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Effects of Railway Engine Emission on the Seedling Growth behavior of Woody Plant Species *Acacia nilotica* (Linn.) Delile

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Abstract— *The vegetation growing close to the railway tracks are usually exposed to various types of toxic pollutant discharged from the locomotive diesel engines. In present studies, the seedling growth performance of Acacia nilotica responded differently in soils of Cantonment Station, Drighroad Junction, Malir Station and Landhi Junction as compared to Karachi University Campus (Control) soil. The seedling growth of A. nilotica (Linn.) Delile gradually increased in soil of Drighroad Junction, Malir Station and Landhi Junction. The seedling growth of A. nilotica in Cantonment soil was significantly ($p<0.05$) deceased as compared to the treatment of University Campus soil. The root, shoot, seedling lengths, circumference, root, stem and seedling dry weights of A. nilotica grown in soil of Cantonment Station showed significant ($p<0.05$) reduction as compared to University Campus. The growth parameters such as root, shoot, seedling lengths, number of leaves, leaf area, circumference, root, stem, leaf, seedling dry weights of A. nilotica grown in soil of Malir Station and Landhi Junction were significantly ($p<0.05$) enhanced as compared to University Campus soil.*
***Keywords*— dry weight, kikar, locomotive railway diesel engine, root, seedling growth, tolerance.**

I INTRODUCTION

Pakistan is a developing country and its urban cities are suffering by a series of environmental pollution problems due to increase in automobile and industrial activities [29]. The automobile activities is a major source of different types of pollutants such as suspended particulate matter, carbon monoxide, hydrocarbons (HC), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), ozone (O_3), peroxyacetyl nitrate (PAN) and heavy metals (Pb, Cd, Cr, Ni, Zn) in the environment. The addition of pollutants in soils nearby railway track might produce toxic effects on the biodiversity, trees and crops productivity. The diesel engines showed low concentrations of carbon monoxide and unburned hydrocarbons outlet as compared to spark ignition engines. Currently, the automotive manufacturing industries are facing the serious challenges to meet the future specific requirements for the regulation of both NOx and particulate emissions [19].

Karachi is the 22nd biggest city of the world and is the largest city of Pakistan. It is situated at 64° longitudes and 27º latitude on the shore of Arabian Sea near the Indus River delta with main seaport of the country. The city covers an area of approximately 3,530 square kilometers with more than 18 towns and 6 cantonment boards. The transport system to carry goods and public in the city is comprises on locomotive train, trucks, buses, mini buses, cars, rickshaws and motor cycle which are the primary mode of conveyance. The railway track of Pakistan covers about 11, 755, 00 kilometers including double line track. The Pakistan railway consists of 12 steam locomotives, 16 electric locomotives and 500 diesel electric locomotives for the transport of goods and public Pakistan Railway, 2010-2011, [22]. 115 passenger and most of the cargo trains have been suspended temporarily due to fuel shortage (The Nation, September 29, 2011). According to Rizvi [28], 26 mail and express, 39 intercity, 33 passenger, 24 mixed, 03 international, 03 Karachi shuttle and 02 cargo trains are in operation from Karachi to other parts of the country.

Gasoline and diesel fuels are mixtures of hydrocarbons (made of hydrogen, oxygen carbon atoms). Diesel fuel is a mixture, which may contain approximately 400 distinct hydrocarbons and 20 organic compounds of sulfur and additives [21]. The level of environmental pollution with polycyclic aromatic hydrocarbons (PAHs) can be correlate with the region of industrialization and the traffic density. These PAHs accumulate in soil along the roads. PAH, contents found at the depths up to 2 meters. It was concluded that the plants can be absorb and decompose some PAHs which were mostly deposited in the soil, and some of them in the roots [31].

