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Survey the Effect of Oil Pollution on Morphological Characteristics in *Faba Vulgaris* and *Vicia Ervilia*

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Abstract: Pollution results when a change in the environment harmfully affects the quality of human life including effect on animals, microorganisms and plants. Among the broad range of organic pollutants contaminating soil-water environment, polycyclic aromatic hydrocarbons are of great environment concern. Oil contaminated soil will affect germination, plant height, leaf area and biomass production. The aim of this research was to elucidate effects of oil pollution on morphological characteristics in Fabaceae family. For this purpose species of *Faba vulgaris* and *Vicia ervilia* were planted in different concentrations of oil in soil. For morphological studies, studied species were removed from polluted and non polluted soils separately and some morphological characters were studied in these species, then these characters were compared in plants, collected from polluted and non polluted soil. Finally, the level of significance of these differences was elucidated by using of SPSS. Obtained results showed that oil pollution can cause some abnormalities in structure of vegetative parts in plants grown on polluted soils. Decreasing of plant length and stem diameter and changing the leaf shape was among the most important effects of oil on morphological characteristics in *Faba vulgaris* and *Vicia ervilia*.

Keywords*: Faba vulgaris,* morphological characteristics, oil pollution, *Vicia ervilia*

INTRODUCTION

Environmental pollution by pollutant of different human activities including agricultural, industrial, nuclear and wastewater causes environmental problems, economic and health [1]. Crude oil and its compounds as a result, the most widespread global pollutants that are found in the soil in most areas. Oil compounds for toxic and carcinogenic properties are considering harmful to health [2]. Petroleum into the environment from different sources. Spilling oil in the soil causes soil problems [3]. There are several reports of the effect of crude oil pollution on plant growth [4, 5]. Oil pollution causes loss of plant covering, plants diversity [6] and soil animal diversity [7]. Some of plant species which can tolerate pollution and it grows in the oil compounds. On the other hand, different kinds of plants also respond concentration of contaminant differently, because of the diversity of physiological and morphological characteristics. The aim of this research was to survey the effects of oil pollution on growth characteristics in Fabaceae family. For this purpose, two species Faba vulgaris and Vicia ervilia were selected randomly for study.

MATERIALS AND METHODS

Faba vulgaris and *Vicia ervilia* seeds were purchased from local market in Hamedan, west of Iran. The soil was collected from around farmland in Hamedan, Iran. The amount of oil was added to soil at ratio of 1%, 2%, 3% and 4% (% w/w) calculated and for to coming uniformity of concentration Oil in the soil, the soil was mixed well with the manual method. The crude oil used for the studies was light crude oil. Control treatment was soil without pollution. 400g of soil was poured in pots. Seeds were planted at 1-1.5 cm soil depth. The pots placed in the open environment. Characteristics measured in this study include: stem length, stem diameter, root length, and leaf area. Growth parameters such as stem length and root length were measured using ruler [8], and based on the unit was expressed centimeters. For stem diameter was harvested of distance 1 cm of soil surface and measured with ruler and based on the unit was expressed centimeters. Testing was performed in plan a randomized complete block design (RCBD) with 3 replications. Data were analyzed by SPSS, to compare results of ANOVA and to compare treatments LSD test at the levels of 0/05 percent was used.

RESULTS

The results of average length of the growing in the 40-day period showed that the species *Faba vulgaris* and *Vicia ervilia* stem length decreased with increasing oil concentration in the soil. Significant difference ($p \leq 0/05$) existed between control sample and contaminated samples. In *Faba vulgaris* species except control sample and 1 Percent level and in species *Vicia ervilia* in control sample and 1 and 2 Percent, there is not significant difference. *Faba vulgaris* species in concentration 4% do not germination. *Faba vulgaris* species increasing root length in high aeration analysis of variance (ANOVA) showed that effect of crude oil on root length in $p \leq 0/05$ wasn't significant. Effects of light crude oil on increasing root length $p \leq 0/05$ are significant. In *Vicia ervilia* effect of light crude oil on increasing leaf area was significant. The lowest leaf area in control sample and the most leaf area in highest level sample. LSD test showed that leaf area in *Vicia ervilia* species

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wasn't significant between levels of sample. Result of LSD test showed that significant between control sample and contaminated sample (Table 1). Effect of light crude oil on reduction of stem diameter in *Faba vulgaris* species LSD test showed that was significant between of control sample and contaminated sample (Table 1). In *Vicia ervilia* stem diameter was not measured due to stem thin. Therefore the effect of crude oil light on growth parameter in contaminated soil, Crude oil light into the soil leads to problem of necrosis and chlorosis in leaves.

