Try-outs and N use

Learning on farm with FAR

5 November 2025

Ngahinapouri & Ohaupo

Health & Safety

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- Follow instructions from FAR staff, or farmer hosts, at all times.
- Stay within the areas specified by FAR/farmer hosts.
- Report any hazards noted directly to a member of FAR/event staff.

First aid and emergencies
FAR staff are qualified First Aiders and there are First Aid kits on site. Should you require any assistance, please ask a FAR staff member.

In case of emergency notify a FAR staff member or call 111 and provide the address of the event:

Courtesy of Dan Finlayson: 54 Old School Road, Ngahinapouri

Courtesy of Alan Henderson: 1287 Paterangi Rd, Ohaupo

FAR contacts:	**Rachel Mudge:**	**022 699 1094**
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Introduction to the Finlayson Farm

The farm is a total of 194ha, of this 155ha is effective. 106ha in continuous maize cropping, which has been in maize for 4 years.

50 ha is in permanent pasture grazing dairy heifers.

25 ha riparian and Waipa River frontage.

The system has moved to 100% strip till cultivation, this, and the application of chicken manure are aims to create a sustainable and repeatable maize production system.

During the winter the maize area is cover cropped with 40ha of annual 40ha Italian with AR37 and 26ha of annual clover.

Livestock are grazed as part of the system which includes dairy grazers and yearling bulls, these graze the winter grass.

The clover is a one cut silage crop.

Daniel Finlayson's on farm nitrogen try out

In 2023 Daniel joined a group of four growers who were investigating alternative nitrogen (N) sources as part of a Growers Leading Change (GLC) project.

The group aimed to identify and evaluate alternative nitrogen (AltN) sources (biological/organic) to maintain profitability and support environmental compliance.

The focus of his own tryout was on investigating primarily broiler chicken manure and its contribution of N to the system on his farm. Daniel is also evaluating annual clover as a cover crop and its contribution of N to the Maize growing system on his farm.

Daniel has been running try outs for two maize seasons now. The 2023/24 growing season was a relatively standard season with regular rainfall. The 2024/25 growing season was dry, which reduced maize yields and delayed cover crop establishment. This season also highlighted the importance of soil water holding capacity as a factor influencing yield.

Key Learnings

- Try outs are useful for understanding crop responses to different decisions.
- Chicken manure as an alternative source of N has demonstrated on this farm that it can maintain yield and provide a source of nitrogen which allows less synthetic nitrogen fertiliser to be applied.
- Pre-season soil testing which is included as part of a strategic plan helps to determine soil N supply. This assessment can assist in providing confidence to reduce fertiliser application.
- Less excess nitrogen in the growing system leads to a helpful avoidance of overapplying nitrogen fertiliser. As a result of these tryouts, in the following season (2024/25) Dan applied 120kg/ha less SustaiN as an average across the 105ha Maize growing area.
- Increasing confidence to use soil N testing and reducing N fertiliser. This positively impacts on profit.
- Having experienced both wet and dry the variability in weather introduces confounding factors for tryouts.
- Being part of a group who are undertaking try outs has helped build trust and confidence in the tools (PMN Soil Test and Calculator). This has helped build capability for informed decision-making skills among participants.

Table 1. Daniel Finlayson's try out decision for 2023/24 and 24/25. Where Full Rate is base N + Starter N + Sidedress N, Base Only is just Base N (No side dress or starter), Starter N is just Starter N (no base or side dress). This allows Dan to calculate return on each part of his N fert programme. Min. N is Mineral N (Ammonium + nitrate), Est. N Min (PMN) is estimated mineralisation of N over the growing season from a soil potentially mineralisable N test. Note: 6T of chicken manure is applied as a base on every treatment as the primary N source for the crop.