Railway transportation is an important mode of transportation [18] in Pakistan and all over around the world. The railway transportation, leaked cargos, fuel combustion, the use of lubricate oils and sleeper impregnation oils during railway transportation considered the main resources of heavy metals likewise Pb and Cd [5]. The impact of toxic pollutants near the railway track and railway stations on ecological point of view investigated by different researchers [6, 8 and 9]. Polycyclic aromatic hydrocarbons (PACs) and heavy metals assessed in soil and plant samples collected from different areas of the railway junction Ilawa Glowna, Poland. PAH, contamination of soil and plants was reported highest in the platform area and near the railway siding and lowest in loading ramp and cleaning bay areas. Whereas, the heavy metal contamination pattern was different. The soil and plants were very highly contaminated in the cleaning bay and sidetrack areas while the loading ramp and platform areas were less contaminated [17]. The botanists carried out some studies for plants growing along the railway tracks for the last many years [33]. A floristic study in 246 areas along the railway tracks of Poland was carried out [11]. Railway ballast contains little organic material [15]. The exceed concentrations of fine particulate matter ($PM_{2.5}$) levels, carbon dioxide (CO_2) levels and particle number concentrations (PNC) against World Health Organization (WHO) permissible limit (25 µg/m^3) in train carriages on seven routes of the mass transit railway in Hong Kong were recorded [34].

The aim of the present study was to investigate the seedling growth behavior of an important woody tree species, *Acacia nilotica* (Linn.) Delile in the soil collected from near the different railway tracks sites of Karachi, city and compared with the soil of Karachi University Campus.

II MATERIAL AND METHODS

Description of study site

Karachi faces many challenges from the last few decades due to rapid urbanization and industrialization. It is an important hub in economy of Pakistan due to its presence on the coast along the Arabian Sea situated at latitude of 24° 48' N and longitude of 66° 55' E. The study area covers about 20 kilometers from Cantonment Station to Landhi Junction (Fig. 1). The area was disturbed and affected from the activities of rail and road transport. The detail work regarding seedling growth behavior of *Acacia nilotica* in the past years is scanty.

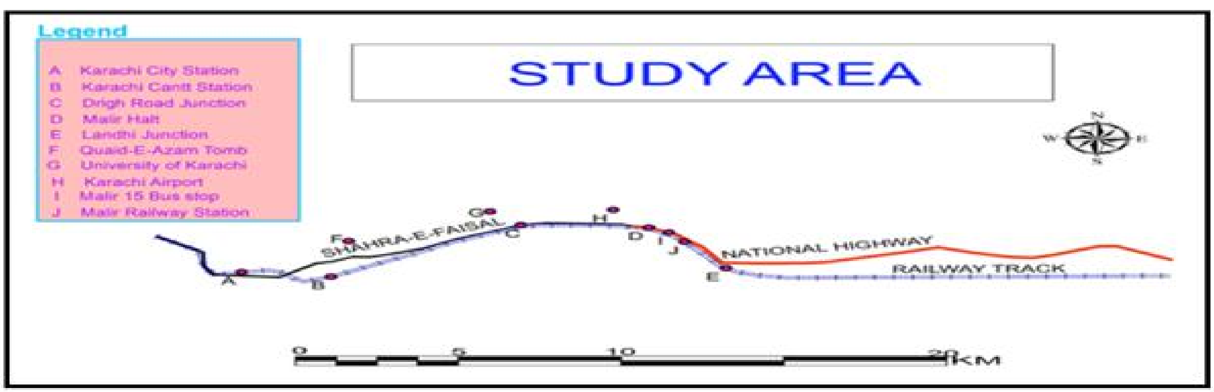

Fig1. Map of the study area

The brief description of the study area is as follows:

A. Karachi University Campus: Karachi University is a public University and away from the city center of Karachi, Pakistan. The University is situated at latitude of 24° 56' N and longitude of 67° 07' E. The Karachi University Campus is considered as pollution free site as compared to other studied sites. The University of Karachi was established by an act of Pakistan parliament in June, 1951. The present campus, to which the University shifted in 1959, is spread over 1279 acres of land, situated 12 Km away from the city center [32] .

B. Cantonment Station: Karachi Cantonment Railway Station is situated at a latitude of 24° 50' N and longitude of 67° 02' E. Roads with high traffic congestion surround the area around the Cantonment railway station. The main express and local train arrives and depart from here for "up" and "down" side of the country. Most of the passengers use this railway station due to departure and arrival points of many trains. The mechanical diesel workshop at this station is also situated. The service facility is available at this station for cleaning and washing of coaches. Most of the cargo trains and extra coaches are parked at this station (Fig. 2).

Fig.2. Railway locomotive diesel engine workshop at Karachi Cantonment Railway Station.

