.27d	21.73a	34.40d	0.47b
4	1.48b	44.20c	21.93a	37.00b	0.52a
6	1.43c	44.23c	22.20a	36.70b	0.40c
8	1.45c	45.43b	21.30a	37.80a	0.50ab
10	1.40d	47.07a	22.20a	37.70a	0.37c
12 WAIA (10 WAP)					
0	1.52a	42.63e	20.10b	36.10c	0.54a
2	1.49b	43.80d	21.90a	34.50d	0.47c
4	1.46c	44.90c	21.83a	36.00c	0.52ab
6	1.43d	45.57bc	22.00a	37.00b	0.40d
8	1.44cd	46.17b	21.57a	37.80a	0.49bc
10	1.39e	47.47a	22.40a	36.90b	0.34e

Table 3: Effects of Poultry Manure on Soil Physical Properties at the (Farmer's field Apatapiti Trial)

Poultry Manure (t/ha)	Dry Bulk Density (g/cm^3)	Total Porosity (%)	Moisture Content (%)	Temperature (^{0}C)	Dispersion Ratio (DR)
			3WAIA (1WAP)		
0	1.45a	45.43c	13.07d	38.40c	0.76a
2	1.35bc	48.93ab	14.60c	36.50c	0.66cd
4	1.47a	44.50c	14.13c	38.10d	0.74ab
6	1.32c	50.07a	16.13ab	38.10d	0.63d
8	1.37b	48.13b	15.80b	40.07a	0.72b
10	1.32c	50.23a	16.60a	38.90b	0.68c
			6WAIA (4WAP)		
0	1.44a	45.57c	13.30d	37.90d	0.78a
2	1.35bc	49.20ab	14.77c	37.20e	0.63cd
4	1.47a	44.63c	14.27c	38.20cd	0.69b
6	1.32c	50.07a	16.57b	38.40c	0.62d
8	1.37b	48.40b	16.27b	39.90a	0.66c
10	1.32c	50.70a	17.33a	39.10b	0.64cd
			9WAIA (7WAP)		
0	1.45a	45.30d	13.03e	38.00d	0.81a
2	1.34b	49.43bc	14.53c	36.60e	0.64c
4	1.46a	45.03d	13.80d	38.93c	0.67b
6	1.31bc	50.47ab	17.80a	38.90c	0.59d
8	1.35b	49.20c	14.47c	41.70a	0.61d
10	1.29c	51.20a	17.80a	39.80b	0.60d
			12WAIA (10WAP)		
0	1.46a	45.03c	13.03f	38.10c	0.80a
2	1.37bc	49.67b	14.43d	36.60d	0.65b
4	1.41ab	45.30c	13.77e	38.00c	0.66b
6	1.31cd	50.60ab	16.00b	39.00b	0.61c
8	1.34bcd	49.57b	15.23c	39.90a	0.53d
10	1.28d	51.77c	16.90a	38.90b	0.53d

Table 4: Effects of poultry manure on infiltration parameters at the Teaching and Research Farm, Federal University of Technology site

Poultry Manure (t/ha)	Initial Infiltration Rate (cm/hr)	Basic Infiltration Rate (cm/hr)	Cumulative Infiltration Rate (cm/hr)	Volumetric Infiltration Rate (cm^3/hr)	Sorptivity ($cm/s^{1/2}$)
			3WAIA (1WAP)		
0	23.00a	5.00a	14.60a	1147.10a	0.17a
2	20.00a	2.00a	11.60a	911.40a	0.14a
4	20.00a	3.00a	12.10a	950.70a	0.14a
6	22.00a	4.00a	13.27a	1042.40a	0.16a
8	22.00a	5.00a	13.47a	1058.10a	0.16a
10	22.00a	6.00a	13.80a	1084.30a	0.16a
			6WAIA (4WAP)		
0	23.00a	4.00a	13.00a	1021.43a	0.18a
2	21.00a	6.00a	13.00a	1021.43a	0.15a
4	22.00a	3.00a	13.50a	1060.70a	0.16a
6	24.00a	5.00a	14.80a	1162.87a	0.18a
8	21.00a	6.00a	15.00a	1178.57a	0.15a
10	24.00a	6.00a	15.73a	1236.20a	0.19a
			9WAIA (7WAP)		
0	22.00a	4.00a	13.70b	1076.40b	0.16b
2	22.00a	4.00a	14.33ab	1126.20ab	0.17ab
4	23.00a	5.00a	14.97ab	1175.90ab	0.18ab
6	25.00a	4.00a	15.17ab	1191.70ab	0.18ab
8	23.00a	7.00a	15.77ab	1238.80ab	0.18ab
10	24.00a	6.00a	16.33a	1283.30a	0.19a
			12WAIA (10WAP)		
0	19.00b	4.00a	10.70b	840.73b	0.13b
2	23.00a	5.00a	14.80a	1162.80a	0.17a
4	25.00a	4.00a	15.33a	1204.80a	0.18 a
6	26.00a	5.00a	16.37a	1285.90a	0.19a
8	24.00a	6.00a	16.37a	1285.90a	0.19a
10	26.00a	7.00a	16.47a	1293.80a	0.19a