Finlayson On Farm Maize Tryout

		Pre-plant Soil N - 0-60 cm (Kg/ha)			N Applied		Removal	Post Harvest Soil N (0 -60cm)	
Season	**Treatment**	**Start Min. N**	**Est. N Min. (PMN)**	**Total N Soil Supply**	**Total N Fert Applied**	**Total N. Soil + Fert**	**Crop yield (tDM/ha)**	**End soil Min. N (kg N/ha)**	**N Use Efficiency (kg DM/kg N applied)**
2023/24	Full Rate	22	71	92	230	**322**	24	51	5
	Base Only	22	71	92	138	**230**	24	30	11
	Starter Only	22	71	92	92	**184**	23	24	9
	Zero	22	71	92	0	**92**	23	24	Baseline
2024/25	Full Rate	11	71	81	168	**249**	18	130	2
	Base Only	38	71	108	46	**154**	19	97	23
	Starter Only	22	71	92	30	**122**	17	92	-11
	Zero	22	71	92	0	**92**	18	38	Baseline
	Clover Starter & Side	22	71	93	122	**214**	18	76	8
	Clover Starter only	22	71	93	30	**123**	18	92	29
	Clover No Starter	22	71	93	0	**93**	17	65	0

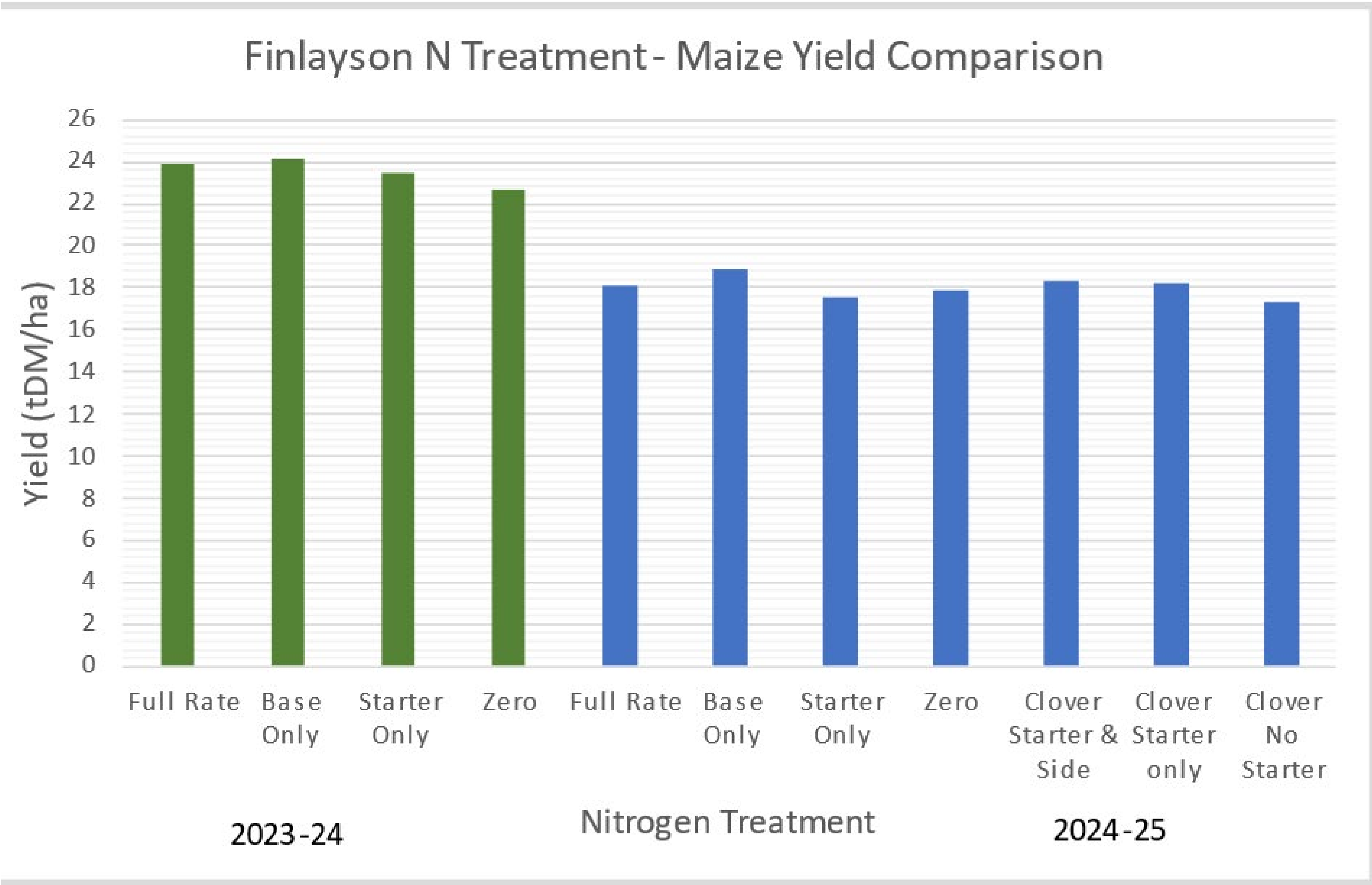

Figure 1. Maize silage yields for each decision in 2023/24 (Green) and 2024/25 (Blue)

Getting started with soil nitrogen

Soil testing allows you to know what you've already got in the ground. It's the best way to match fertiliser inputs to crop demand and to support productivity, profitability, and sustainability. Four years of FAR trial results across crops show $250/ha savings when factoring soil mineral N and potentially mineralisable N in to meet target yields, compared to using no soil N information.

Although there is a lot of nitrogen (N) in the soil, only a fraction is plant-available. Microbes release mineral N (nitrate + ammonium) from soil organic matter, a process called mineralisation. This is a natural process that occurs regardless of fertiliser use or crop demand, as microbes gain energy from carbon while releasing N. Using soil supplied N isn't "mining", but the soil organic matter pool does need replenishing through restorative phases in the rotation (see Good soil is good business).

To watch a video on how to get started with soil sampling this follow this QR code –

Nitrogen (N) is a key macronutrient for maize, so checking out how much you have in the soil is a great idea. It's not simple though as there are four nitrogen tests available through labs and it pays to know which test does what:

