

Root Intrusion Deterrent Statement

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Research and practical experience strongly suggests that the unique arrangement of materials in KISSS *Below Flow Flat* acts as a powerful, non-chemical deterrent to roots entering, and blocking, emitters.

This observation is consistent with root development studies conducted by Commonwealth and Scientific Industrial Research Organisation (CSIRO) (Muirhead *et al.*, 1998) and with observations made in university trials (Fuentes *et al.*, 2004). Furthermore, in more than 10 years of commercial use, there have been no confirmed cases of roots blocking emitters where KISSS has been correctly installed.

A possible explanation for the protective effect observed in KISSS Flat is that the geotextile cover hides the location of emitters from roots. Roots find emitters in conventional buried pipe by following the soil moisture gradient during drying cycles. Since the soil immediately adjacent to the emitter is the first to receive water and the last to dry, the roots have little difficulty locating them.

With KISSS, the geotextile cover is the emitting source and so roots do not develop preferentially around individual emitters in the drip pipe. Roots do grow through the geotextile but the hydraulic conductivity of the material is so much greater than the surrounding soil that this has little impact on the transmission of water.

Root numbers are highest in the interface between the geotextile and the polyethylene layer - which is the wettest area. The lowest root numbers are found in the geotextile directly under the KISSS deflective tape and over the emitter. This could be because the tape physically blocks the entry of roots and because the geotextile in this elevated position drains rapidly and holds less water than the surrounding soil. (Muirhead *et al.*, 1998)

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Muirhead, W.A., Charlesworth, P.B., Meyer, W.S., Miller, M.L., Katupitita, A. and Win, M. 1998 Controlled Root Zone Irrigation, Final report CSIRO Land and Water, Griffith.

Fuentes, S. Rogers, G. Conroy, J. Ortega, F.S. and Acevedo, C. 2004 Soil wetting pattern monitoring is a key factor in precision irrigation of grapevines. *Acta Horticulturae* 664:245-252.