

Determining the nitrogen requirements of crops : 3 sunflowers

P.D. Handson and V.C. Amenta

State Chemistry Laboratory, 5 Macarthur St, East Melbourne, Victoria 3002

The nitrogen (N) nutrition of sunflowers and their ability to respond to N applications before floret initiation are well documented. Nevertheless many growers still suffer financial loss through applying too little or too much N to their crops. Consequently there is considerable interest among sunflower growers in the development of a field test to monitor crop N status. This is particularly true for irrigated crops where the ability to apply N in irrigation water provides innovative growers with the opportunity to maintain crops at optimum N status during early growth. This paper reports on the calibration of such a test for sunflowers.

Methods

Two on farm sites were established in 1987/88, using a range of N rates (0 to 200 kg N/ha) either incorporated before sowing or topdressed immediately before irrigation at bud initiation (BI) or floret initiation (FI). Petiole nitrate levels were monitored using the sap nitrate test described in Paper 136, Proc. 5th Agronomy Conference. Seed yield weight and oil content were measured.

Results and discussion

At both sites, optimum yields (3.6 and 3.9 t/ha) were achieved with 100 kg N applied at sowing or at BI, with the topdressed application giving slightly lower yields than incorporated fertilizer. Seed weight increased with increasing rates of N, while oil content was not significantly affected. The petiole sap nitrate levels remained fairly constant up until 50 days after sowing (DAS) and then declined rapidly. Beyond 65 DAS, sap nitrate levels are too low to differentiate between N sufficient and deficient crops. There were strong correlations ($R^2 > 0.90$) between seed yield and petiole nitrate levels at BI and FI (figure 1). The critical sap nitrate concentrations between 25 and 65 DAS for a seed yield of 4t/ha are shown in Figure 2. Growers should monitor nitrate levels weekly over this period and apply N either by fertigation or by topdressing whenever values fall below the critical levels. The lower the sap nitrate value, the greater the potential response to applied N.

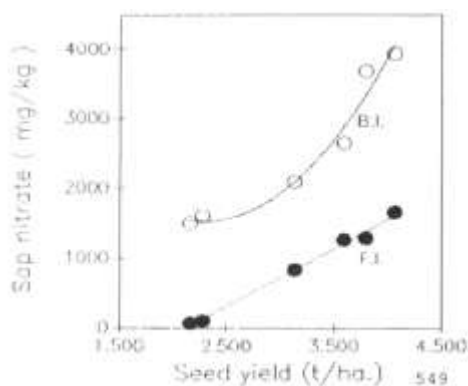


Figure 1 See yield vs. Petiole nitrate

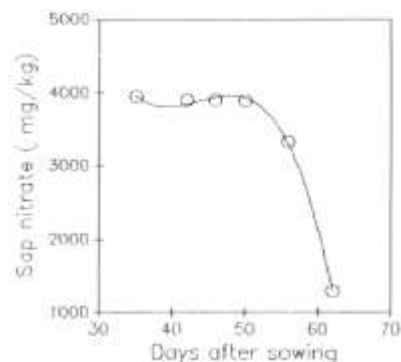


Figure 2 Critical sap nitrate concentrations