C. Drigh road Junction: Drigh road railway Junction is an important railway station of Karachi, Pakistan and situated at latitude of 24° 53' N and longitude of 67° 07' E. The up trains have no stoppage at Drigh road Junction while the down trains stop here for 2 to 5 minutes. Only few passengers use this railway station coming from other parts of the country to Karachi. The Drigh road railway station serves for "up" and "down" trains. In the past, this railway junction was used for cargo trains on large scale, but now days this junction is available for parking of the cargo trains (Fig. 3).

Fig.3. Drigh Road Railway Station.

D. Malir Railway Station: Malir railway station is located in Malir 15 and situated at a latitude of 24° 52' N and longitude of 67° 11' E. This railway station was active in the past but now days, the passengers less use this station. The local train runs on this route. The long route trains have no stoppage here and in case of emergency, the trains are used to stop here.

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Fig.4. Malir Railway Station.

E. Landhi Junction: Landhi Railway Station Junction is situated at latitude of 24° 52' N and longitude of 67° 11' E. Although, this junction is a large one. The fast and cargo trains runs on the Landhi railway line. Some of the passengers use this railway station as departure and arrival points for some trains. The station is situated at the east end of the Karachi, city that, make the less disturbance to vegetation and soil as compared to other railway track site (Fig. 5).

Fig.5. Landhi Junction Railway Station.

Species description

Acacia nilotica (Linn.) Delile is a small to medium size tree with more or less rounded umbrella shaped crown and locally known as Kikar (Fig. 1). It belongs to family Fabaceae and sub-family Mimosideae. It is widely distributed in subtropical and tropical Africa from Egypt to Mauritania southwards to South Africa, and in Asia eastwards to Pakistan and India [3]. It is widely planted in arid and semi-arid regions of India and Pakistan [24]. *A. nilotica* is also a salt tolerant species and successfully adapted in arid environment [20]. The adult and juvenile plants easily regenerated from the base after removal of top growth and viability of seed remain more than five years [4]. The tap roots of *A. nilotica* rapidly penetrated deeply in soil and access soil moisture for successful growth that ensured the competition to other plants [16] and the seeds remain dormant for long periods due to the presence of hard impermeable seed coats [23]. *A. nilotica* rapidly grow up to 2-3 m in diameter and 15-18 m in height. The pods with 8-12 seeds, increased 7-15 cm in length with a necklace appearance [13]. *A. nilotica* is multipurpose leguminous nitrogen fixing tree which increased the soil fertility [2].

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Fig. 6. ***Acacia nilotica*** **growing in Karachi University Campus.**

Seedling growth experiment

The soil samples of polluted sites near the railway tracks (Cant Station, Malir Halt, Malir-15, Landhi Junction) and non polluted site the Karachi University Campus were obtained at 30 cm depth and were brought to the laboratory in polythene bags. The soil samples were air dried and then sieved through 2 mm sieve to remove large size particles, stones and boulders. The healthy seeds of *Acacia nilotcia* (Linn.) Delile were collected randomly from the Karachi University Campus. The experiment was conducted in green house at the Department of Botany, University of Karachi in pots. The top ends of the seeds were slightly cut with a clean scissor to remove any possible dormancy. The seeds were sown in large pots having garden soil at 1 cm depth and watered regularly. After two weeks of their germination, uniform size seedlings was transplanted in pots of 7.0 cm in diameter and 9.8 cm in depth containing the soil of Cant Station, Malir Halt, Malir-15, Landhi Junction and University Campus. There were five replicates for each soil and the experiment was completely randomized. The seedlings were irrigated with tap water after two days intervals. Pots were reshuffled weekly to avoid light/shade or any other environmental effect. After 8 weeks of growth, the seedlings were removed from pots and washed their roots with water. Root, shoot and leaves were separated to dry in an oven at 80ºC for 24 hours. Data on seedling, root, shoot length and leaf area was obtained. Oven dried weights of root, shoot, leaves and total seedling dry weights were taken by electrical balance. Root/shoot ratio, leaf weight ratio, specific leaf area and leaf area ratio were determined as mentioned by Rehman and Iqbal [27].

Statistical analysis

Data of various growth parameters of *A. nilotica* and different variables of soil samples was statistically analyzed by analysis of variance (ANOVA) and Duncan's Multiple Range Test at $p< 0.05$ level on personnel computer using statistical software COSTAT ver. 3.