Mineral N = a snap shot of plant available nitrogen (ammonium and nitrate). Test close to when you are making a N fertiliser decision, leaving enough time for results to come back.

Potentially Mineralisable Nitrogen = an estimate of what soil nitrogen will become available over the growing season. This starts when the soils warm up in spring.

Anaerobically Mineralizable Nitrogen (AMN) or Plant Available Nitrogen (PAN) = the amount of nitrogen released from the soil when it is flooded (anaerobic = no air) and held at 40 degrees C. The results of this test are not as simple to interpret as those from the PMN test

Total Nitrogen (TN) = the total amount of nitrogen in both plant available and non plant available forms – this number can be large (>10 t/ha) and is not typically used to make fertiliser decisions.

FAR has built a calculator to turn your lab results into something you can make a decision with – follow the QR code to get the calculator and see a video of how to use it.

Table 1 Soil mineral N and potentially mineralisable for Daniel Finlaysons 2023/24 try out block

Month	Initial mineral N (kg N/ha)	Estimated monthly N supply (kg N/ha/month)	Compounding N supply (kg N/ha)
September	21	16	37
October		16	53
November		16	69
December		18	87
January		18	105
February		18	123

Calibrate your approach

First up, consider where you can make changes in your operation. If you are sidedressing, you can use the monthly estimate of mineralisation from a PMN test to adjust your sidedress rate from the time you apply to the point at which the crop stops taking up N (R4).

If all the fertiliser N is going in up front you can use the soil N supply result (mineral N + PMN) to get information on how much you've got and how much you'll get to fine tune the one application you'll give to the crop.

Record, reflect and refine

The aim of being Fert Smart is to get started, record, reflect and refine for next season. Being Fert Smart is also about knowing what stress is nutrient related and what is weather or pest related. Walking your crop after making your decision is fundamental to learning.

