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# The effects of shrubs common myrtle (*Myrtus communis*) on soil chemical and physical characteristics of Basht area

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**ABSTRACT**

*Forest trees as result of various factors affecting the soil under its canopy. Studying the relationship between trees and soils is one of the main reasons for forest management and land. Common Myrtle (Myrtus communis) of the family Myrtaceae, is a shrub or evergreen shrub habitat that investigation of its characteristics helps to preserve, cultivate and develop the habitat of this plant. This study aims is to examine how species influence on soil properties to be able to understand the relationships and generalize the results in similar solutions in the field of reform and reclamation advised. This study was conducted in Kohgiluyeh and Boyer Ahmad city in Basht area. Six profile that half profile were under canopy shading and the other half were outside shading, on the north side of trees (in triplicates). In each of the three depth profiles of 30-0, 60-30 and 90-60 cm soil samples were taken. Evaluation tests showed that the electrical conductivity, organic matter, percent nitrogen, phosphorus, potassium, copper, manganese, zinc, iron, and percent sand particles under the tree canopy of the tree canopy has increased significantly. Also treated neutral subject matter, soil pH, percent clay and silt particles in the soil under the canopy showed a significant reduction in the size of the.*

**Key words:** *Myrtus communis*; Soil characteristic; Canopy; Basht area; soil chemical and physical characteristics

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## INTRODUCTION

Myrtle (*Myrtus communis*) of the family Myrtaceae, is shrubs or evergreen shrub. Investigation of characteristics of its habitat helps to maintain, cultivate and develop the habitat of this plant. With this study, the ecological factors needed of plant and the area of to produce more oil, it is clear that the pharmaceutical industry is required It can be widely used for the cultivation of the plant, therefore, need to accurate studing for identification of species of medicinal plants ecological, is importante. The Effect of plants on cultivated soil themselves have caused physical and chemical changes to the soil. In general we can say that the food reserves in the soil properties and vegetation is heavily dependent on plants (1). The soil characteristics is affected by soil response to root activity and characteristics of litter that fall under canopy collapses perennial plants (2). For example, perennial plants by accumulation of litter and whose roots affect the soil quality, improve their sites (3). The effect of plants on soil characteristics, much research has been done in Iran and other parts of the world. Bailey (4) believes the vegetation, will speed the nutrient cycle and created favorable changes in the microclimate of the area. Charlie and the West (5) on the effects of plants on the soil chemical properties in Utah, *Artemisia tridentate* stated that the amounts of nitrogen, carbon, phosphorus can be seen, total phosphorus, PH and salinity in the surface soil around the plant is more than of around. Halvarson et al. (6) in the study of sagebrush fields south of Washington concluded that the accumulation of organic carbon and nitrogen and the speed of nitrogen cycle in the soil below of Artemisia tridentate plant is more than the soil between plants. Belsky and Canham (7) also examinated affect of plants cultivation on soil stability and carbon content and the ratio of C/N and identified as the best indicators of soil sustainability. They showed that increased aggregate stability and carbonat content, carbon, organic nitrogen and C/N ratio in the soil under *Prosopis glandulosa* species. This study aims was to examine how *Myrtus communis* species influence on soil properties in order to understand the relationship and generalize the results in similar field to express recommending suitable solutions for reform and reclamation and introduced the best species soli plant. In relation to the effect of plants on soil chemical changes can be said that the accumulation of plant residues, the emergence of significant changes in the profile below the canopy, especially in arid and semi-arid plant species (8). Hinsingr (9) has been described five factor due to effect of roots in the soil quality are changes in ion concentrations, pH, oxidation reduction conditions, the metal complexes and enzymatic activity. The effect of couses by root plant on chemical properties of the soil is from the roots of plants can be an imbalance of cations and anions in ion uptake by plant roots, organic anion release, root respiration and microbial production of acids from root exudates attributed (10). Davenport et al. (11) reported that the presence of trees and shrubs control changes in mineral seal air transfer, clay and silt, sediment or analysis of secondary carbonates and other minerals will causing a severe effect on soil physical and chemical properties of the plant are below. The low-yielding land, the trees have a positive effect on crop production leading to further production of the product under the shading canopy is removed (12). Koochaki (13) reasons for differences in soil nutrient levels under the crown of the plant are as follows: 1) nutrient uptake by plant roots shallow and deep, 2) immobilization of nutrients by plants or symbiotic organisms, 3) increased soil nutrients by large organisms that use plants to their nests and rest, etc and 4) stop and accumulate in Brushwood and soil particles caused by wind at the foot of shrubs and trees. Between the roots and the soil environment is a complex and often with undefined borders. Material released from the roots into the soil, its properties change and stimulate the growth of micro-organisms (11). Barth and Klemmedson (14) showed that the significantly increased the amount of iron, manganese and zinc in the pine canopy, accumulation of organic matter on the outside of the plant. Tajodini (15) result that Haloxylon plants and Tamarisk coused that increased plant matter, organic matter, total nitrogen, calcium, potassium, chlorine, iron, zinc and electrical conductivity on soil.

