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Evaluation of Poultry Manure and Cow Dung on S*olanum lycopersicum* L Planted on Spent Oil Polluted Soil

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ABSTRACT: Pollution from Spent Lubricating Oil (SLO) is one of the major problems farmers encounter in Nigeria. The study is a completely randomized design with Ibadan Local tomato seedlings grown on the following treatments: 0 ml SLO (control), 75ml SLO, 35g of poultry-manure + 75ml SLO, 35g of cow-dung + 75ml SLO, and 4g of NPK + 75ml SLO replicated four times. Physico-chemical parameters of the soil, poultry manure (PM) and cow-dung (CD), heavy metals, and Total-Petroleum-Hydrocarbon (TPH) were determined before and after pollution using standard procedures. Tomato seedlings were transplanted into pots of amended soil with SLO (5 kg/2 plants) and monitored till maturity. Data were taken on growth, yield parameters and analyzed using ANOVA ($p<0.05$). Results showed significant differences among the treatments. The soil textural class was sandy-loamy with pH (7.2). Tomato in control plots had the highest values 48.30cm plant-height (PH), number-of-leaves (82.63) (NOL), number-of-fruits (0.98) (NOFR) and fresh-weight (0.55g) (FW). Tomato plants grown on CD amended had the lowest 14.40 cm PH, SLO at 75 ml had 6.00 and 1.71cm for NOL and SD, respectively. The NOFR 0.70 value was from PM amended, FW 0.10g was from SLO at 75ml. Heavy-metals bioaccumulation ranges were: Cu 3.00-36.61mg/kg and Zn 15.00-303.79mg/kg. The final TPHs ranged from 181.66 -1350.00mg/kg, while % TPH removal ranged from 4.69- 53.18%. Cow-dung treated soil reduced the amount of copper and zinc present compared with spent oil soil. The growth performance of tomatoes in this study suggests that soil amendment should be encouraged.

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Pollution is the introduction of harmful materials into the environment called pollutants. It is the addition of any form of energy such as sound, heat, or radioactivity or any substance; solid, liquid, or gas to an ecosystem at a rate quicker than it can be disseminated, diluted, decomposed, recycled, or stored in some harmless form (Nathanson, 2021). These can be natural such as volcanic ash or artificially created by human activities such as runoff produced by factories (National Geographic Society, 2014). Pollutants cause long and short-term damages by changing the growth rate of plant or animal species or by interfering with human amenities, comfort, and health (Web finance, 2015). Severe damages on plants and hazardous effects on soil properties affect the ability of plants to grow well as a result of the pollutants. Spent Lubricating Oil (SLO) also called waste engine is oil that has served its service properties in a vehicle and withdrawn from the meant area of application and is considered not fit for its initial purpose (Ameh *et al.*, 2012). It is obtained by draining used oil from automobiles and generator engines. The SLO has been reported as one of the most common soil and environmental contaminants in Nigeria. This is more widespread than crude oil (Odjegba and Sadiq, 2002), which has been known to contain most toxic and hazardous pollutants such as aliphatic, aromatic, and polycyclic aromatic hydrocarbons, polychlorinated biphenyls, chlorodibenzofurans, lubricate additives, and aluminum, chromium, lead, manganese, nickel, and silicon (heavy metals) (Wang *et al.*, 2000; Sharifi *et al.*, 2007). Oil pollution of soil leads to the build-up of essential (organic C, P, Ca, Mg) and non-essential (Mg, Pb, Zn, Fe, Co, Cu) elements in the soil translocated into plant tissues (Vwioko *et al.*, 2006). Studies on non-essential (heavy metals) have shown toxicities and poisoning for plants, animals, and micro- and macro-organisms in the environment by directly affecting the biochemical and physiological activities (Pandey and Sharma, 2002).

