

2011 WA SOIL SCIENCE CONFERENCE

PROCEEDINGS

BUSSELTON, WESTERN AUSTRALIA

23–24 SEPTEMBER 2011



ASSSI
Australian Society of Soil Science Inc

Soil management calculator (SMCAL) - Making nutrient and lime recommendations, and environmental impact assessment for the cropping and pasture systems of Western Australia

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Soil Management Calculator (SMCAL) combines various soil nitrogen (N), sulphur (S), phosphorus (P), potassium (K), copper (Cu), zinc (Zn) and soil acidity routines into a single model for making soil management decisions. It also provides an assessment of the environmental impact of agricultural land use in terms of its impact on leakage (loss of water below the root system) and nutrient loss associated with P runoff, nitrate leaching, nitrous oxide emissions and product removal. SMCAL provides a linkage between the nitrogen cycle, soil acidity management and product removal for the calculation of soil acidification rates. Currently SMCAL does not provide routines to calculate soil nutrient depletion because it is assumed farmers undertake regular soil testing to detect nutrient decline associated with agricultural production. Phosphorus runoff and nitrous oxide emission calculations were made possible due to the development of water balance routines (evaporation, leakage and runoff). SMCAL also adopts the APSIM approach for defining the plant available water holding capacity of different soil types. Hence, it is possible to calculate amount of water leakage from the soil profile. This value is especially important in WA due to the nature of the soils (low water holding capacity) and climatic conditions (intense June-July rainfall) and the resulting impact on calculated potential yield and N and S use efficiencies. The project is funded by GRDC, DAFWA and Murdoch University.