## MATERIALS AND METHODS

This study was examined in Kohgiluyeh and Boyer Ahmad city in Basht area. In This study in area covered by forest, shrub about six profiles that half in canopy shading and half out canopy shading, on the north side of the tree (in three replicates) were drilled.In each of the three depth profiles of 30-0, 60-30 and 90-60 cm soil samples were taken. Selected area of forest land with little slope and soil parent material is the same in relative terms. Soil samples after drying and passing the 2 mm sieve to determine chemical properties such as pH in saturated paste soil electrical conductivity using an electrical conductivity meter, with chromic acid oxidation of organic matter by the application of (16), equivalent calcium carbonate to neutralize the hydrochloric acid method (4), total nitrogen Kejeldal method (17) and soil phosphorus by Olsen et al. (1954) (18) were tested. Available potassium extracted by ammonium acetate one normal, the readings were measured by flame (19). Iron, manganese, zinc and copper after extraction with the following DTPA (20), were determined by atomic absorption. Soil texture hydrometer method (21) was performed.

## RESULTS AND DISCUSSION

**Soil texture**: The results showed that the soil under the Common Myrtle trees has changed, and the percentage of soil particles under the canopy outside shading indicates differences (Table 3). According to test results soil texture out of Common Myrtle tree canopy is clay that this soil has been changed to clay loam soil under the canopy. Experiments showed that the percentage of clay and silt beneath the canopy of shade is reduced comparison out of the canopy of shade however the sand particle size shows a significant increase. The soil texture is the reliable traits of the soil that typically changes in the short term is negligible, except that external forces such as water currents, wind and gravity or human intervention to alter it. Shukla et al. (22) reported more silt and clay beneath the canopy of oak and know due to trapped particles in the air, the soil surface under the canopy. Perkins et al. (23) reported that the amount of silt and clay increases with increasing distance from the trunk Larya Trydntata shrubs and sand has been reduced (24) with the study of Tamarix and Haloxylon plants reported that amount of sand beneath tamarisk canopy shading comparison the outside canopy shading increased but under the canopy Haloxylon has been reduced. They are the reason for this difference in appearance between the two species studied, and finally gathering dust in the wind know.

**Organic carbon:** Common Myrtle trees caused significant increase in soil organic carbon under the tree canopy than outside the canopy (Table 1). So that out of the shadows is 0.51% and savings under 2.03%. Organic carbon in the soil surface is higher than the lower layers is increased. Melambo et al. (25) in South Africa to study *Colophosprmum mopane* plant amount of organic carbon in the canopy obtained from zero to 10 cm depth was significantly higher than that obtained from shading. The increase in organic carbon can be due to various processes such as accumulation of litter (26), reducing in erosion or increase in sedimentation (Charley, 1976) (27), improve micro-climatic soil conditions (Pierson and Wight, 1991) (28) or be input sources such as insects, birds and other animals (Davenport et al., 1996) (11). In general, the amount of organic matter accumulated Lashbbrg plant size and there is a direct relationship (Thtus et al., 2002). (29)