Organic amendments such as cured Poultry manure and Cow dung enhance soil fertility by adding nutrients. It is a cheaper option that allows a reduction in the use of inorganic fertilizer, improves soil

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structure, water retention, permeability, infiltration, drainage, aeration, and the soil structure, thereby leading to more degradation of the polluted soil (Njoku *et al*., 2012). Also, the organic amendment is an inexpensive solution for managing organic wastes (Njoku *et al*., 2012). Application of organic matter may also provide other environmental benefits such as habitat for wildlife, soil fertility, increasing soil biodiversity, and watershed function (Obi and Ebo,1995; Njoku *et al*., 2012). Soil amendments such as poultry manure and cow dung are materials added to a soil to improve its physical properties, such as water retention, permeability, water infiltration, drainage, aeration, and structure. The goal is to provide a better environment for plants. The rate of organic waste applied to agricultural land is generally dictated by their nutrient contents (nitrogen and phosphorus) and the crops' demand.

Tomato (*Solanum lycopersicom* L.) belongs to the nightshade family Solanaceae. It is one of the most widely consumed vegetable crops. It plays important role in the human diet, its nutritional quality is of particular concern to consumers throughout the world (Copetta *et al*, 2011: Chapagain and Wiesman, 2004**)**. Tomato fruits are a major source of antioxidant micronutrients such as vitamin C, lycopene, and β-carotene. Worldwide, it has been recorded that in tomato production, Nigeria is ranked 16th position. This accounts for 10.8% of Africa and 1.2% of total world production. About 4.7million hectares had been used for tomato cultivation that produced 159 million tonnes globally and an average yield of 33.6ton ha-1 (United Nations, 2013). Study conducted by Adefemi and Awokunmi (2013) revealed that tomato fruits meant for consumption are often grown in soil from dumpsites that were polluted with heavy metals. Fayinminnu and Abimbola (2016) reported that the contamination of soil with spent engine oil caused growth retardation on tomato (*Solanum lycopersicom*) plants with more adverse effects. A report from a baseline study carried out by Fayinminnu and Abimbola (2016) revealed accumulation of heavy metals and Total Petroleum Hydrocarbon in tomato plants grown on spent lubricating oil-polluted soil. Njoku *et al*. (2012) reported that the addition of cow dung and poultry manure had reduced, removed, and increased degradation of pollutants in crude and spent oil from contaminated soils to a controllable level. There is need, therefore, to assess the levels of heavy metals and Total Petroleum Hydrocarbon (TPH) in tomato plants grown on amended (cow dung, poultry manure and NPK 15-15-15 amendments) spent lubricating oil-polluted soil. This is to ascertain tomato quality and safety.

MATERIALS AND METHODS

The study was carried out at the open rooftop of the Department of Crop Protection and Environmental Biology (CPEB), University of Ibadan, Nigeria for twelve weeks. Experimental site (CPEB) falls within latitude 7.431 N and longitude 3.541 E at an altitude of 200 m. It has an annual rainfall between 1250-1500 mm spanning eight months (March –October) with a dry spell in August; an average temperature of 21.30ºC and relative humidity of 70-80%.

Tomato variety (Ibadan local) was purchased at Bodija International market, Bodija, Ibadan, Oyo State, Nigeria. Spent Lubricating Oil (SLO) was collected from an Automobile Workshop, Ajibode, Ibadan, Oyo State, Nigeria. The soil amendments (poultry manure and cow dung), were collected from the Teaching and Research Farm of the University of Ibadan, Ibadan, Nigeria, while NPK fertilizer (15-15-15) was purchased from Eagles Nigeria Limited, Ajibode, Ibadan, Oyo State, Nigeria.