III RESULTS

The seedling growth performance of *Acacia nilotica* was evaluated in soils of University Campus, Cantonment Station, Drighroad Junction, Malir Station and Landhi Junction. The seedling growth of *A. nilotica* was gradually increased in soil of Drighroad Junction, Malir Station and Landhi Junction, while in Cantonment Station soil, the growth was decreased as compared to University Campus soil. The root, shoot, seedling lengths, circumference, root, stem and seedling dry weights of *A. nilotica* grown in soil of Cantonment Station showed significant ($p<0.05$) reduction as compared to University Campus. The growth parameters such as root, shoot, seedling lengths, number of leaves, leaf area, circumference, root, stem, leaf, seedling dry weights of *A. nilotica* grown in soil of Malir Station and Landhi Junction were significantly ($p<0.05$) enhanced as compared to University Campus soil (Fig. 7a and 7b).

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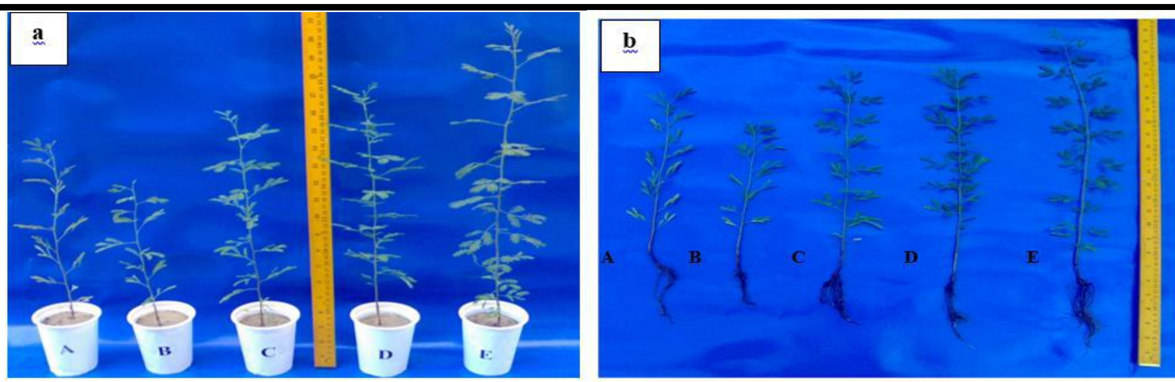

Fig.7: Growth of Acacia nilotica in different soils (a) and after harvest (b)
Symbol used: A = Karachi University Campus; B = Karachi Cantonment Railway Station; C = Drighroad Railway Junction; D = Malir Railway Station; E = Landhi Junction

The seedlings of *Acacia nilotica* showed better growth regarding root, shoot and seedling lengths, number of leaves and circumference in soil of Drighroad Junction, Malir Station and Landhi Junction as compared to University Campus while, the seedlings grown in Cantonment Station soil showed inhibitory effects on root, shoot and seedling lengths, number of leaves and circumference (Table 1). The root length of *A. nilotica* was significantly ($p<0.05$) enhanced in soil of Drighroad Junction (9.40 cm), Malir Station (11.98 cm) and Landhi Junction (12.66 cm) as compared to University Campus (8.20 cm) while, in soil of Cantonment Station a significant ($p<0.05$) reduction was found in root length (7.38 cm). The shoot length of *A. nilotica* was significantly ($p<0.05$) increased, 39.60 cm, 42.80 cm and 46.00 cm in soil of Drighroad Junction, Malir Station and Landhi Junction, respectively as compared to University Campus (33.20 cm). A significant ($p<0.05$) decline was noted in shoot length in the soil of Cantonment Station (26.60 cm) as compared to the University Campus soil. The seedling length of *A. nilotica* seedlings grown in soil of Cantonment Station showed a prominent reduction (33.98 cm), whereas Drighroad Junction, Malir Station and Landhi Junction soil represented a significant ($p<0.05$) increase in seedling length, 49.00 cm, 54.78 cm and 58.66 cm, respectively as compared to the University Campus soil (8.20 cm). The number of leaves of *A. nilotica* was significantly ($p<0.05$) greater, 65.00, 74.00 and 96.20 seedlings grown in soil of Drighroad Junction, Malir Station and Landhi Junction, respectively as compared to University Campus while, the seedlings grown in soil of Cantonment Station showed a significant($p<0.05$) reduction which was recorded as 42.00. The leaf area of *A. nilotica* seedling was significantly ($p<0.05$) increased, 1.29, 1.40, 1.91 and 2.04 cm^2 in soil of Cantonment Station, Drighroad Junction, Malir Station and Landhi Junction, respectively as compared to University Campus (1.07 cm^2). The circumference of *A. nilotica* was significantly ($p<0.05$) reduced to 20.00 cm for the seedlings grown in soil of Cantonment Station as compared to University Campus (29.40 cm). A non significant difference was observed in circumference of the seedlings developed from the soil of Drighroad Junction, Malir Station and Landhi Junction as compared with University Campus soil. The dry weights of root, stem, leaves and cumulative seedlings of *A. nilotica* were recorded high for the seedlings which were grown in soil of Malir Station and Landhi Junction as compared to University Campus (Table 1).