**Play saturation and percentage of neutral solutes:** Tests showed that the Common Myrtle tree significantly reduced saturation percentage alkaline and Percentage of neutral solutes under the canopy shading than out of canopy shading. Saturation percentage below perspective shadows is 58% and out of perspective shadows is 64% and percentage of neutral solutes under shading is 47% and out of shading 48%. But it is not a significant difference between different soil depths (Table 1). The results show that vegetation decreased significantly saturation percent and percentage of neutral solutes (Table 2). Tajodini (15) results calcium carbonate increased significantly of 23.3 percent below the canopy to 28.8% of the canopy species of Tamarix and Haloxylon. A similar trend by Morshedi (30) in connection with the mountain almond trees were reported. Low pH is probably the result of the activity of micro-organisms in the canopy area and production of carbon dioxide and carbonic acid, which can lead to increased solubility of calcium carbonate. The permeability of the soil to canopy due to increased root development and higher porosity leads to more rapid leaching of the soil profile is calcium carbonate. Chandler and Chapel (5) described the of the animate and inanimate (covered) root of trees with cavities be a good relationship between the hydraulic conductivity at the soil surface can cause the ducts to several hundred times the hydraulic conductivity of the soil. Furthermore, the addition of plant residues on the soil surface to improve forest structure and increased infiltration rate is aggregate.

**Acidity (PH):** In relation to the effects of Common Myrtle trees on soil acidity results showed that soil pH is significantly decreased below the canopy than outside it and save it under 7.99 and outside the canopy 7.71 units (Table 1). The pH level of the soil surface less than to a soil depth that is not significant. The interaction between soil depth and soil cover dressing is a significant increase in the depth and shading acidity decreased (Table 2). Hisinger et al. (31) stated that the production of CO2 result of root respiration is reduced pH, calcareous soil from 3/8 to 7/6. Moreno (32) observed beech and oak trees species are better able to reduce the soil pH than maple trees. Sharma (33) studies showed that soil pH below the forest canopy by increasing plants age have a reduction siginificant , and stated that this reduction due to decomposition of plant residues and secretion of organic acids in the soil under the canopy. Zheng et al. (34) whit studing *Salsola passerina* found that the pH with increasing depth plants did not show significant differences, but its rate savings under the canopy is 9.1 and outside the 8.45 Finzi et al. (35) have expressed Following the decomposition of plant litter, organic acids are produced which causes a change in the amount of alkali cations and exchangeable cations calcium and magnesium and iron and aluminum in acidic soils may become soil pH changes in the.

**Electrical conductivity (EC):** trees significant increase in electrical conductivity shade the landscape outside the Electrical conductivity under the shading canopy is 0.08 and in view of the verse is 0.56 dS . Ec indicate significant decreases with increasing depth (Table 1). In comparison, the interaction of different levels of electrical conductivity depth coverage on the outside of the canopy, there is no significant difference, but under different soil depths in contrast to significant savings can be seen that the electrical conductivity decreased with increasing depth (Table 2). Trees existence provide shade and reduce the temperature of the soil surface evaporation, less water and less solute transfer from the surface to depth, While the organic acids resulting from the decomposition of organic material dissolved minerals and helps release ions (29). Falah Shojaee (36) in the study of four Acacia species concluded that the electrical conductivity of soil in Acacia canopy shading were significantly higher than out plants and they express that most of activitu of micro-organism in shading due to higher food region, leading to increased secretion of organic acids in the root zone, which is an increase of ions causes an increase in electrical conductivity. Results Everett et al. (37) showed that the electrical conductivity of the soil-plant pine trees out there and also shading and gradual decrease of the electrical conductivity decreased with depth. McDaniel and Graham (38) indicate that electrical conductivity beneath the canopy and outside canopy of pine, has a significant positive correlation with increasing depth. Zheng et al. (34) found that the rate of *Salsola passerina* rangeland plant canopy under increased electrical conductivity and the electrical conductivity decreases dramatically with increasing depth.

