

# Preferential flow paths in two alluvial soils with long-term additions of pig slurry in the Mediterranean zone of Chile

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## SOIL RESEARCH

Volumen: 53

Número: 4

Páginas: 433-447

DOI: 10.1071/SR14264

Fecha de publicación: 2015

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## Resumen

Spatial variability of soil hydraulic properties helps to understand the complexity and dynamic patterns of solute distributions in soils. This study assessed the effects of slurry additions and soil physical properties on preferential flow and nitrate concentrations in two Mediterranean soils of central Chile under conventional agriculture management with long-term slurry additions. Two alluvial basins continuously cropped with maize (*Zea mays*) were selected, Pichidegua (Mollic Xerofluvent) and San Pedro (Fluventic Humixerept). Soils that had been amended with pig slurry were compared with unamended controls. Soil texture, bulk density, particle density, organic matter, porosity and hydraulic conductivity (Ks) were measured. Soil nitrate concentrations at different depths were determined every 2 weeks during the study, and a dye tracer test using Brilliant Blue FCF was conducted on each soil. Digital picture analysis was then performed to classify flow types in the soil profiles through the distribution of stained path width. Stained path width allowed classification of soil flow types. Preferential flow showed no evidence of being affected by pig slurry; the stained patterns were mainly explained by tillage and soil physical properties, such as texture and Ks. Matrix flow-types in the first horizon grading to macropore flow-types at depth characterised all profiles, except San Pedro amended soil, where homogeneous matrix flow dominated through the entire profile. Concentrations of nitrate showed temporal variation during the measurement season, mainly due to the mineralisation-immobilisation budget and leaching, both triggered by Mediterranean climate conditions. Physical properties helped to explain nitrate distribution in the studied soils.

## Palabras clave

**Palabras clave de autor:** [dye tracers](#); [image analysis](#); [nitrate leaching](#); [Mediterranean climate](#); [soil hydraulic properties](#)

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## Financiación

Entidad financiadora	Número de concesión
Agriculture and Livestock Service (SAG Chile)	
Livestock Protection Department	
Program U-Apoya Project, University of Chile	11/09

[Ver texto de financiación](#)

## Editorial

CSIRO PUBLISHING, UNIPARK, BLDG 1, LEVEL 1, 195 WELLINGTON RD, LOCKED BAG 10, CLAYTON, VIC 3168, AUSTRALIA

## Categorías / Clasificación

**Áreas de investigación:** Agriculture

**Categorías de Web of Science:** Soil Science

## Información del documento

**Tipo de documento:** Article

**Idioma:** English

**Número de acceso:** [WOS:000357123100009](#)

**ISSN:** 1838-675X

**eISSN:** 1838-6768

## Información de la revista

- **Impact Factor:** [Journal Citation Reports®](#)

## Otra información

**Número IDS:** CL7AW

**Referencias citadas en la Colección principal de Web of Science:** 53

**Veces citado en la Colección principal de Web of Science:** 1