Unpolluted topsoil (0-15 cm depth) was collected randomly from the fallow field, bulked together to form a composite sample. This was passed through a 2 mm sieve to remove the non-soil particulates. The experimental plastic pots of 20 cm x 60 cm, were filled with an above uniform quantity of 5 kg topsoil. Spent Lubricating Oil (SLO) was added to the 5 kg unpolluted soil in each experimental pot treatment at 75 ml v/w (volume per weight) and were mixed using a hand trowel and left for two weeks for full homogenicity (Fayinminnu and Abimbola, 2016). After two weeks, cured amendments (cow dung, poultry manure, and NPK 15-15-15) were weighed and applied at recommended quantity to the soil polluted pots separately with a modification from the method of Ebere *et al*. (2011) as the following treatments: 0 ml SLO (control), 75 ml SLO, 35 g of poultry manure + 75 ml SLO, 35g of cow dung+ 75 ml SLO and 4 g of NPK + 75 ml SLO. Subsequently, three weeks old uniformly grown Ibadan local tomato seedlings were transplanted into the pots (two plants/pot) containing contaminated and amended soil. The experiment was laid in a completely randomised block design with each treatment replicated four times, watered regularly and monitored till harvest. Physico-chemical properties of the soil, cow dung, poultry manure, and heavy metals were determined before pollution, while Total Petroleum Hydrocarbon (TPH) was determined after pollution. Heavy metals and TPH were also determined at the termination of the experiment. Data collection on tomato plants commenced on growth parameters such as plant height (cm), number of leaves (visual counting) and stem diameter (cm; using Vernier caliper) two weeks after transplanting (WAT) until maturity. Number of flowers and fruits on each plant were counted and fresh weights (yield) harvested per plant was recorded.

Physicochemical determination of soil and amendments: The pH of the soil and amendments (cow dung and poultry manure) was determined using the method of Hendershot *et al*. (1993). The Association of Official Analytical Chemists methods (AOAC, 2003), was used to determine the Organic carbon, Nitrogen, while phosphorus was determined according to the Bray method (Olsen *et al*., 1954). The exchangeable bases Na^{2+}, K^{2+}, Ca^{2+} and Mg^{2+} were determined using the IITA method (2002).

Heavy metal analysis: Heavy metal analyses were carried out at the Soil Analytical Laboratory of the Department of Agronomy University of Ibadan, using AOAC (2005). The harvested shoots and roots were washed thoroughly in deionized water to remove soil particles and were then oven-dried at 70ºC until constant weights were obtained. Five (5) grams of both dried soil and plant parts; shoots (leaf + stem) and roots were ground in a stainless steel mill, separately. The soil and ground plant samples were digested in a fume chamber with nitric acid (HNO_3) and perchloric acid (Chloric (VII) acid) ($HClO_4$) in the ratio of 3:1. Copper, Zinc and Iron concentrations were measured using an Atomic Absorption Spectrophotometer (Bulk Scientific, Model 210 VGP)**.**

*Total Petroleum Hydrocarbon (TPH) analysis***:** This analysis was carried using the method of Adesodun and Mbagwu (2008). Ten grammes (10 g) of soil was weighed into a 50 mL flask and 20 ml Toluene (Analar Grade) was added. Shaken for 30 minutes on an orbital shaker, the liquid phase of the extract was measured at 420 nanometer (nm) using DR/4000 spectrophotometer. The Total Petroleum Hydrocarbon in the soil was estimated using a standard curve derived from fresh used engine oil diluted with toluene. The absorbance for each concentration was taken using the spectrophotometer and plotting the calibration curve of Absorbance value against concentration.

*Data analysis***:** Data collected from the study were analysed using the Analysis of Variance (ANOVA) with the SAS statistical package (SAS Institute, 2003). Means were separated using Duncan Multiple Range Test (DMRT) at 5 % probability level.

RESULTS AND DISCUSSION

Physicochemical properties of the experimental soil, poultry manure and cow dung are presented in Table 1. The soil was identified and classified as sandy loam with a pH of 7.2 with Organic Carbon of 15.15 (g/kg). Results showed Nitrogen from the soil as 3.39 g/kg which was higher than Cow dung (CD) 1.57 g/kg and Poultry manure (PM) 1.41 g/kg. Also, the Phosphorus 18.41mg/kg from the soil was higher than CD 0.22 mg/kg and 0.96 mg/kg for PM. Potassium from PM had the highest value (1.05 Cmol/kg) followed by CD (0.94 Cmol/kg), while the lower value (0.14 Cmol/kg) was from the soil. Heavy metals present in the soil prior to pollution include Cu, (0.77 mg/kg), Zn (1.24 mg/kg) and Fe (77.80 mg/kg) which were all higher than the amendments; CD (0.001 mg/kg Cu, 0.004 mg/kg Zn and 0.18 mg/kg Fe) and PM (0.003 mg/kg Cu, 0.008 mg/kg Zn and 0.11 mg/kg Fe). However, the heavy metals were below the European Union (EU) Standard (Table 2).