**Table 1 - Comparison of different characteristics for different levels of coverage and depth.**

| Treatments | SP % | EC ds/m | PH | TNV % | OC % | N % | P *Mg/kg* | K *Mg/kg* | CU *Mg/kg* | MN *Mg/kg* | FE *Mg/kg* | ZN *Mg/kg* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Outside Ghosting** | 64a | 0.56b | 7.99a | 48a | 0.51b | 0.05b | 10b | 401b | 0.61b | 3.46b | 6.11b | 0.28b |
| **Under Ghosting** | 58b | 0.80a | 7.71b | 47b | 2.03a | 0.2a | 14a | 487a | 0.66a | 10.01a | 11.87a | 1.09a |
| **0-30cm** | 61.75a | 0.86a | 7.79a | 47.13a | 1.88a | 0.187a | 14.00a | 475.9a | 0.708a | 10.73a | 10.99a | 0.918a |
| **30-60cm** | 61.63a | 0.64b | 7.93a | 47.63a | 1.09b | 0.107b | 12.88a | 441.5b | 0.608b | 4.90b | 8.59b | 0.673b |
| **60-90cm** | 59.63a | 0.53c | 7.82a | 47.75a | 0.83c | 0.086c | 9.12b | 414.6c | 0.575c | 4.59c | 7.38c | 0.457c |

*Those marked with common letters mean significant at the 5% level are not significantly different.*

**Table 2 - Comparison of different levels of soil depth and vegetation interactions on traits**

| Depth interaction with vegetation | | SP % | EC ds/m | PH | TNV % | OC % | N % | P *Mg/kg* | K *Mg/kg* | CU *Mg/kg* | MN *Mg/kg* | FE *Mg/kg* | ZN *Mg/kg* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Outside Ghosting** | 0-30cm | 64.75a | 0.602bc | 7.77b | 48.25a | 0.875d | 0.085d | 12.00b | 436.8b | 0.702a | 5.19d | 8.37d | 0.427d |
| | 30-60cm | 64.00ab | 0.587c | 8.09a | 48.25a | 0.375e | 0.0375e | 11.00b | 391.0c | 0.542d | 2.40f | 4.38f | 0.247e |
| | 60-90cm | 63.75ab | 0.502c | 8.10a | 47.75ab | 0.275f | 0.030e | 7.50c | 376.3c | 0.572c | 2.80e | 5.57e | 0.167f |
| **Under Ghosting** | 0-30cm | 58.75bc | 1.125a | 7.81ab | 46.00b | 2.892a | 0.290a | 16.00a | 515a | 0.715a | 16.26a | 13.60a | 1.41a |
| | 30-60cm | 59.25bc | 0.700b | 7.77b | 47.00ab | 1.805b | 0.177b | 14.75a | 492a | 0.675b | 7.40b | 12.80b | 1.10b |
| | 60-90cm | 55.50c | 0.575c | 7.55b | 47.75ab | 1.400c | 0.142c | 10.75b | 453b | 0.577c | 6.38c | 9.19c | 0.747c |

*Those marked with common letters mean significant at the 5% level are not significantly different.*

