Make nutrition a priority for forage oats

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Growing forage oats has generally been considered a low input system, relegated to the less productive parts of the farm, while better paddocks are sown to grain. However, this year, the need to rest pastures and provide fodder to hungry animals means the low input approach might not be appropriate.

The nutritional requirements of a good quality forage oats crop can be higher than prime hard wheat, so if feed is a priority, good nutrition must also be a priority for these crops.

Choosing better paddocks and providing appropriate nutrition will help produce better quality forage oats, with better regrowth and higher yields.

The first step is to arrange soil testing. Use a reputable, quality assured laboratory like Nutrient Advantage® laboratory services. By soil testing now, you'll be in a better position to manage your resources and select the right paddocks for the right crops.

A good approach is segmented soil testing from 0-10 cm, 10-30 cm, 30-60 cm and 60-90 cm. This will identify the current levels of macro nutrients and their position, and any surface or subsoil constraints to crop growth, such as salinity or sodicity.

A better understanding of nutritional requirements can also come from previous paddock and fertiliser history, soil water availability and seasonal outlooks. It may be worth soil testing again when conditions improve to assess the contribution from mineralisation, particularly with regard to nitrogen.

The following advice covers the key macro and micro nutrients for forage oats, starting with phosphorus which provides the largest dry matter responses in oats.

Phosphorus

Phosphorus (P) nutrition is often an issue in oat production, mainly because of paddock selection. Phosphorus deficiency can result in poor seedling establishment and poor root development, with low vigour and delayed maturity. Textbook phosphorus deficiency symptoms are rare and symptoms are confusing, so confirm any suspected deficiency with a plant tissue test.

Because the period of peak phosphorus uptake and requirement happens in the early stages of growth, phosphorus needs to be available to the seed at planting. Therefore, phosphorus fertilisers should be placed with or in close proximity to the seed. There is insufficient evidence to recommend foliar applied phosphorus for cereals as a phosphorus management strategy post planting (Fecelli et al, 2016).

Nutrient response curve data developed by Incitec Pivot Fertilisers suggests that oat crops are responsive to phosphorus fertiliser where soil tests show less than 35 mg/kg Colwell P. However, the right phosphorus rate will depend on the yield expectation for the crop, and the Colwell P, BSES P levels and Phosphorus Buffering Index (PBI) from this season's soil test or a recent soil test.

As a guide, 8-20 kg/ha of phosphorus should be applied at planting for forage oats. Careful consideration of row spacing, opener type, soil texture and moisture need to be considered to reduce any risk associated with seed burn from starter fertilisers. Seek advice from your local agronomist or review the seed safety guidelines at https://agronomycommunity.incitecpivotfertilisers.com.au/~/media/SBU.pdf

Recent GRDC guidelines on deep P applications may also be useful. When soil testing, add a subsoil (10-30 cm) sample for phosphorus as well as the usual 0-10 cm sample. The Colwell P, BSES P and Phosphorus Buffering Index tests provide invaluable information about likely crop responses to surface and deeper applied phosphorus. Phosphorus soil tests are only needed once or twice a decade.

Incitec Pivot Fertilisers' strip trial work at Delungra in northern New South Wales in 2016 and 2017 showed the value of soil testing for phosphorus at a very low phosphorus site (5 mg/kg Colwell P). The farmer's practice was nitrogen alone. Only after the phosphorus rate was optimised did significant benefits to applied nitrogen occur in dry matter yields.

Table 1: Strip trial in forage oats, Delungra, New South Wales

Treatment	Dry Matter Yield (kg/ha) 2017
Nil fertiliser	3981
80 kg/ha of N alone (farmer practice)	5592
20 kg/ha of P alone	7401
80 kg/ha of N + 20 kg/ha of P	9200

Treatment	Dry Matter Yield (kg/ha) 2016
Nil fertiliser	1937
32 kg/ha of N alone (farmer practice)	4643
14 kg/ha of P alone	6920
28 kg/ha of P alone	7114
77 kg/ha of N + 28 kg/ha of P	7249

Note: Nitrogen and phosphorus rates determined by soil testing. Source: Incitec Pivot Fertilisers

Nitrogen

Nitrogen (N) is as important in forage oats as it is in grain crops, to set up tiller development for greater biomass and to aid in the development of plant proteins, which drives feed quality.

Forage oats should be grown with a protein target in mind, depending on the stock grazing it. A higher protein forage crop will require more nitrogen. For young, growing animals and lactating cows, the dry matter protein target should be between 12-14%, while for maintenance feeding or fattening older animals, the protein target can be 8-10%.

Pre-plant application rates should be budgeted following soil testing at segmented depths (0-10 cm, 10-30 cm, 30-60 cm and 60-90 cm). As a general rule, 40 to 100 kg/ha of nitrogen should be sufficient, applied in bands no more than twice that of the intended planting row spacing.

