

The Role of Aspect on Spatial Variability of Soil Properties and Quantitative, Qualitative, and Vegetative Properties of Peach in Saman Region, Shahrekord

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Introduction: Soils form from the interplay of five main factors namely parent material, time, climate, relief (topography) and organisms. Topography is one of the local factors that has direct and indirect effects on soil formation, physical and chemical properties of soils. To understand the mutual relationship between topographic properties, soil properties and plant community (phytocoenosis), it is necessary to decide on the appropriate method for properly managing the soil resources. In addition to the soil properties, topography may affect the soil production indices as well. Soil production index and consequently its productivity will in turn affect the growth and fruiting. Insight about the pattern the spatial variability of soil properties can be used to manage the lands properly. This study was performed to investigate the spatial variability of soil properties regarding aspect and also the relationship of these changes with the quality and quantity of peach production in Saman region in Chaharmahal-Va-Bakhtiari province, Iran.

Materials and Methods: The study area contained 1.5 hectare of 200-hectare peach gardens belong to BaghGostaran Company located in Saman, Chaharmahal-Va-Bakhtiari Province. The soil moisture and temperature regimes are xeric and mesic, respectively. 136 soil samples were collected from 0-30 and 30-60 cm depths. Two peach trees around the soil samples were also selected. Then, soil physical and chemical properties including soil texture, percentage of calcium carbonate equivalent, organic carbon, plant available potassium, phosphorous, iron and zinc, pH and electrical conductivity were determined and fruit properties including branch length and diameter in the current year, number of fruits, total yield, average of fruit weight, TSS, tissue strength, pH, acid and extract percentage were measured. Finally, the dataset were analyzed using Statistica 6.0 software. Analysis of spatial data was calculated via variogram and performed using Variowin, 2.2 software package. After determination of the best model, kriging maps of the soil and fruit properties were prepared by Surfer 8 software.

Results and Discussion: The statistical results revealed that among the soil properties, pH of the surface and subsurface horizons in both aspects had the lowest CV. Plant available phosphorous and iron showed the highest CV at surface and subsurface horizons of eastern aspect, respectively. Among the soil variables, plant available iron showed the highest CV for both horizons at western aspect. Regarding peach properties, the tissue strength showed the highest and pH showed the lowest variation in both slopes, respectively. The results of mean comparisons revealed that the soil of eastern slope has more clay percentage, silt, organic carbon, plant available potassium, phosphorous, and iron in comparison with western aspect. Peach yield was higher in eastern aspect than the western one. Correlation coefficient among soil and peach properties did not show a similar trend for two aspects. Amount of clay and plant available potassium in subsurface horizon showed a positive significant correlation with yield in western and eastern aspects, respectively. Variography showed that all variables except pH of subsurface horizon have spatial structure. The pattern of spatial variability of the yield and the number of fruits was also approximately the same as that of clay particles and organic carbon, plant available potassium, phosphorous and iron in both depths. The spatial variability of the branch length and diameter in the current year was similar to the spatial variability of clay particles percentage and the plant available potassium. The results suggested the significant effect of soil properties, especially clay particles percentage and the plant available potassium on the performance and vegetative properties of peach. However, the peach qualitative properties showed no significant correlation with the soil properties.

Conclusion: The results suggest that the significant effect of aspect on the soil and fruit properties. It seems that the aspect caused the formation of soil with different properties. Significant differences observed among some soil properties including texture components, the amount of organic carbon and nutrients in both aspects. The trees on the eastern slope had higher yield due to having more organic carbon and nutrients and

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consequently higher soil quality, while the trees on the western slope had fruits with higher quality which may be due to the climatic factors such as receiving more light, or other soil properties like the amount of available nitrogen. More investigation is needed to understand the effect of NPK and iron fertilizers and climate properties on peach properties in the orchards of the area. The effect of climatic factors on the peach qualitative and quantitative characteristics should be investigated as well.

Keywords: Eastern slope, Peach quality and quantity, Spatial variability, Western slope

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