Table 1. Effects of different soils on growth of *Acacia nilotica* in the field conditions.

Sites	Root length (cm)	Shoot length (cm)	Seedling length (cm)	No. of leaves	Leaf area (cm^2)	Circumference (cm)
A	8.20±0.22b	33.20±0.66b	41.40±0.61b	56.60±0.68b	1.07±0.11a	29.40±0.92b
B	7.38±0.18a	26.60±0.81a	33.98±0.74a	42.00±0.71a	1.29±0.04b	22.00±0.89a
C	9.40±0.14c	39.60±0.81c	49.00±0.76c	65.00±1.67c	1.40±0.03b	30.60±0.92b
D	11.98±0.28d	42.80±0.86d	54.78±0.86d	74.00±1.79d	1.91±0.06c	28.80±1.56b
E	12.66±0.12e	46.00±0.71e	58.66±0.67e	96.20±1.39e	2.04±0.05c	31.00±1.00b
LSD (p<0.05)	**0.58**	**2.28**	**2.20**	**3.93**	**0.19**	**3.18**

Symbol used: **A** = University Campus; **B** = Cantonment Station; **C** = Drighroad Junctionn; **D** = Malir Station; **E** = Landhi Junction
Numbers followed by the same letter in the same column are not significantly different according to Duncan Multiple Range Test at p<0.05 level; ± Standard Error

Table (2) showed a significant (p<0.05) increase in root dry weight of *A. nilotica* grown in soil of Drighroad Junction (0.064 g), Malir Station (0.113 g) and Landhi Junction (0.152 g) in comparison with University Campus (0.072 g). The seedlings of *A. nilotica* developed from the soil of Cantonment Station showed a significant (p<0.05) reduction (0.064 g) in dry weight. The stem and leaf dry weights of *A. nilotica* also showed a significant difference for the seedlings grown in soil of Cantonment Station, Drighroad Junction, Malir Station and Landhi Junction as compared to University Campus (Table 2). The cumulative seedling dry weight of *A. nilotica* was recorded significantly (p<0.05) high for the seedlings grown in Drighroad Junction (0.833 g), Malir Station (0.931 g) and Landhi Junction (1.186 g), whereas the seedlings grown in the soil of Cantonment Station demonstrated a significant (p<0.05) reduction (0.494 g) as compared to University Campus soil (0.782 g). The root/shoot ratio of *A. nilotica* was significantly (p<0.05) different for the seedlings grown in Cantonment Station, Malir Station and Landhi Junction as compared to University Campus soil. Leaf weight ratio of *A. nilotica* showed a significant (p<0.05) difference only for the seedlings developed from the soil of Malir Station and Drighroad Junction as compared to the University Campus soil. The specific leaf area showed significant (p<0.05) difference in seedlings grown in soil of Cantonment Station as compared with University Campus. The leaf area ratio showed significant (p<0.05) increase (2.64 cm^2 g^{-1}) in seedlings grown in Cantonment Station and Malir Station soil as compared to the University Campus.

Table 2. Effects of different soils on dry weights and ratios of different variables of *Acacia nilotica* in the field conditions.

