Spatial Variability of Nitrogen Mineralisation in Wine Grape Fields in Chile

MARIA MERCEDES MARTINEZ-SALGADO\textsuperscript{1}, RODRIGO ORTEGA BLU\textsuperscript{2}, MARC J. J. JANSSENS\textsuperscript{1}

\textsuperscript{1}University of Bonn, Institute of Crop Science and Resource Conservation (INRES), Germany
\textsuperscript{2}Federico Santa Maria University, Industries Department, Chile

Abstract

Nitrogen is the most important element determining yield and quality of wine grape. Actual management has tended to minimise the use of mineral N on vineyards, relying more on the soil N being mineralised each season. The balance between vineyard N demand and N supply is critical, not only from the production stand point but also from the environmental one; however few studies have been performed to estimate the amounts of N mineralised and the variability of the mineralisation in vineyard fields, in Chile.

Two fields of different soil texture, of approximately 2-ha each, were studied during the growing season (November through April). Intact soil cores (0–20 cm), containing ionic resins in the bottom, were incubated \textit{in situ}, for 4 or 5 periods lasting 35 days each. Sampling points were systematically distributed over the fields with the help of a GPS receiver and a Geographic Information System, with an intensity > 10 samples ha\textsuperscript{-1}. After each incubation period soil and resins were extracted with 2 M KCl to determine N-NH\textsubscript{4} and N-NO\textsubscript{3}; N mineralised during each period was estimated subtracting the amount of N present in the soil + resin at the end of the incubation from that at the beginning of it.

Results showed a large spatial variability (CV > 60\%) of N mineralised in both fields. Over the entire season, net mineralisation was positive in all areas of the fields, ranging from 0.1 to 1.5 kg N ha\textsuperscript{-1} d\textsuperscript{-1}. Average mineralisation rate was approximately 0.5 kg N ha\textsuperscript{-1} d\textsuperscript{-1}, which would yield enough nitrogen for sustaining grape yields of up to 15 ton ha\textsuperscript{-1}, much higher than actual yields for high quality grapes.

Keywords: N mineralisation, spatial variability, wine grape, GIS

Contact Address: Maria Mercedes Martinez-Salgado, University of Bonn, Institute of Crop Science and Resource Conservation (INRES), Hinter Hoben, 53129 Bonn, Germany, e-mail: mmmartin@javeriana.edu.co