

## Nitrogen application and waterlogging in wheat

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Waterlogging leads to changes in soil conditions which may affect plant growth through oxygen deficiency, reduced nitrogen availability or manganese toxicity and so on. The development of systems of waterlogging injury in wheat and the recovery of plants upon re-oxygenation may be modified by supplying contrasting concentrations of nitrate in nutrient solution(1). This paper addresses the hypothesis that nitrogen application alleviates the adverse effects of waterlogging in soil.

### Methods

The glasshouse experiment was a randomized complete block design with 4 replicates, with the following treatments in factorial :

- Waterlogging (WL) (for 3 weeks at emergence of third leaf)
- Nitrogen (applied as urea) at 0, 115, 230 mg/pot at sowing or 115 mg/pot at sowing plus 115 mg/pot (after waterlogging). Harvests were taken immediately after waterlogging, and three weeks later.

### Results and discussion

**Table 1 Effect of WL at differing soil N status and timing of N application on dry weight of main axis, tillers and roots of Hartog wheat.**

	Dry weight (g/plant)	Urea applied (mg/pot)	Harvest 2		Harvest 3	
			- WL	+ WL	- WL	+ WL
Main Axis	0		0.43	0.27	0.86	0.52
	115		0.92	0.49	1.99	1.22
	230		0.87	0.53	1.76	1.34
	115+115				1.95	1.32
Tillers	0		0	0	0.01	0.01
	115		0.32	0.25	0.23	0.21
	230		0.70	0.36	1.78	0.24
	115+115				1.04	0.41
Root	0		0.10	0.02	0.09	0.05
	115		0.28	0.04	0.25	0.19
	230		0.35	0.04	0.48	0.20
	115+115				0.38	0.18

Addition of urea (115 or 230 mg/pot) increased the dry weight of the main axis and tillers of both waterlogged and control wheat plants at each harvest. However, waterlogging depressed the increase in main axis and tiller dry weight with increasing nitrogen. Split applications of nitrogen significantly increased the dry weight of tillers in both waterlogged and non waterlogged plants; tiller dry weight of waterlogged plants with a split application of nitrogen were greater than at 230 mg urea/pot. Waterlogging decreased root weight at each nitrogen level. With the removal of waterlogging, root growth continued. The interaction between nitrogen and waterlogging on root weight was negative at each harvest. Split application of nitrogen increased root weight of non waterlogged plants but not waterlogged plants.

1. Trought, M.C.T. and Drew, M.C. (1981), J of Expt Botany, 32, 509