Table 1: Physicochemical parameters of the experimental soil and soil amendments

Parameter	Soil	Cow Dung (%)	Poultry Manure (%)
Ph	7.20	-	-
Organic Carbon (g/kg)	15.51	-	-
Nitrogen (g/kg)	3.39	1.57	1.41
Available Phosphorus (mg/kg)	18.41	0.22	0.96
Exchange Acidity	0.70	-	-
Calcium (Cmol/kg)	4.60	0.31	2.84
Magnesium (Cmol/kg)	1.02	0.22	0.25
Sodium (Cmol/kg)	0.44	0.20	0.15
Potassium (Cmol/kg)	0.14	0.94	1.05
Manganese (Cmol/kg)	101.30	0.024	0.042
Silt	13.20	-	-
Fine sand	78.80	-	-
Textural Class	Loamy soil	-	-

Table 2: Heavy metals detected in soil, cow dung and poultry manure prior to SLO pollution

Parameters	Soil	Cow dung	Poultry manure	EU (2001)
Copper (mg/kg)	0.77	0.001	0.003	140
Zinc (mg/kg)	1.24	0.004	0.008	60
Iron (mg/kg)	77.80	0.18	0.11	-

EU = European Union Standard (2001); SLO = Spent Lubricating Oil

Effects of poultry manure (PM), cow dung (CD) and NPK amendments on growth parameters of tomato grown on spent oil polluted soil: There were significance differences ($p \leq 0.05$) among the treatments across the weeks in tomato plant height (Table 3). At two weeks after transplanting (WAT) to 6WAT, the control (0 ml SLO) had the tallest plant heights (26.00 cm), (39.68 cm), (48.30 cm), respectively, while the lowest plant height was observed in the plant treated with poultry manure (PM) at 2WAT and 4WAT (16.03 cm), (16.84 cm), respectively. Although there were no significant differences ($p > 0.05$) in plant heights among the spent oil and the amended plots, however, the NPK fertilizer treated plots showed tallest plant heights. Number of leaves produced by tomato plant showed that the control plots (41.75), (83.88), (82.63) were significantly higher ($p \leq 0.05$) than other treatments across the weeks. At 2WAT to 6WAT the lowest numbers of leaves produced were obtained from SLO at 75 ml treated plants (14.00), (14.25), (6.00), respectively (Table 3) although with no significant difference ($p > 0.05$) from the amended treated plants. Results from stem diameter of control (0 ml SLO) was significantly ($p \leq 0.05$) higher than other treatments across the weeks (Table 3). However, from 2WAT to 6WAT lowest stem diameter values were observed in NPK treated plants at 2WAT (1.69 cm), CD at 4 and 6 WAT (1.73 cm; 1.71cm), respectively.

Effects of poultry manure (PM), cow dung (CD) and NPK amendments on number of flowers and fruits and yield (g) of tomato grown on spent oil polluted soil: Results on number of flowers in plants treated with 0 ml SLO (Control) were significantly ($p \leq 0.05$) higher compared to other treatments in recording higher number of flowers (4.44). The lowest value (0.71) was obtained in SLO at 75 ml, CD and NPK treated plots, respectively (Table 4). Number of fruits of control (0.98) was significantly ($p \leq 0.05$) higher than all other treatments with similar value of 0.71. Results on weight of the fruits (yield) also followed the same trend as number of fruits. Yield from control (0.55 g) significantly higher than PM, CD and NPK amendments with 0.3 g, respectively, while SLO at 75 ml had the lowest value of 0.1g (Table 4).

