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High performance liquid chromatography (HPLC) for determination of trace nitrate and nitrite in dew, snow and rain water

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Although nitrate has been determined routinely in most rain water surveys due to the concerns about the causes of acid rain and the eutrophication of surface water, measurements of nitrite in snow and other atmospheric condense phases are scarce. Recently, it was reported an ion-pair HPLC method for the determination of nitrite and nitrate in dew, and rain waters. In this presentation, a more sensitive hydrophilic interaction HPLC method for the simultaneous determination of nitrite and nitrate in snow, dew, rain and other environmental samples is reported. Quantification was carried out by the peak area integration method using a Waters HPLC 2695 Module with UV-visible detection at 215 nm. A clean separation of analytes was achieved in less than 10 minutes. Limits of quantification (LODs) of 5.0 ppb for nitrate and nitrite were obtained. This developed method has been successfully applied to the analysis of snow, dew and rain samples collected in the Southeastern Massachusetts. The concentration of nitrate and nitrite has been found in the range from undetectable to as high as 3.5 and 0.90 ppm respectively. The method proved a sensitive, accurate, and cost-effective technique for the analysis of trace level nitrate and nitrite in snow, dew, rain water and other environmental water samples.

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Nitrate leaching and water balance estimation for fallow or cover cropped maize based on WAVE model

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Nitrate leaching decreases crop available N and increases water contamination. Replacing fallow by cover crops (CC) is an alternative to reduce nitrate contamination, because it reduces overall drainage and soil mineral N accumulation. A study of the soil N and nitrate leaching was conducted during 5 years in a semi-arid irrigated agricultural area of Central Spain. Three treatments were studied during the intercropping period of maize (*Zea mays* L.): barley (*Hordeum vulgare* L.), vetch (*Vicia villosa* L.), and fallow. Winter CC were killed in March, allowing direct seeding of maize in April. All treatments were irrigated and fertilised following the same procedure. Soil water content was measured using capacity probes. Soil mineral N accumulation was determined along the soil profile before sowing and after harvesting maize. Soil analysis was conducted at six depths every 0.20 m in each plot in samples from 0 to 1.2-m depth. The mechanistic water balance model WAVE was applied in order to calculate water and N balance of the different treatments. The model showed that drainage during the irrigated period was minimized in all treatments, because irrigation water was adjusted to crop needs, leading to nitrate accumulation on the upper layers after maize harvest. Then, during the intercrop period, most of the nitrate leaching occurred. Cover crops usually led to a shorter drainage period, lower drainage water amount and lower nitrate leaching than the treatment with fallow. These effects resulted in larger nitrate accumulation in the upper layers of the soil after CC treatments.

Biography

Jose L Gabriel completed his PhD in 2011 at the Technical University of Madrid (UPM), being prized with the best thesis of the year award by the University. Today he is developing his research in the soil-plant-atmospheric system, focused on water and N cycles, in Crop production department at the UPM, and also worked at the University of Florida (USA) and the Université Catholique de Louvain (Belgium). He has collaborated with 2 European and 5 national competitive projects and 3 non-competitive. He has published 10 papers in *JCR* journals and presented more than 20 abstracts at international congress.

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