The effect of nitrogen fertilizer on the response of the potato crop to irrigation

B.J. Logan

Agricultural Research Centre, Yanco N.S.W. 2703

The potato crop is sensitive to water stress, shallow rooted, and in the Riverina area of N.S.W. is grown in sandy soils and an environment with a very high evaporative demand (1). The potato crop also has a high requirement for nitrogen. In sandy soils and under frequent irrigation, applied nitrogen is rapidly leached out of the root zone. An experiment was carried out at Yanco in 1980 to determine the effect of applied nitrogen on the response of the potato crop to irrigation.

Methods

Certified seed potatoes were planted at Yanco in autumn 1980. Phosphorus and potassium were applied at 75 kg/ha before planting and incorporated. Urea was applied as a single side dressing four weeks after emergence at 0, 100, 200 and 300 kg N/ha. The crop was irrigated with a range of five frequencies varying from daily to weekly. The experiment had a split-plot design with irrigation frequency as main treatments and nitrogen rate as split plots. There were four replications. Through the growing period of the crop, five samples of six plants from each plot were harvested to determine the relative effects of the treatments on leaf and tuber growth.

Results and Discussion

There was a significant (l.s.d. 5%) effect of irrigation on potato leaf growth and yield. Tuber yields at harvest are presented in Table 1.

Table 1. Effect of Irrigation and Nitrogen on Yield of Potatoes.

Mean irrigation interval (days)	1.4	2.9	4.1	5.0	6.5
Yield of tubers (t/ha) Mean	28.8	24.0	22.1	18.0	14.1
Yield of tubers (t/ha) at Nil N	21.3	20.1	20.9	15.2	13.5
Yield of tubers (t/ha) at 300 kg N/ha	32.7	26.5	19.9	18.3	14.0

The mean effect of irrigation frequency showed little difference between 100, 200 and 300 kg N/ha, but there was a significant effect between these treatments and nil nitrogen. When the effect of irrigation frequency was analysed at different levels of nitrogen, a significant interaction (1.s.d. 5%) between nitrogen and irrigation was found. The response to irrigation varied with the level of nitrogen applied. Where irrigation was applied daily, leaf growth was greatest at the highest level of nitrogen. At longer irrigation intervals the response to nitrogen was smaller. At irrigation intervals greater than four days there was no response to nitrogen.

Increased irrigation frequency increased the number of tubers per plant and increased the size of tubers. Both irrigation and nitrogen affected potato tuber quality. High irrigation frequency and low nitrogen levels resulted in tubers with a high specific gravity, which is desirable for potatoes used for processing.

1. Cother, E.J., Hocking, D. and Logan, B.J. 1981. Technical Bulletin 25 Department of Agriculture, New South Wales.