Table 3: Effects of poultry manure, cow dung and NPK amendments on plant height (cm), number of leaves and stem diameter (cm) of tomato grown on SLO polluted soil

	Plant Height (cm)			Number of Leaves			Stem Diameter (cm)		
Treatment	2WAT	4WAT	6WAT	2WAT	4WAT	6WAT	2WAT	4WAT	6WAT
Control (0 ml SLO)	26.00[a]	39.68[a]	48.30[a]	41.75[a]	83.88[a]	82.63[a]	2.01[a]	2.63[a]	2.75[a]
SLO (75 ml)	16.23[b]	17.34[b]	15.41[b]	14.00[b]	14.25[b]	6.00[b]	1.71[b]	1.74[b]	1.71[b]
35 g PM +75 ml SLO	16.03[b]	16.84[b]	16.26[b]	15.63[b]	18.25[b]	13.75[b]	1.79[b]	1.90[b]	1.90[b]
35g CD + 75 ml SLO	16.33[b]	16.96[b]	14.14[b]	17.50[b]	14.88[b]	11.38[b]	1.70[b]	1.73[b]	1.71[b]
4g NPK +75 ml SLO	17.33[b]	19.21[b]	16.13[b]	17.75[b]	16.50[b]	12.50[b]	1.69[b]	1.76[b]	1.76[b]

Means with the same alphabet(s) on the same column are not significantly different from each other at 5% level of probability; WAT= Weeks After Transplanting, PM= Poultry Manure, CD= Cow Dung, NPK15:15:15; SLO= Spent Lubricating oil.

Table 4: Effect of poultry manure, cow dung and NPK amendments on number of flowers and fruits and yield of Tomato grown on spent oil polluted soil

Treatments	Flowers	Number of Fruits	Yield (g/pot)
Control (0 ml SLO)	4.44[a]	0.98[a]	0.55[a]
SLO (75 ml)	0.71[b]	0.71[b]	0.10[c]
35 g PM + 75 ml SLO	1.35[b]	0.70[b]	0.30[b]
35 g CD + 75 ml SLO	0.71[b]	0.71[b]	0.30[b]
4 g NPK +75 ml SLO	0.71[b]	0.71[b]	0.30[b]

Means with the same alphabet(s) on the same column are not significantly different from each other at 5% level of probability
WAT= Weeks after Transplanting, PM= Poultry Manure, CD= Cow Dung, NPK15:15:15
SLO= Spent Lubricating oil

Quantification of heavy metals and Total Petroleum Hydrocarbon after treatments application at termination: Heavy metal concentrations in soil after termination of experiment revealed significant differences ($p \leq 0.05$) among the treatments. Copper had the lowest value of 1.33mg/kg in CD, while zinc lowest value 3.69 mg/kg was from control (0 ml SLO). Highest values of 2.18 and 24.35 mg/kg were obtained in Cu and Zn, respectively from PM treatment (Table 5**)**. Heavy metal levels in roots of tomato treated plants were significantly different ($p \leq 0.05$) among the treatments for Cu and Zn (Table 6**)**. The highest value (18.86 mg/kg) of Cu was recorded in 75 ml SLO treatment, while lowest (3.00 mg/kg) was recorded in control. Also 75 ml SLO treatment recorded the highest value (111.91 mg/kg) of Zn with the lowest value (15.00 mg/kg) from control (0 ml SLO). Significant differences ($p \leq 0.05$) were revealed among the treatments in the concentrations of Cu and Zn present in the shoot (Table 6**)**. Copper and zinc, respectively had their highest mean values (36.61 and 303.79 mg/kg) from 75 ml SLO treatment, while lowest values (6.18 and 32.66 mg/kg) of Cu and Zn, respectively were recorded from the control (0 ml

