Reviewing the EC Temperature Calibration Equations and Tracing Two Dimensional Distribution of Soil Nutrients.

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It is essential to control soil nutrient balance to gain an identical yield of crops. As an indicator of the amounts of soil nutrients, electrical conductivity (EC) is commonly used. Since EC depends on solution temperature, ECw25, which is EC of the solution whose temperature is 25 ℃, is used as a comparison criterion. To correct EC to ECw25, some calibration equations were developed like USDA Salinity Laboratory’s equation or Heimovaara’s equation. However, less attention has been paid for the accuracy of these equations. Therefore, the first objective of this study was reviewing the accuracy of the USDA Salinity Laboratory’s equation or Heimovaara’s equation. Because there is a linear relationship between EC and each dissolved ion when the ion concentration is low, each ion’s distribution can be traced by estimating ion concentration from EC. The second objective of this study was to determine soil nutrient’s two-dimensional distribution under a drip irrigation system. TDR method was used to measure EC of soil columns, which were put in an incubator. High EC conditions (ECw25 was about 400 mS m-1), and low EC conditions (ECw25 was about 150 mS m-1) were tested. The temperature of the incubator was changed from 10 ℃ to 50 ℃. When EC was high, the two equations corrected the EC well. However, when EC was low, the correction of two equations was not accurate, especially at low temperatures. It might be necessary to use different EC calibration equation depends on EC value and temperature of the solution. We modified Heimovaara’s equation for low EC conditions. From June 8th, 2019 to July 31st, 2019, volumetric water content and EC were measured with the TDR method, and soil temperature was measured with thermocouples in bell pepper grown drip-irrigated field. Soil samples were collected to measure its EC and chemical concentration with EC meter and ion analyzer, respectively. We will report how EC changed and each nutrient transported during the measurement period.

Keywords: TDR method, Electrical Conductivity (EC), Nutrients Distribution

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