

Changed ABA synthesis in roots of nectarine trees under drip irrigation

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Localised (drip) irrigation is widely adopted in Mediterranean-type environment in order to maximise water use efficiency and keep good plant water status. Abscisic acid (ABA) is one of the phytohormones synthesised by roots facing dry soil and it participates to the root-to-shoot signalling for plant response/adaptation to drought (e.g. stomatal regulation).

During summer in well drip irrigated orchards, the moisture of row soil is optimal, while the soil in the inter-row alley reaches low water contents (close to the wilting point). Although plant water status is optimal in drip irrigated trees, we hypothesised that roots of the inter-row portion of root system increase ABA concentration at a level able to regulate stomata functioning.

To test that hypothesis, ABA synthesis in root of peach trees grown in Southern Italy under drip (wetting only the row) and micro-jet irrigation (wetting the whole soil surface) was monitored. Irrigation volumes were based on evapotranspirative demand and pre-dawn leaf water potential was measured to monitor plant water status.

In mid-summer, roots were sampled from row and inter-row in trees (x3) in both the irrigation treatments, and used for ABA determinations (competitive enzyme-linked immunosorbent assay).

In mid-summer, soil moisture of inter-row was 13.61%vol in microjet plot, while it decreased to 4.53%vol in drip irrigated one.

ABA concentration in roots sampled from inter-row of drip irrigated trees was increased (up to approx. 800nmol g fw⁻¹) compare to that sampled from the same position in micro-jet irrigated tree. Effect of increased ABA synthesis on leaf gas exchanges is also discussed.