SLO). It was observed that all the values of Cu in both root and shoot, and Zn in root were below the tolerance standard levels of 73.3 mg/kg and 99.4 mg/kg, respectively. However, Zn levels in the tomato shoots were higher in most treatments than 99.4 mg/kg of FAO/WHO (2001) (Table 6**)**. In the total petroleum hydrocarbon (TPH) present, there were significant differences (p≤0.05) observed among the treatments. The highest TPH value (2883.33 mg/kg) was obtained from NPK and the lowest value (146.67 mg/kg) in control at 2 WAT (Table 7**)**. The NPK amended plots had the highest TPH value of 1350.00 mg/kg, while the lowest value (181.66 mg/kg) was recorded in control at 6 WAT. Results of both total TPH and % removal showed NPK treatment having highest value 1533.33 mg/kg and 53.18%, respectively over other amended treatments. However, the control (0 ml SLO) had the lowest total TPH removal value of 34.99 mg/kg, while the lowest %TPH removal of 4.69% was obtained from 75 ml SLO treatment.

Table 5: Heavy metals in soil of treated tomato plants grown on SLO polluted soil after termination at 6 WAT

Treatments	Copper (mg/kg)	Zinc (mg/kg)
Control (0 ml SLO)	1.89^{ab}	3.69^{e}
SLO 75 ml	1.75^{ab}	11.96^{b}
35 g PM + 75ml SLO	2.18^{a}	24.35^{a}
35 g CD +75 ml SLO	1.33^{b}	4.59^{d}
4 g NPK fertilizer+ 75 ml SLO	1.65^{ab}	5.72^{c}
EU (2001)	140	60

Means with the same alphabet(s) on the same column are not significantly different from each other at 5% level of probability.
WAT- Weeks after Transplanting, PM= Poultry Manure, CD= Cow Dung, NPK 15:15:15; SLO= Spent Lubricating oil

Table 6: Heavy metals in root and shoot of treated tomato plants grown on SLO polluted soil after termination at 6WAT

	Root		**Shoot**	
Treatments	Cu (mg/kg)	Zn (mg/kg)	Cu (mg/kg)	Zn (mg/kg)
No spent oil (0 ml SLO)	3.00^{d}	15.00^{e}	6.18^{e}	32.66^{e}
SLO (75 ml SLO)	18.86^{a}	111.91^{a}	36.61^{a}	303.79^{a}
35 g PM + 75ml SLO	5.33^{c}	28.00^{d}	27.33^{b}	224.61^{b}
35 g CD + 75 ml SLO	7.22^{b}	43.40^{c}	14.11^{d}	107.07^{c}
4 g NPK +75 ml SLO	6.65^{b}	81.70^{b}	20.93^{c}	61.44^{d}
FAO/WHO (2001)	73.3	99.4	73.3	99.4

Means with the same alphabet(s) on the same column are not significantly different from each other at 5% level of probability.
WAT- Weeks after Transplanting, PM= Poultry Manure, CD= Cow Dung, NPK 15:15:15. SLO = Spent Lubricating oil

Table 7: Total Petroleum Hydrocarbon (TPH mg/kg) variations of Tomato plants grown on SLO polluted soil

Treatments	Initial TPH 2WAT	Final TPH 6WAT	Total TPH Removed (mg/kg)	%TPH Removal
Control (0 ml SLO)	146.67^{c}	181.66^{b}	34.99	23.86
SLO 75 ml	1066.67^{a}	1116.66^{a}	49.99	4.69
35 g PM + 75 ml SLO	1466.67^{b}	1183.33^{a}	283.34	19.32
35 g CD + 75 ml SLO	1283.33^{b}	1066.67^{a}	216.66	16.88
4 g NPK fertilizer+ 75 ml SLO	2883.33^{a}	1350.00^{a}	1533.33	53.18

Means with the same alphabet(s) on the same column are not significantly different from each other at 5% level of probability
WAT- Weeks after Transplanting, PM= Poultry Manure, CD= Cow Dung, NPK 15:15:15; SLO = Spent Lubricating oil