Table 5: Effects of poultry manure on infiltration rate at the Farmer's field Apatapiti Trial

Poultry Manure (t/ha)	Initial Infiltration Rate (cm/hr)	Basic Infiltration Rate (cm/hr)	Cumulative Infiltration Rate (cm/hr)	Volumetric Infiltration Rate (cm^3/hr)	Sorptivity ($cm/s^{1/2}$)
			3WAIA (1WAP)		
0	27.00a	6.00a	19.43a	1526.90a	0.23a
2	26.00a	6.00a	18.53a	1456.17a	0.22a
4	28.00a	7.00a	20.10a	1579.30a	0.24a
6	27.00a	6.00a	19.50a	1532.13a	0.23a
8	26.00a	6.00a	18.30a	1437.87a	0.21a
10	26.00a	4.00a	18.87a	1482.33a	0.23a
			6WAIA (4WAP)		
0	28.00a	6.00a	20.07a	1576.67a	0.24a
2	26.00a	6.00a	19.13a	1503.33a	0.23a
4	26.00a	4.00a	18.60a	1461.43a	0.22a
6	28.00a	7.00a	18.53a	1456.20a	0.22a
8	26.00a	6.00a	18.67a	1466.63a	0.22a
10	26.00a	4.00a	18.63a	1464.07a	0.22a
			9WAIA (7WAP)		
0	30.00a	10.00ab	21.77a	1710.20a	0.26a
2	28.00ab	10.00ab	21.63a	1699.80a	0.26a
4	30.00a	11.00a	20.27a	1592.40a	0.24a
6	27.00ab	9.00ab	19.80ab	1555.70ab	0.23ab
8	27.00ab	7.00bc	19.27ab	1513.80ab	0.23ab
10	25.00b	4.00c	17.17b	1348.80b	0.20b
			12WAIA (10WAP)		
0	31.00ab	12.00a	23.57a	1851.7a	0.28a
2	31.00ab	10.00ab	22.87ab	1796.7ab	0.27ab
4	33.00a	11.00ab	22.60ab	1775.7ab	0.27ab
6	24.00d	8.00b	20.53bc	1613.3bc	0.24bc
8	28.00bc	8.00b	20.00c	1571.4c	0.24c
10	27.00cd	3.00c	20.00c	1571.4c	0.24a

Effect of poultry manure on soil infiltration dynamics

Data with respect to infiltration such as initial infiltration rate, basic infiltration rate, cumulative infiltration rate, volumetric infiltration rate and sorptivity are presented in Tables 3 and 4. Poultry manure had no significant effect on infiltration parameters in both trials, however, poultry manure at rates of 6 t/ha – 10 t/ha increased initial infiltration rate, basic infiltration rate, cumulative infiltration rate, volumetric infiltration rate and sorptivity in the Farmer's field clay loam soil class, while at the sandy clay loam soil class (Teaching and Research Farm trial), poultry manure at reduced initial infiltration rate, basic infiltration rate, cumulative infiltration rate, volumetric infiltration rate and sorptivity with increasing rate of poultry manure from 6 t/ha – 10 t/ha.

