

IS YOUR SOWING RATE RIGHT?

This Insight discusses how a minimum input strategy can be, on average, a winner for **cereal crop growers** in the sandy soils of Western Australia.

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On a recent trip to Western Australia, I travelled with Grant Borgward (RLF National Sales Manager, Australia) to Geraldton in the northern wheat belt of Western Australia for a day trip.

Geraldton has a yield potential of some 4 tonnes/ha, and an annual rainfall of some 400 mm. The eroded sandy acid soils in the area generally require inputs of potassium in addition to rates of nitrogen, phosphorus and sulphur, and crops can still struggle to reach the potential available from the rain. Leaching of nitrogen, potassium and sulphur is so high that excess inputs is often uneconomical.

Most crops that we inspected appeared to have been sown at higher than optimum rates. Close examination of the crops showed generally, one fertile head per plant (main stem tiller) and often no green leaf. In some cases, one or two infertile or dead tillers were seen – presumably as a result of competition for light and nutrients.

Septoria was dominant, perhaps partly due to poor canopy light and high nitrogen input. Nitrogen banding before sowing, practised by some, is another concern in limiting root growth and increasing nutrient loss and soil acidification. Naturally these crops requiring NPKS would cost more to establish their non-productive dry matter with higher input of seed, seed treatment, pesticides and fertilisers.



Photo: Over-sowing and shading resulted in dead tillers, loss of chlorophyll in the flag leaf and one tiller per plant

Researchers in general have shown that as sowing rates are increased, the number of plants per m² is increased at the expense of spikes/plant and spikelets/spike, such that the yield actually may decrease at above optimum sowing rate, and as shown in the following table (*table adapted from Fischer et al, 1976*).

Component	Seeding rate kg/ha				
	50	100	200	300	SE of mean
Plants/m²	120	200	350	480	
Total dry wt. at 46 DAS	200	244	207	318	9
Culms/ m ² at 46 DAS	912	1088	1250	1446	35
Spikes/plant	7.6	5.4	3.6	3	-
Spikes/ m ²	403	440	465	458	8
Spikelets/spike	19.6	19.1	17.8	17.1	0.2
Grains/spikelet	2.17	2.03	2.04	2.08	-
Kernel wt (mg)	41.2	41.5	41	42.4	-
Grain wt (g/ m ²)	706	708	704	692	9
Total Dry wt. at maturity(g/ m ²)	1624	1627	1669	1643	30
Harvest Index	30.3	30.3	29.7	29.6	-

A trial published by GRDC (*Sharma 2002*) in Nabawa, NE of Geraldton (average rainfall 450 mm and wheat yield of 2.8 t/ha), showed that best sowing rate for Carnamah, Wyalkatchem and Bonnie Rock cultivars was 50 kg/ha and the optimum nitrogen rate was 20 kg /ha. The plots had a canola crop previously and were top-dressed with adequate super-phosphate.

Grain yield of wheat varieties at a range of plant density and nitrogen levels

Adapted from data of D. Sharma (2002) as per GRDC site

Plants per m ²	50	100	150	250	350
Bonnie Rock	3.5	3.7	3.7	3.7	3.6
Carnamah	3.2	3.5	3.4	3.4	3.3
Wyalkatchem	3.5	3.9	3.8	4.1	3.9

Nitrogen kg/ha	0	20	40	80	160
Bonnie Rock	3.5	3.6	3.6	3.8	3.8
Carnamah	3.4	3.4	3.5	3.4	3.2
Wyalkatchem	3.8	3.9	3.8	3.9	3.8

I remember asking Iranian wheat farmers some 30 years ago about their yield, and they were proud to say that they got 60 seeds for each seed sown. This rule of thumb is pretty well valid for dry-land wheat farms today, and so it should be with improved cultivars.

The rule says that we should get at least 60 seeds from the main stem and tiller 1 and 2.

Thus the rule of thumb is to sow 20 kg of seeds per each tonne of expected yield.

This 'rule of thumb' assumes that some 90% of sown seeds are established.

Seed weight varies by as much as 40% based on varietal differences or sometimes growing conditions. Fine-tuning of seeding rate is useful to minimise inputs by discouraging unproductive dry matter, especially in WA soils, requiring higher input of costly major elements.

Grant's crop of Bonnie Rock and Wyalkatchem in Canna also showed some interesting features. Wyalkatchem is known to perform better in weaker soil (e.g. lower P) than Bonnie Rock. It was interesting that we picked up more grain per spikelet (usually 3) in Wyalkatchem than Bonnie Rock (usually 2 per spikelet), when they were in similar fertility conditions. The 2500ha leased property that Grant managed was sown with 30kg of DAP and 45kg of seed.

It had BSN on the seed and two foliar sprays of CSF. We expect a yield of around 2 tonnes with such minimum (low-risk) input in an area with half the rainfall and a fraction of Geraldton land price.

The minimum input strategy turns out to be, on average, a winner in today's fertiliser and climate, especially in sandy soils of Australia.