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GRDC
GROWNOTES™

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CORPORATION

DURUM

SECTION 5

NUTRITION AND FERTILISER

CURRENT GENERAL PRE-PLANT NUTRITIONAL LEVELS FOR NITROGEN |
CURRENT GENERAL PRE-PLANT NUTRITIONAL LEVELS FOR PHOSPHORUS |
CURRENT GENERAL PRE-PLANT NUTRITIONAL LEVELS FOR MICRONUTRIENTS

October 2016

SECTION 5

Nutrition and fertiliser

For more information, see the *GRDC GrowNotes WHEAT (Northern region),* Section 5: Nutrition and fertiliser.

5.1 Current general pre-plant nutritional levels for nitrogen

Paddocks with deep soil and high natural N fertility would be suitable for growing dryland durum wheat. Soil sampling to the full depth of root exploration prior to sowing should be a good guide to the available soil N supply. For the production of a 3.0 t/ha crop with 13% protein, access to 140 kg N/ha is necessary. [1]

Crop nutrition is critical to the durum crop to achieve a high-quality product. To obtain high protein levels (13%+) soil N management requires careful planning. Ideally durum should be planted into a rotation following a grain or pasture legume phase. Alternatively, use cropping history in conjunction with soil tests to calculate an N budget. It is important to test soil for N to the effective rooting depth of the crop. Nitrogen fertiliser is now an expensive input in our farming systems, and so it pays dividends to get the critical levels correct. Depending on the location, other nutrients such as phosphorus (P), sulfur (S) and, on highly alkaline soils, zinc (Zn) requirements may need to be managed. [2]

Fertiliser rates should be aimed at producing a finished protein level at ADR1 (≥13%). This may necessitate soil tests to establish base N levels. As a rule of thumb, for every tonne per hectare of high-protein grain harvested, about 50 kg of N is removed in the grain. This amount of N must be replaced, together with other N losses such as from leaching and de-nitrification. The amount of N fertiliser required can be calculated when the percentage of elemental N is known for the fertiliser product (e.g. urea N 46%, anhydrous NH3 82%). [3]

For general information on N crop nutrition and application see: http://www.daff.qld.gov.au/plants/field-crops-and-pastures/broadacre-field-crops/nutrition-management/nitrogen

More information

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B O'Mara, C Walker (2015), Lessons learnt about nitrogen and phosphorus from a 30 year study in a sub-tropical continuous cropping system on a vertosol.

R Graham, G McMullen, G Kadkol (2015), Durum wheat variety response to nitrogen management – Tamarang 2014. p159.

1 DAFF (2012) Durum wheat in Queensland. Queensland Department of Agriculture, Fisheries and Forestry, http://www.daff.qld.gov.au/plants/field-crops-and-pastures/broadacre-field-crops/wheat/durum-wheat

2 J Kneipp (2008) Durum wheat production, NSW Department of Primary Industries, http://www.nvtonline.com.au/wp-content/uploads/2013/03/Crop-Guide-NSW-Durum-Wheat-Production.pdf

3 R ,Hare (2006) Agronomy of the durum wheats Kamilaroi, Yallaroi, Wollaroi and EGA Bellaroi. Primefacts 140, NSW Department of Primary Industries, http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0007/63646/Agronomy-of-the-durum-wheats---Primefact-140-final.pdf

5.2 Current general pre-plant nutritional levels for phosphorus

Phosphorus is important in growing tissue where cells are actively dividing, i.e. seedling root development, flowering and seed formation. Use a soil test to determine phosphorus status. Long fallows due to crop rotation or drought may accentuate P deficiency through absence of mycorrhizae; P fertiliser should be used in this situation. Where needed, apply P with the seed at planting. [4]

Current research on the deep placement (10-30 cm) of phosphorus in Queensland and NSW trials is demonstrating mixed outcomes, from consistently good responses in some districts (e.g. Central Queensland), to more mixed results in southern Queensland and northern New South Wales.

Where evaluated, responses to starter fertiliser are demonstrable in most of our research sites where Colwell P in the top 10 cm is low. Growers are encouraged to continue using starter P fertilisers at rates appropriate for the crop row spacing and soil moisture conditions at sowing. Applying small amounts of P in the seed row at sowing is offering excellent utilisation of the nutrient by the emerging crop.

Yield increases with deep P application are predicated on a crops' ability to access and utilise the nutrient in the band.[5]

5.3 Current general pre-plant nutritional levels for micronutrients

Compared with bread wheats, durums can be sensitive to low Zn levels. Elongated necrotic lesions (dead patches) on the lower leaves may indicate the onset of Zn deficiency. If the soil is known to be low in Zn, a 1% aqueous solution of zinc sulfate heptahydrate should be applied as a foliar spray 2–4 weeks after emergence, at about 1 kg/ha. Zinc sulfate monohydrate applications can provide 4–5 years supply of this essential micronutrient. Apply at 15 kg/ha on sandy and sandy-loam soils, or 30 kg/ha for clay and clay-loam soils and incorporate some months before sowing. Where P fertilisers are required, products that are coated with Zn provide a very efficient method of increasing crop recovery of applied Zn. Several Zn-fortified fertilisers are now available. [6]

Most northern durum varieties including EGA Bellaroi(b) are usually not sensitive to low Zn levels when grown on very heavy, self-mulching black earth (pH 8–8.5). When a crop is growing in a very wet, high-phosphate soil for several weeks, Zn deficiency symptoms may be evident. Note that zinc oxide (5 kg Zn/ha) applications can be spread with N fertilisers but not with phosphate fertilisers, as the phosphate can bind with the Zn and could render it unavailable.[7]

More information

DW Lester, M Bell, R Graham, D Sands, G Brooke (2016), Phosphorus and potassium nutrition.

K Andersson, M Tighe, C Guppy, P Milham, T McLaren (2016), The mobility of P in alkaline clays of the Northern Grains Region.

M Bell, D Sands, D Lester, R Norton (2015), Response to deep placed P, K and S in central Queensland.

G Blair, W Matamwa, I Yunusa, M Faint (2015), Adding sulfur to finished fertilisers: inside or outside?

[4] DAFF (2012) Durum wheat in Queensland. Queensland Department of Agriculture, Fisheries and Forestry, http://www.daff.qld.gov.au/plants/field-crops-and-pastures/broadacre-field-crops/wheat/durum-wheat

[5] DW Lester, M Bell, R Graham, D Sands, G Brooke (2016), Phosphorus and potassium nutrition. https://grdc.com.au/Research-and-Development/GRDC-Update-Papers/2016/02/Phosphorus-and-potassium-nutrition

[6] DAFF (2012) Durum wheat in Queensland. Queensland Department of Agriculture, Fisheries and Forestry, http://www.daff.qld.gov.au/plants/field-crops-and-pastures/broadacre-field-crops/wheat/durum-wheat

[7] R Hare (2006) Agronomy of the durum wheats Kamilaroi, Yallaroi, Wollaroi and EGA Bellaroi. Primefacts 140, NSW Department of Primary Industries, http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0007/63646/Agronomy-of-the-durum-wheats---Primefact-140-final.pdf

Figure 1: As durum wheat is a high-quality product, appropriate nutrient management will help to reduce the risk of producing grain that does not meet the strict quality receival standards.