

ASSESSMENT OF RUNOFF (^7Be) IN VINEYARDS OF THE CENTRAL VALLEY OF CHILE AND IMPACT ON PESTICIDES

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Abstract: In Chile, the total area under vineyard production is 1.98 million hectares, which 35,000 are located at the VI Region. The wine production increased in 38% since 2004. Only on 2007 the total exportation was US\$ 1297 millions.

The 1300 ha-Apalta vineyard (34°36'S; 71°16'W), located in the Colchagua valley near Santa Cruz in the VIth Region of Chile. The study site has soils classified as *La Lajuela Association* (fine loamy, mixed, thermic Ultic Haploxeralfs) and an annual rainfall of 600 mm, mainly from May to September. Two vineyards were selected, vineyard V, which covers 65 ha, characterized by slopes in the range of 13 to 22 degrees, the vines have been planted mainly in rows aligned downslope and in a less extent terraces following the contours. Another vineyard (vineyard N), which covers 32 ha, the slopes are less steep ranging from 3 to 12 degrees. Here the vines are only planted in rows following the direction of the slope. The ^7Be isotopic technique was used to document soil redistribution rates associated with the establishment of vineyards and the influence of vineyard management practices and slope steepness. Using a Potential Impact Ranking Index (PIRI) program the erosion rate was introduced to estimate the impact of pesticides soil associated onto ground and surface water.

The ^7Be make feasible to measure erosion rates on short period of time, considering a minimum rainfall event of 40 mm. Soil sampling campaigns were done between years 2006 and 2008.

The soil sampling, subsequent preparation and gamma analysis were done following the methodology describes [1]. And the erosion rates were estimated using a mathematical model developed [2].

The results obtained at vineyard V showed the effectiveness of terraces, presenting less erosion rates (0-4.73 mm, Ap horizon) than in vineyards with rows aligned downslope (0.14-5.11mm, Ap horizon). Comparing these results with the ones in vineyard N under the same alignment, the losses were 31 to 61% less than in vineyard V. Considering these erosion rates, the PIRI results showed a high rank pesticides in terms of their relative pollution potential to surface water and its toxicity and mobility. Even when the vineyards have been well managed, the topographic characteristics and the climatic conditions facilitate the potential soil erosion.

References: [1] Walling, D.E., Quine, T.A. 1995. The use of fallout radionuclide measurements in soil erosion investigations. In: Proceedings of the International FAO/IAEA Symposium on Nuclear Techniques in Soil-Plant studies for Sustainable Agriculture and Environmental Preservation (IAEA. Ed.), pp 597–619. IAEA Proc. Series STI/PUB/947, Vienna.

[2] Walling D.E., He Q., Appleby P.G. 2002. Conversion Models for use in soil-erosion, soil-redistribution and sedimentation investigations. In: Handbook for the Assessment of Soil erosion and Sedimentation Using Environmental Radionuclides (Zapata, F. Ed), Chapter 7, pp. 111 – 164. Joint FAO/IAEA Division, International Atomic Energy Agency, Vienna, Austria.