National Hay Agronomy Project: 2020 results

The National Hay Agronomy (NHA) Project aims to increase adoption of new hay varieties and agronomic practices by providing applicable research and extension to growers.

A four-year investment by AgriFutures Export Fodder Program, the project is a collaboration between growers, exporters, researchers, and scientists from across Australia.

Led by the Department of Primary Industries and Regional Development in Western Australia, the team includes representatives from Agriculture Victoria, NSW DPI, SARDI and grower groups.

Last year, the NHA project conducted 29 field trials and a field surveillance program to identify diseases affecting oat crops across Australia's export hay growing regions.

With most of the project's research complete, the focus has turned to extension to ensure those in the field are equipped with the latest industry information to improve fodder quality and yield.

What's the best way to pick a variety?

For the most successful oaten hay crop, selecting an oat variety to match the season, region, and sowing window is crucial. This means oaten hay variety selection can be different across the various export hay growing regions and seasons.

Growers could also consider new cultivars with improved disease resistance for added crop protection.

NHA program research demonstrated that variety selection is the number one tool to optimise maturity, quality, yield, and disease resistance.

For example, the newly released Koorabup export hay variety has a slightly longer maturity than benchmark varieties, suiting an earlier sowing window. Those sowing oats in June, should look for a short season variety such as Durack for the best yield potential.

What happens to fodder yield and quality at different growth stages?

Western Australian trials revealed the key window to cut hay to optimise quality and quantity was between the ear emergence (Z59) and the watery ripe stage (Z71). During this growth window, traits such as water-soluble carbohydrates (WSC), acid detergent fibre (ADF), neutral detergent fibre (NDF) and leaf chlorophyll levels/ content plateaued. These traits deteriorated as the crop growth progressed. Crude protein progressively reduced following growth stage Z59.

Victorian trials, however, showed most oat varieties held hay quality from Z59 to 14 days after Z71. Delayed cutting was of greater detriment to hay quality in Western Australia than in Victoria in 2020. Muresk experienced a drier than average spring, and Rupanyup a wetter than average spring. As the plant progressed from Z59 to Z71, the change in hay quality was relatively minor. However, as the crop went beyond watery ripe, the decline in quality was both more rapid, and severe when water was limited.

Further research is needed to better understand how we can successfully predict rainfall patterns to optimise time of sowing; this may allow for production in lower rainfall areas.

What did the nitrogen application trials reveal?

When it comes to growing oaten hay, more nitrogen isn't always better. Growers must weigh-up the risk of diminishing hay quality with yield gains. Trials revealed a consistent relationship between increased nitrogen applications and decreased hay quality.

NHA project research in 2019 and 2020 demonstrated the ideal application of nitrogen fertiliser to strike a balance between quality and quantity was between 60-90kg N/ha in the 8t/ha production zone.

Research at Muresk, Western Australia, showed a yield increase for an early May sown crop with applications up to 150kg N/ha, but this high rate was detrimental to quality, with the hay downgraded due to reduced water-soluble carbohydrates (WSC).

The best result in this Western Australian trial was a hay yield of 8t/ha with 25.4% WSC following the application of 90kg N/ha across the growing season. Two thirds of this nitrogen was applied at seeding, one-third was applied six weeks later.

Rainfall is a huge factor in determining nitrogen applications. A trial at Hart, South Australia in 2020 demonstrated no benefit when more than 30kg N/ha was applied because the dry winter limited nitrogen uptake. Trials in the Victorian Wimmera and Mallee benefitted from increased nitrogen applications due to consistent winter and early spring rainfall.

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What did the crop surveillance reveal?

Red Leather Leaf (RLL) is the most common foliar disease in oats in the medium and high rainfall zones of south-eastern Australia. RLL was visible in 80% of Victorian crops last year, bacterial blight was found in 55% of crops. RLL was not detected in Western Australia.

Septoria avenae blotch was the most prevalent oaten hay disease in Western Australia. It was the primary disease detected in the state's oat crops for the past three years.

What impact does disease have on oaten hay crops?

RLL caused yield losses of 10-22% in suspectable oaten hay varieties in Victoria last year. The most severe loss was recorded at Inverleigh, the trial site with the highest rainfall. Findings suggested RLL was most damaging in wet environments. It's understood that for every 10% increment in RLL infection, there would be a 1% yield loss due to reduced biomass.

Western Australian Septoria disease trials were stymied by drier seasonal conditions. Researchers found little evidence of foliar diseases in the trial crops and attributed this to the weather. Wetter conditions in Western Australia in 2021 have provided the ideal conditions to rerun these trials. The 2021 trial has been established at Manjimup, an area susceptible to high levels of *Septoria avenae blotch*.

Hay variety Carrolup which is susceptible to leaf rust was significantly affected by the disease in the Western Australian trials, with impacts on quality and yield. Hay cut from this trial was downgraded from Grade 1 export, to Grade 4 export due to the impacts of leaf rust.

How do I best manage diseases in oaten hay crops?

Accurate disease identification is the first step to effective management. Correctly identifying the disease symptoms and severity helps determine what fungicide to use, the number of applications required and the appropriate growth stage for treatment, to reduce crop damage. Crops suffering from high disease pressure could benefit from more than one application of fungicide, but growers must remain mindful of maximum export market residue levels. Genetic resistance is an import disease management tool. The NHA project has shown this with oat leaf rust trials where the susceptible variety Carrolup required multiple fungicide applications to control disease, while more resistant varieties Mulgara and Williams.

The risk of loss due to RLL can be reduced by growing less susceptible varieties, but research by the NHA project recommends further investigation into this hypothesis.

Is there a role for plant growth regulators in hay production?

Moddus®, with the active ingredient Trinexapac-ethyl, is a tool to help growers manage hay crop lodging. NHA project research involving April sown crops in 2019 and 2020 demonstrated a single application of Moddus® at 200ml/ha reduced lodging when applied between the first and second node crop growth stage. This application didn't have a negative effect on hay yield. Comparatively, a 400ml/ha single application rate reduced lodging but also cut hay yield by 2t/ha when compared to unsprayed control trials.

NHA project research also showed plant growth regulator gibberellic acid did not assist with increasing the head emergence from the boot in export hay crops in lower rainfall areas.

Contact

Principle researcher – Blakely Paynter
Senior Research Scientist, Department of Primary Industries and Regional Development, WA
blakely.paynter@dpird.wa.gov.au

Kylie Chambers
Research Scientist, Department of Primary Industries and Regional Development, WA
kylie.chambers@dpird.wa.gov.au

Sarah Jackson
Research Scientist, Department of Primary Industries and Regional Development, WA
sarah.jackson@dpird.wa.gov.au

Rhiannon Schilling
Agronomy Program Leader, South Australian Research and Development Institute
rhiannon.schilling@adelaide.edu.au

Peter Matthews
Technical Specialist Grain Service, Department of Primary Industries NSW
peter.matthews@dpi.nsw.gov.au

Hari Dadu
Research Scientist, Agriculture Victoria Research, Department of Jobs, Precincts and Regions
hari.dadu@agriculture.vic.gov.au

AgriFutures Australia Publication No. **21-114**
AgriFutures Australia Project No. **PRJ-011029**
agrifutures.com.au/export-fodder

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