Fertiliser Banding In Wheat and Canola

The aim of this trial was to determine optimum seed and fertiliser placement in canola and wheat and the effect of Agrotain in reducing seedling burn from urea.

Summary
Sowing more than 20kg of N with seed (seeder set on 9 inch spacings) resulted in seedling burn and poor crop establishment. Canola was better able to compensate poor crop establishment compared to wheat. Agrotain, a compound which inhibits the breakdown of urea, was not beneficial in reducing seedling burn. The best establishment technique was to sow wheat or canola seed with the P fertiliser (in this case MAP) and in the same operation to band the N fertiliser (as Urea) below the seed.

Method
Demonstration established at the Resistant Ryegrass Site. Wheat (Rosella) and Canola (Pinnacle) were sown as demonstrations in large blocks (100x 10m) with farm machinery with varying rates of P and N, with and below the seed. MAP and Urea were used as the fertiliser sources. The effect of Agrotain was tested for its ability to reduce the effect of urea burn on seedling wheat. Agrotain is an enzyme that inhibits the break down of urea to ammonium which supposedly makes the urea safer to use when sowing with seed.

The seeder (Janke bar, Simplicity airseeder with a triple bin box) could be changed to sow fertiliser with the seed and/or below the seed (5cm below and 2cm to the side of the seed). Row spacings were 22cm (9 inches). The trial consisted of changing the placement of fertilisers to trial all combinations of full rate, half rate, or no fertiliser with or below the seed (Table 3.7).

Table 3.7 Treatment description of fertiliser placement

fertiliser placement		Wheat		Canola	
with seed	**below seed**	**with seed**	**below seed**	**with seed**	**below seed**
full P	full N	12P, 2N	55N	15P, 6N	38N
full P, half N + Agrotain	half N + Agrotain	12P, 30N	27N		
full P, full N + Agrotain	-	12P, 57N	-		
full P, half N	half N	12P, 30N	27N	15P, 25N	19N
full P, full N	-	12P, 57N	-	15P, 44N	-
half P	half P, full N	6P, 1N	6P, 56N	7P, 3N	8P, 41N
half P, half N	half P, half N	6P, 28N	6P, 28N	7P, 22N	7P, 22N
half P, full N	half P	6P, 56N	6P, 1N	7P, 41N	8P, 3N
-	full P, full N	-	12P, 57N	-	15P, 44N
half N	full P, half N	27N	12P, 30N	19N	15P, 25N
full N	full P	55N	12P, 2N	38N	15P, 6N

Results: Half rates of N (around 28kg N for wheat and 22kg N for canola) sown with the seed resulted in a large decrease in crop establishment. Wheat never recovered from these low plant populations and where N was sown with wheat seed the yields were less (Table 3.8). Agrotain did not 'soften' the effect of urea on wheat establishment. Canola compensated to some extent with the plots with initial low plant numbers yielding similar to the treatments with higher plant numbers. Crop yields overall were disappointing due to the frost in late October, it appears that wheat suffered more than canola (potential yield for wheat was 3.5 t/ha and for Canola 2.0 t/ha).

Table 3.8 Wheat and Canola establishment and yield in relation to fertiliser placement

Fertiliser (kg/ha) with seed	Fertiliser (kg/ha) below seed	Wheat		Canola	
		plants / m^2	yield t/ha	plants / m^2	yield t/ha
full P	full N	198	1.77	58	1.43
full P, half N + Agrotain	half N + Agrotain	105	1.47		
full P, full N + Agrotain	-	71	0.91		
full P, half N	half N	106	1.31	48	1.61
full P, full N	-	67	1.09	39	1.55
half P	half P, full N	190	1.47	60	1.61
half P, half N	half P, half N	112	1.41	50	1.68
half P, full N	half P	86	1.47	44	1.78
-	full P, full N	189	1.72	67	1.87
half N	full P, half N	129	1.55	60	1.94
full N	full P	75	1.23	44	1.92

Interpretation

Sowing 28 kg of N/ha with wheat seed and 22kg N/ha with canola seed was too high a rate and seedling numbers were reduced (sowing at 9 inch spacings). Agrotain (a compound which reduces the rate at which urea breaks down to ammonium) did not reduce the effect of seedling burn. The optimum fertiliser placement was to sow the Phosphorus (as MAP) with the seed and Nitrogen (as Urea) below the seed.

Commercial Practice

There is some evidence from work undertaken in South Australia by Rohan Rainbow that it is best to place some of the P fertiliser with the seed and some below, and all of the N fertiliser below the seed. Soil conditions at sowing will also have an influence on this - in sub optimal conditions with poor moisture conditions - seedling burn could be worse compared to conditions when the soil is moist. At this stage it appears from our trial work that it is prudent to avoid sowing more than 15 kg of N with the seed (when sowing on 9 inch spacings).