**Nitrogen (N):** There is significant increase in nitrogen levels under canopy trees that shade the rate savings 0.2% and outside the canopy 0.05 percent. The increase in soil depth than the two other most significant is that the 0.187, 0.107 and 0.086 % for various depths. (Table 1). The contrast between the deep and coatings are also significant differences and vegetation has a significant impact on the amount of nitrogen (Table 2). Moody and Jones (39) the amount of nitrogen distribution under an oak tree close to the case say that the nitrate concentration in the trunk, shading the lowest and middle and high nitrate concentrations at the edge of the canopy decreases again. Zhang et al. (34) showed significantly higher total nitrogen in the soil than the soil around it *Salsola passerina* driver is 4 to 5 times more. Barth and Kelmdson (14) stated that one of the reasons for the accumulation of nitrogen in the Prosopis canopy, probably lack of favorable conditions for nitrate reduction and ammonia sublimation canopy than outside it. Jackson and Ash (20) studied the effect of *Eucalyptus xantolada* trees of two soils with low fertility, high fertility, and the other with a higher nitrogen content in canopy area measurements So that soil fertility is low, 481 ppm of total nitrogen in the canopy to 722 mg per kg of soil fertility in shading area and greater than 1009 mg total N kg to 1566 kg under the shading canopy of trees has increased. Gallardo (10) gain mineral nitrogen under the oak most of canopy shading out. Shukla et al. (22) reported the concentration of nitrogen in the soil under the oaks and Juniper tree higher than outside it, and under oak canopy nitrogen concentration increases with increasing depth, but the opposite trend was observed Juniper.

**Table 3 - Comparison of different levels of interaction between particles of soil depth and soil texture on the cover**

| Cover | Depth | Silt (%) | Clay (%) | Sand (%) | Texture |
|---|---|---|---|---|---|
| Outlook shade | 0-30 cm | 38 | 21 | 41 | CL |
| | 30-60cm | 40 | 21 | 39 | C/CL |
| | 60-90cm | 38 | 21 | 41 | CL |
| External shading | 0-30cm | 52 | 21 | 27 | C |
| | 30-60cm | 48 | 31 | 21 | C |
| | 60-90cm | 48 | 31 | 21 | C |

**Phosphorus (P):** Common Myrtle has a significant impact on tree canopy soil phosphorus and has been increase the amount of phosphorus in the landscape under the canopy. Phosphorus levels in the canopy soil and the outside canopy soil is 14 and 10 mg/kg soil. This difference significantly different between the depth can be seen in the surface soil phosphorus grenades in the verse above (Table 1). The contrast between the different depths and soil cover have difference significant, and the effect on Common Myrtle plant phosphorus in the soil indicates (Table 2). Li et al. (24) in their study of the correlation between available P and soil organic matter content did not obtained, but suggests that total phosphorus, consistent with increased organic matter is increasing. micro-organisms and plant root whit released the acid phosphatase and phytase enzyme causes organic compounds and increased P uptake (10). Balamorgan et al. (40) achieved amount of P, under the canopy of trees and eucalyptus and 9.9-13.9 Kg/hec and in outside the canopy 9.3-10.9 kg/hec. Jackson and Ash (20) to study the effects of both eucalyptus trees, soil fertility, one with low and one with high fertility observed that the amount of available phosphorus in soils in the area of shading. So that in low soil fertility, available phosphorus from 6 mg/kg in out of shading to 8 mg/kg in the area under the canopy, and the soil more fertile, available phosphorus from 35 to 54 mg/kg below the canopy was increased. Also under the shading of Mesquite tree view of available phosphorus concentrations were significantly higher than outside the canopy. This could be due to increased plant phosphorus in the summer and fall and under canopy is decomposed plant residues (41). The results of Wezel et al. (42) showed that the soil under the canopy and outside canopy of 57 species on rangeland soil available phosphorus was significantly higher than outside the canopy, and decreased with increasing depth, the amount is significant. Because they increase the organic matter in the canopy know.