The Spent Lubricating Oil (SLO) and other petroleum products adversely affected the tomato growth and yield parameters (plant height, stem diameter, number of leaves and fruits and fruit weight) measured as shown in the results. The reduction in plant height noticed in polluted soil could be due to reducing nutrient contents in soil. Petroleum products can reduce nitrogen availability in soil (Agbogidi *et al*., 2007). The growth and yield performance of *Solanum lycopersicum* L. in terms of plant height, number of leaves produced as observed in this study may be due to the addition of soil amendments in the polluted soil. These results were in agreement with Ebere e*t al*. (2011). They used nitrogen-fixing crops cowpea and groundnut, respectively. Also, the growth and yield parameters (especially fruits) obtained in this study revealed improvement of the amendments on the SLO polluted soil. It was against the report from Fayinminnu and Abimbola (2016), whereby the tomato plants grown on SLO soil without amendments, did not attain the fruiting stage. In this study, the growth and yield parameters were higher in poultry manure (PM) treatment over others. It conforms to the report of Ebere *et al*. (2011) that higher agronomic parameters from PM amended could be due to the suitability of the micro-organisms that acted as bio-stimulants in helping to degrade SLO. It releases nutrients to the plants rapidly.

Although there was a progressive depression in plant height observed, the number of leaves and stem diameter increased from 2WAT to 4WAT on oil-polluted soil even with the amendments decreased significantly. The pollution level may have caused the waxy nature of the oil-polluted soil, while the amendments reduced oxygen content from the water added. Usually, it took a long time to get to the roots of the tomato plants as observed in this study. Earlier study by Fayinminnu and Abimbola (2016), on tomato grown on SLO soil without soil amendments revealed high-level residue of heavy metals and total petroleum hydrocarbon (TPH). Cow dung (CD), Poultry manure (PM) and NPK (inorganic fertilizer) had shown that they were effective in reducing significant levels of Cu and Zn in the soil when compared with the unamended SLO treatment. They are needed to increase the microbial activities in breaking /degrading down toxic contaminants of SLO in polluted soil (Adedokun and Ataga, 2007). The Cu values obtained in this present study were lower than the previous work of Fayinminnu and Abimbola, (2016). It could be due to the addition of soil amendments. However, higher levels of Zn were in the tomato shoot. It could be that tomato plants have affinity for heavy metals and the ability to accumulate higher levels of the toxic pollutant in the shoot (Andal and Ching, 2014). There was a decrease in TPH values and an increase in the percentage of TPH removal at the termination of the experiment in amended polluted soils. It may be due to the removal of toxic hydrocarbon and degradation with the addition of organic wastes. This conforms to the studies of Okolo *et al*. (2005), which revealed an increase in degradation of SLO when amended with PM. There were increased agronomic parameters of tomato plants. The addition of CD showed the implication in reducing SLO to the minimum (safe) level in soils to a controllable stage. The addition of the soil amendments showed a higher reduction of TPH contaminant in the polluted soil (Ebere *et al*., 2011). The TPH reductions from all amended soils depicted a higher microbial population that might have broken down / degraded the toxic compound (Fayinminnu, 2020). This present study revealed increased agronomic parameters of tomato plants to increased degradation of Spent lubricating oil (SLO) in soil amended with poultry manure, cow dung and NPK. Also, there were reduced levels of Cu and Zn accumulated by the plants and increased percentage (%) of total petroleum hydrocarbon (TPH) removal from the soil.

Conclusion: The present study was designed to Evaluate Poultry manure and Cow dung (Soil amendments) on S*olanum lycopersicum* L. planted on spent oil-polluted soil. An increase in the growth and yield performance of *Solanum lycopersicum* L. observed in this study may be due to the addition of soil amendments in the polluted soil. Growth and yield parameters were higher in poultry manure (PM) treatment over others. Hence, poultry manure and cow dung are readily available in all parts of Nigeria. Therefore, the use of these amendments in remediating SLO should be encouraged.

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