Sites	Root dry weight (g)	Stem dry weight (g)	Leaf dry weight (g)	Seedling dry weight (g)	Root/shoot Ratio	Leaf weight ratio	Specific leaf area (cm^2 g^{-1})	Leaf area ratio (cm^2 g^{-1})
A	0.072±0.002b	0.417±0.01b	0.238±0.04b	0.728±0.01b	0.11±0.003a	0.33±0.002a	4.50±0.41a	1.47±0.15a
B	0.064±0.001a	0.266±0.01a	0.162±0.05a	0.494±0.01a	0.15±0.005c	0.33±0.005a	8.06±0.54b	2.64±0.14c
C	0.095±0.002c	0.424±0.02ac	0.313±0.01c	0.833±0.03c	0.13±0.008ab	0.38±0.006c	4.51±0.22a	1.69±0.05a
D	0.113±0.003d	0.461±0.02c	0.356±0.01d	0.931±0.02d	0.14±0.008bc	0.38±0.011c	5.36±0.10a	2.04±0.04b
E	0.152±0.002e	0.635±0.13d	0.398±0.02e	1.186±0.02e	0.15±0.004bc	0.33±0.012a	5.18±0.35a	1.72±0.07a
LSD (p<0.05)	**0.007**	**0.04**	**0.04**	**0.07**	**0.02**	**0.02**	**1.05**	**1.05**

Symbol used: **A** = University Campus; **B** = Cantonment Station; **C** = Drighroad Junction; **D** = Malir Station; **E** = Landhi Junction
Numbers followed by the same letter in the same column are not significantly different according to Duncan Multiple Range Test at p<0.05 level; ± Standard Error

Table 3 (a): Physical properties of soil.

Sites	M.W.H.C. (%)	B.D (gcc^{-1})	Porosity (%)	Sand (%)	Silt (%)	Clay (%)	Soil texture class
A	26.59±0.18b	1.36±0.3b	49±1.00a	24.34±0.91a	44.28±0.10a	31.42±1.01a	Clay loam.
B	31.11±0.24c	1.34±0.4b	49±2.00a	41.80±1.00b	29.00±0.50b	29.20±1.00a	Clay loam
C	24.17±0.11a	1.47±0.01c	44±1.00a	60.80±0.94c	31.00±0.50b	08.20±0.44b	Sandy clay loam
D	23.84±0.30a	1.23±0.03a	54±3.00b	64.08±1.00c	13.00±0.50c	22.92±0.55c	Sandy clay loam
E	24.45±0.01a	1.43±0.01bc	46±0.50a	60.08±0.20c	11.00±0.10c	28.92±0.10a	Sandy clay loam

Table 3(b): Chemical properties of soil.

Sites	$CaCO_3$ (%)	Cl (mgL^{-1})	pH	O.M. (%)	T.O.C. (g)	S (μgg^{-1})	EC ($dScm^{-1}$)	TDS (mgL^{-1})	Ex. Na (ppm)	Ex. K (ppm)
A	21.6±0.01a	00.00±0.00a	7.00±0.02a	4.50±0.03c	2.61±0.13b	58.75±0.04a	19.0±0.50a	13.9±0.40a	190.00±6.00b	156.00±3.00a
B	13.0±0.40d	875.0±10.00e	7.25±0.04b	4.39±0.03a	2.55±0.01b	142.50±4.00d	19.6±0.30a	14.1±0.55a	1340.00±25.00d	180.00±7.00a
C	16.7±0.20c	190.0±2.00d	7.40±0.01c	3.35±0.02a	1.94±0.01a	71.25±1.00b	4.4±0.20b	3.3±0.20b	300.00±15.00c	160.00±11.00a
D	14.7±0.10b	100.0±3.00e	8.0±0.04d	3.90±0.01b	2.26±0.01c	150.00±4.00d	1.5±0.40c	1.1±0.20c	120.00±5.00a	80.00±6.00b
E	17.4±0.29c	80.0±5.00b	7.50±0.07c	4.82±0.02d	2.79±0.01d	91.25±3.00c	2.1±0.20c	1.6±0.20c	100.00±2.00a	80.00±3.00b