DISCUSSION

The soil class from two different locations in Akure, an alfisol (Adekiya et al., 2014) showed characteristics of degraded soils and the need for the physical properties to be improved for optimum productivity. The result of this study is consistent with earlier studies conducted by Agbede et al., (2008) and Adekiya et al., (2014) who observed that poultry manure improved soil physical properties on alfisols in southwestern Nigeria by significantly reducing soil bulk density. Reduction in bulk density expectedly led to increase in total porosity since both parameters are inversely related. In this study, the total porosity of untreated soil was about 43 % and 45 % in the first and second trial respectively, which is less than 50 % known to be ideal for air and water movement in the soils for optimal plant growth. Improvement in soil total porosity due to poultry manure application might be as a result of improved soil particle aggregation brought about by the improved soil organic matter content of the plots amended with poultry manure. Studies indicate that organic manures were effective in stabilizing soil structure, improving aggregation and aggregate stability which lead to increase in porosity and aeration thus reducing erosivity (Osunbitan and Adekalu, 1999). Studies carried out on ultisols of southeastern Nigeria showed that animal manures and crop residues notably improved nutrients availability, biological and physical properties of the soil which led to enhanced crop productivity (Mbagwu, 1992; Mbah and Onweremadu, 2009). The result of this study is in agreement with that of Adekiya et al., (2014) who observed that test soil on alfisols in southwestern Nigeria with bulk density of 1.45 to 1.65 g/cm3 recorded least total porosity and moisture content. Period of application of manure somewhat influenced the soil temperature, a relationship was observed vis-à-vis period of manure application and period of observation. The closer the period of application of manure to the period of observation, the higher the soil temperature, this is obvious at 12 WAIA, where 8 and 10 t/ha had lower values compared to the 8 WAIA, this could be due to the fact that biological activities of the moderately weathered manure increased soil temperature during further decomposition in the soil. Earlier studies have shown that fertilizing the soil organically is usually associated with a significant higher level of biological activity and soil organic matter (Stolze et al., 2000, Hansen et al., 2001, Pulleman et al., 2003, Oehl et al., 2004). 10t/ha poultry manure application rate recorded highest reduction in DR values of the different soil class, this implies that PM increased aggregate stability in water by reducing detachment. The dispersion ratios (DR) recorded for untreated soil between 3 to 12 WAIA were above critical which is 0.50 according to (Nsor and Akamigbo, 2014). Without manure application, the test soil showed signs of weak structure and tendency to be easily compacted as shown by the values of bulk density. It is expected that application of manure would serve to reduce DR and stabilize soil structure to normal depending on the extent to which the soil has been degraded. This observation is consistent with Adesodun (2008) work on alfisols polluted with spent oil and amended with cow dung, poultry manure and pig waste at 10 t/ha in two years, with observation that manure significantly improved macro-aggregate fractions (2.0 - 2.5 mm) and aggregate stability of test soil. This supports the suggestion that application of organic manure is essential for physical improvement of degraded soil. Adesodun and Adekonojo (2011), also noted that soil organic carbon (SOC) is important in restoration of micro-aggregate stability of tropical soils estimated by dispersion ratio (DR), hence DR was inversely related to SOC. Their study indicated that compost at 10 mg/ha was adequate to enhance better carbon storage and improve micro-aggregate stability of fragile tropical soil. In a study conducted by Okunade et al., (2005), it was also concluded that infiltration reduced with increase in rate of cow dung and poultry manure applied to an alfisol (Iwo series) in southwestern Nigeria; although poultry manure significantly increased infiltration rate of (Apomu series), the reduction can be adduced to formation of slurry in the presence of water which could reduce infiltration as observed with cattle slurry (Haraldson and Sveistrup, 1994). Mubarak et al. (2009) observed that there was a decrease in water movement in sandy soils amended with organic residues. This provided a better medium for crops to absorb water and nutrients instead of nutrients being leached down rapidly. The conclusion by Mubarak et al. (2009) is in line with the findings about decrease in infiltration rate in the second trial with soil texture sandy clay loam in this study compared to the increase in the clay loam test soil of the first trial which could have been due to increase in macropores created by the soil fauna as a result of poultry manure applied.

CONCLUSION

The application of poultry manure at different rates on the alfisol in southwestern Nigeria has significantly ($P < 0.05$) improved its physical properties and infiltration rates. Poultry manure significantly ($P < 0.05$) reduced soil bulk density with value reducing between 0 to 10 t/ha manure for every application whereas total porosity increased in the same trend. At all periods of observation, biological process of decomposition tended to increase soil temperature with a correlation between time of poultry manure application and observation period. Soil dispersion ratio (DR) at application rates of 10 t/ha manure recorded the least values and the effect of manure application was significant on DR. Manure application significantly increased moisture content in both soil types while at 9 and 12 WAIA manure reduced infiltration parameters on the sandy clay loam test soil of the second trial and an increase observed in the clay loam test soil of the first trial. It is concluded that organic manure such as poultry manure at application rate of 10 t/ha can be used in the improvement and stabilization of physical status and infiltration dynamics of degraded alfisols in southwestern Nigeria.

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