Nitrogen can also be broadcast in front of the planter and incorporated at planting, or it can be banded at planting below and to the side of the seed. It can be broadcast post planting, ideally in front of 12 mm or more of rainfall.

If broadcasting urea without incorporation, beware of nitrogen losses from volatilisation. In northern soils these losses can be in the range of 5.4 to 19% (Schwenke et al, 2014).

Nitrogen fertiliser applications after grazing in oats can help maintain the quality of the feed well into the season.

Ideally, forage oat crops should be topdressed prior to rainfall with 50 kg/ha of nitrogen after the first grazing. This will help the crop recover quickly, assist with tiller survival and vigour and help maintain feed quality. In high rainfall or irrigation situations, apply 50 kg/ha of nitrogen after each grazing to support high productivity. Allow the crop to regain leaf area and be actively growing before allowing grazing again.

High nitrite or nitrate levels in forage may be an issue in oats if the crop is immature, growth has been slow due to frosts, the weather has been cold and cloudy or there has been intermittent waterlogging. That's because plants will continue to take up and accumulate nitrate during periods of slow growth. Most of that plant nitrate is located in the bottom third of the stalk, so you can manage and reduce the risk to stock health with controlled grazing, by only grazing actively growing crops, offering carbohydrate in the diet and avoiding grazing with hungry stock.

Potassium

Adequate potassium (K) is essential in forage oats. Deficiency symptoms may include poor root growth, restricted leaf development, fewer grains per head or smaller grains. Potassium's role in water use and other nutrient uptake is paramount to bolstering crop resistance to drought, waterlogging, frost and leaf diseases and maintaining straw and stalk strength.

Soil potassium status should be checked before planting at 0-10 cm and 10-30 cm depths. Where potassium is needed (at levels below 150 mg/kg total available, or 0.4 cmol/kg), 50 kg/ha of potassium as Muriate of Potash can be applied four to six weeks prior to planting, drilled in narrow bands.

Potassium should not be applied with the seed at planting because of the high risk of seed burn. However, if deficiencies are correctly identified and confirmed by plant tissue analysis or test strips, in-crop broadcast applications of Muriate of Potash may be effective.

Poplar box soils, sodic or magnesic soils in the northern cropping region are particularly noted for potassium deficiency or uptake issues.

Be aware that hay and silage systems are particularly prone to potassium deficiency because large amounts of potassium are removed from the paddock with the fodder. Conversely, where manures are applied, they can contribute useful amounts of potassium and fertiliser may not be required.

Sulphur

Sulphur (S) nutrition should be considered in conjunction with nitrogen. Sulphur is nitrogen's partner in the formation of proteins and the production of chlorophyll.

Sulphur release from organic matter and stubble breakdown can be slow during dry, cool conditions and accelerated during warm, wet conditions. Sulphur is also mobile nutrient and can move down the profile, so sulphur can be depleted following a period of wet conditions or in double-crop or intensively irrigated cropping situations.

Soil testing for sulphur should be conducted to the same profile sampling depths as for nitrogen. Where low soil sulphur levels of less than 5 mg/kg are revealed (using either the MCP S or KCL40 tests), sulphate sulphur is the preferred source of fertiliser sulphur for this year's forage oat crop because it offers immediate availability.

If sulphur is required, rates of 20-30 kg/ha of sulphur using GranAm® or SuPerfect® are ideal to meet the demand from the coming season.

Zinc and copper

In our northern alkaline soils, the most important trace element is zinc. While the requirement for zinc is smaller than for NPKS, it is essential for healthy growth.

The best strategy is to apply a zinc fortified starter fertiliser at planting in contact with the seed. Distribution is important, because plant roots need to intercept a zinc granule for uptake, so the number and distribution of zinc point sources is critical. Obviously compound starter fertilisers have an advantage here, where zinc is present in every granule.

If a zinc deficiency occurs, it is generally very early in the season. Suspected deficiencies should be confirmed with a plant tissue test. Address any deficiencies within the first six weeks of growth with a foliar application.

Rotations containing a high frequency of grain sorghum are noted to have high zinc removals, so particular attention must be paid to zinc nutrition.

The other micronutrient of note for southern Queensland producers, particularly in parts of the western Darling Downs, is copper. Where a copper deficiency has been noted in wheat, some copper may be required in forage oats too. Copper sulphate can be used in planting fertiliser blends. Seek advice from your local agronomist for the right approach, including correct diagnosis using tissue testing with micronutrients.

For more information on nutrition for forage oats this season, feel free to contact me on 0417 896 377 or bede.omara@incitecpivot.com.au.

Further reading

GRDC GrowNotes™ for Oats, Northern Region

https://grdc.com.au/resources-and-publications/grownotes/crop-agronomy/oatsgrownotesnorthen

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