Table 1 Results of measurements growth characteristics *Faba vulgaris* and *Vicia ervilia* in different concentrations of oil (0, 1, 2, 3 and 4%) ± SD., common Letters shows no significant difference in the levels of 0/05 percent LSD test, each number is the mean of 3 replicates.

Indicators measured		Control	1 %	2 %	3 %	4 %
Stem length	*Faba vulgaris*	28.45^{a}	27.04^{ba}	13.5^{c}	12.82^{a}	1^{e}
	Vicia ervilia	14.26^{a}	13.69^{ba}	12.26^{ca}	10.03^{dc}	6.53^{e}
Stem diameter	*Faba vulgaris*	6.16^{a}	5.16^{b}	5^{cb}	4.5^{dc}	-
Root length	*Faba vulgaris*	16.84^{a}	16.96^{ba}	16.98^{ca}	17.8^{da}	-
	Vicia ervilia	14.22^{a}	14.78^{ba}	15.58^{ca}	15.52^{da}	7.8^{e}
leaves area	*Faba vulgaris*	507.6^{a}	520.15^{ba}	666.28^{ca}	999.2^{da}	-
	Vicia ervilia	21.11^{a}	13.02^{ba}	12.37^{ca}	11.41^{da}	9^{ea}

DISCUSSION

The results showed that light crude oil affected on the growth parameters. Reduced growth or stop growing stage showed that this species was sensitive plant in this concentration. The *Vicia ervilia* the ability to resist in all concentrations, although reducing growth was observed with increasing concentration crude oil light in the soil. Stop growing *Faba vulgaris* species in concentration of %4 due to toxicity, by hydrocarbon compounds. But *Faba vulgaris* growing near the 40 days in low concentration from 4. Reduce growth the aerial organic cause of volatile compounds that comprise 5 to 10 percent of oil hydrocarbons [9]. Non-aerated of the soil and reduction in mobilization of nutrients causes reduction stem length, dejection and retardation of growth [10]. Mendelssohn and Hester found that reduce stem length due to Physical, chemical and biological transformation oil compound in soil [11]. Dejection causes decreasing water in plant tissue [12]. Loose stem [13, 14] and reduction stem diameter observed in treatment of contaminated oil. The change of root length due to reduction or removing oil from the soil [15, 16, 17], increasing root length in high concentrations can be determined significant role plants in the removal of oil compounds. Soil contaminated with oil crude oil light due to gathering water in the soil surface and artificial dry in lower layers. In this condition plant couldn't absorb water and nutrients, so increasing root length can solve those [18]. Huang and his colleagues had same result for this. they reported that increasing root cause taken water and nutrient found [19]. Increasing leaves area in *Faba vulgaris* specie can be because the components are oil plants such as auxin acts [20]. Ghafari and his colleagues thought that some of these plants are capable of growing some features such as leaf contaminated soil by oil or in other words to increase reinforcement [21]. Reduced leaf area compared to the control samples were contaminated with the report that the results Sharifi and his colleagues, Anoliefo and Vwioko reported the reduction in leaf area. Resistant to oil pollution depended on the species [22, 23]. Changes and responses against oil stress in the different members of a family are different such as result of this research increasing leaf area in *Faba vulgaris* species and reduction leaf area in *Vicia ervilia* species.

CONCLUSION

The results growth characteristics species studied reducing stem length, increasing root length, reducing diameter, reducing leaf area in Vicia ervilia and increasing leaf area in Faba vulgaris with increasing oil concentration in the soil. Reducing aerial organs growth and increasing root length showed that more effect of oil on aerial growth against root, aerial is sensitive to oil. Also, the species studied are suitable species for phytoremediation of soil that has recently been contaminated with oil products.

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