Symbol used: **A**= University Campus, **B**= Cant Station, **C**=Malir Halt, **D**= Malir15,**E**=Landhi Junction **M.W.H.C.** = Maximum Water Holding Capacity, **B.D.** = Bulk Density, **$CaCO_3$** = Calcium carbonate, **Cl**= Chlorides, **OM** = Organic matter, **T.O.C.** = Total Organic Carbon, **EC**= Electrical Conductivity, **T.D.S.** = Total Dissolved Salts, **Ex. Na^+** = Exchangeable sodium, **Ex. K^+**= Exchangeable potassium. **Numbers followed by the same letter in the same column are not significantly different according to Duncan Multiple Range Test at $p<0.05$ level.** ± **Standard Error. Source: (Farooqi *et al.*, 2016.)**

IV. DISCUSSION

The influence of railway exhaust emission on the seedling growth of *Accacia nilotica* was investigated. Railway emission affected seedling growth of *A. nilotica*. A significant ($p<0.05$) reduction in seedling growth of *A. nilotica* raised in soil of Cant railway station observed. The routine works on railway tracks of Karachi is badly affected the soil properties near the railway tracks. The workshops for maintenance of vehicles, train engines and coaches also contaminated the soil of the area. The plants growth directly depends on the soil of the area in which they are growing, because the soil is the medium for plant growth, water and nutrient supplier and give support to plants [10]. In our previous studies the changes in physical and chemical properties of soil near the railway track of Karachi, city were recorded (Table 3a, 3b). The roots of plants penetrate in soil, which act as a water-holding tank and fulfill the needs of water for plants growth. The physical properties of soil such as compactness, structure, and texture and bulk density directly influenced the root penetration, growth performance and production of yield to different crops [12]. The nutrient availability, their absorbance and uptake from water to plants depend on physical attributes of soil [30]. The soil texture, bulk density, porosity and water holding capacity, organic matter, dissolved salts and available sulfates are affecting the plants growth [26].

The physical and chemical characteristics of University Campus, Cantonment Station, Drighroad Junction, Malir Station and Landhi Junction soils were different. The activities of automobiles at the above mentioned study areas are different and the rate of pollutants introduction in environment vary from area to area. The most polluted and disturbed area was Cantonment Railway Station and the less polluted area was Landhi Junction as compared to Karachi University Campus. The growth performance of *Acacia nilotica*, showed a significant ($p<0.05$) variation raised in different soils of the study area due to changes in physical and chemical nature. The height of *A. nilotica* was highly increased in soil of Landhi Junction whereas; in the soil of Cantonment Station height of *A. nilotica* was lowest. The lowest number of leaves and circumference were recorded in soil of Cantonment Station. Rehman [25] carried out similar studies in the polluted soils of Landhi and Korangi industrial areas of Karachi city. The height and number of leaves of *Leucaena leucocephala* showed discontinuous variation after every two weeks in polluted soils of Landhi and Korangi industrial areas [27].

The seedlings of *A. nilotica* grown in soil of Karachi Cantonment Station exhibited significant reduction in root, shoot and seedling lengths, number of leaves and circumference due to most contamination of repairing and servicing activities of train engine and coaches as well as some other activities in that area. The reduction in these parameters of different plants might be due to disposal of waste products and spent engine oil in the vicinity of

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Cantonment railway station. These findings were supported by Akoto *et al*. [1], who described that vegetation in the vicinity of railway servicing workshops in Kumasi city of Ghana was severely affected. The root, stem, leaf and seedling dry weights of *A. nilotica* seedlings grown in soil of Karachi Cantonment Station were significantly reduced as compared to University Campus, Drighroad Junction, Malir Station and Landhi Junction. The same results were coated by Iqbal and Shafiq [14], who described that the reduction in leaf number, plant height, circumference, root, shoot and total plant dry weights of *Prosopis juliflora* and *Blepharis sindica* were suppressed due to low contents of calcium carbonate, high electrical conductivity and high contents of sodium and potassium salts.

V CONCLUSION

The present study showed that the seedling growth of *A. nilotica* raised in the soil of different areas of railway tracks of Karachi responded differently due to anthropogenic activities, grazing, and construction of railway tracks and release of emission from railway engines. The soil of Cantonment Station was highly polluted due to repairing activities, release of exhaust from train engines, chemical used for rolling stock, exploitation (machine grease, fuel oils, and sleeper impregnation oil) and toxic substances processed by railway transport. If the exposure of pollutant on soil near railway tracks goes on then there would likely to be more damage to the vegetation changes in future.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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