**Potassium (K):** In this study, soil K under a canopy of trees shading the soil is significantly and under the canopy of 487 and 401 mg per kg of soil outside the canopy. This increase can also be seen at various depths in the soil, which is the highest order of 475, 441 and 414 mg per kg soil (Table 1). Mishra et al. (42) showed significant differences between the canopy and outside canopy of K 3 and 6 years old eucalyptus trees and causes significant increase in K under the canopy of K release from K-bearing minerals or are free of litter decomposition relationships. Banerjee (43) with the ecosystem studing of which it was the dominant oak species, expressed as the amount of exchangeable potassium in the canopy than outside the shading. Karimian and Military (44) causes an increase in the concentration of potassium in the plant canopy organic matter in the plant shading savings and increased biochemical activity and results in the release of potassium-bearing minerals potassium. Also under the eucalyptus trees shading (31) and a range of plants called Larya Tryddntata (45) has observed a significant increase in available potassium. Wang et al. (46) described an increase of organic acids secreted by plant roots leads to release of potassium by plants contain minerals such as potassium feldspar gneiss and is. Tan (1978) effect of organic compounds on acid Humic and Folic acid and K release from illite and smectite clays showed.

**Iron (Fe), copper (Cu), zinc (Zn) and manganese (Mn):** Common Myrtle Plants on Fe, Zn, Cu and Mn in the soil under the canopy has a significant impact and has increased the amount of these elements in the soil. The depth of the soil increased significantly and the surface is much higher. Levels of copper, manganese, iron and zinc in the soil outside the canopy are 0.61, 3.46, 6.11 and 0.28, respectively, so that the values of the soil under the canopy, are 0.66, 10.01, 11.87 and 1.09 mg per kg that shows good effect of Common Myrtle plants on soil (table 1). Table 2 presents the results of a significant effect on plant Cu, Fe, Zn and Mn interactions at different levels of depth of soil and vegetation on the show. Everett et al. (37) have stated that the trace elements iron, manganese, copper and zinc in two-thirds of the maximum radius of the canopy trees. They observed that, in the lower depths of the difference is intangible. Shuman (48) indicate that the increased organic matter, manganese and iron in the form of useless plant available form (Figure exchangeable and organic) are changed. Lindsay (49) is known the most important effect of organic matter on the solubility and availability of iron in the soil decrease (reduction) divalent iron to trivalent iron (solution). Shuman (48) indicate that the increased organic matter, manganese and iron in the form of unusable plant available form (Figure exchangeable and organic) are changed, but the organic matter does not affect the concentrations of zinc and copper. Since these two conditions are not susceptible to oxidation reduction. Nayak et al. (50) in studies on the distribution of micronutrients in soils with different characteristics (no Assessment of vegetation) did observe that in all cases the surface of Horizon downward micronutrient concentrations decreased negatively correlated with soil pH and iron concentration and organic matter content has a significant positive correlation. Kubota and Alaway (51) stated that due to the strong copper-ligand bonds with organic matter than other micronutrients, low organic matter will increase the availability of this element. The depth of the surface, due to the presence of organic matter, is the ability to use less copper. Palma et al. (45) created very stable complexes of copper Hume factor for the reduction of EDTA-extractable Cu knew. They investigated the presence of more than 6% organic matter strongly negative effect on the rate of copper extraction. Soil organic matter or materials on the availability of micronutrients through Kalateh Humici of the elements that can increase or decrease their availability (49). Kalateh metal solubility usually increases toward the inorganic form but decreased activity in the soil solution. In particular, the formation of Cu chelates are affected. Mn and Zn elements similar to the high levels of organic matter is affected (52). Research by Stevenson (53) decreasing the availability of metal ions with an acid Humic: is shown. Soleimani (54) in a range of different plant species Atriplex significant difference between the inside and outside canopy Mn was not observed. Falah Shojaee (55) in the soil under the canopy of Acacia species showed significant differences in the amount of available iron was not observed.

## CONCLUSION

The results show that the trees of shrubs can influence soil chemical and physical characteristics of their habitat. In this study, the shrubs increased electrical conductivity, organic carbon, percent nitrogen, phosphorus, potassium, zinc, copper, manganese, iron, and percentage of dust particles under the driver has. But to reduce the acidity of soil saturation, percentage of inert material, the percentage of clay and silt is. Common Myrtle Shrub can now identify the ecological needs of the production and cultivation of this plant for industrial and pharmaceutical needs modification to protect habitat where this plant was used.

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