After harvest, record what yield you were targeting, how you made your fertiliser decision, how the season went and give your decision a score. Soil sampling after the crop has been harvested gives a great snapshot of what was left behind and where you might have been short or had a surplus.

Where can resources be found?

FAR Focus Issue 14: Nitrogen: the confidence to cut back
FAR Focus Issue 15: Good soil is good business
Digital tools: How to take soil samples, Soil nitrogen supply calculator and How to use the soil nitrogen supply calculator
Sustainable Vegetable Systems calculator: svstool.co.nz

September 2020

Arable Update

Maize: Issue 82

Argentine stem weevil biology and control

Introduction

Argentine stem weevil (ASW) (*Listronotus bonariensis*) was first recognised as a pest in New Zealand in 1933 and is now regarded as one of the country's major insect pests. Both the adult and larval stages feed on a wide range of cereal, grasses and maize. ASW is considered a pest throughout New Zealand.

Lifecycle

ASW complete two generations per year in most parts of New Zealand. The first generation develops during the spring and early summer and the second in late summer and autumn. The weevil over-winters as an adult. Egg laying begins any time from late July to September, depending on climate and first generation larval numbers peak in October to November, coinciding with the main planting period for maize. Larvae pupate in the soil litter and new adults begin emerging and laying eggs from early December onwards. Egg laying ceases in early March when the females enter a winter resting stage. Climatic variations from year to year have little impact on ASW populations.

Larvae are pale yellowish-white legless grubs with light brown head capsules. Fully grown larvae are about 5 - 6 mm long (Figure 1). The larvae are stem borers and are the damaging life stage of the weevil. Each larva inhabits one or two stems during its development and when it is ready to pupate it chews a hole in the plant and falls to the ground.

Figure 1. Argentine stem weevil larva. Photograph by Syngenta.

Figure 2. Argentine stem weevil adult. Photograph by Landcare Research.

Pupae are white with non-functional legs. They are found in the top 10 - 20 cm of the soil surface.

Adult Argentine stem weevils are 3 - 4 mm long, hard bodied and light to dark grey-brown in colour. They have a distinct snout and three whitish stripes on the thorax (Figure 2). Adult weevils are strong fliers with large dispersal flights occurring in mid-summer. Adults overwinter on the crowns of grasses and mate in the early spring. The adults can be a problem in newly sown grass but cause no damage in maize.

Eggs are small, 0.5 - 0.75 mm long, cylindrical, and greenish-black in colour. They are laid in the leaf sheath tissue close to the base of the plant. Eggs hatch approximately two to three weeks after being laid. Eggs are not usually laid in maize itself.

Key points

- Argentine stem weevil (ASW) occurs throughout New Zealand and is a pest of seedling maize.
- Damage is caused by ASW larvae, and peak larval numbers coincide with spring maize planting.
- Maize sown after pasture, annual ryegrass or cereal crops, or into areas with lots of grass weeds, is likely to suffer ASW damage.
- Damage is characterised by the centre leaf of the seedling wilting and turning grey-green in colour.
- Cultural control can be achieved by a six-week physical or chemical fallow period.
- Insecticide seed treatments generally provide good control.

Maize damage

Maize can become infested with ASW larvae if it is planted without a suitable fallow period (about six weeks) after cultivation following pasture, annual ryegrass or cereal crops, or in previously cropped ground where grass weeds, especially *Poa annua*, are present. In these conditions, partly developed larvae transfer from the decaying grass tillers and tunnel into the young maize plants.

ASW can kill maize plants before they emerge, while seedling damage can resemble moisture stress, i.e. the centre leaves wilt and turn a blue-grey colour and can be pulled out of the plant very easily by hand. The growing point is usually eaten, resulting in the collapse and death of the plant at the two- to four-leaf stage. Removal of the plant from the soil will reveal a small round hole (about the size of a pin head) at the base of the plant where the larva has entered or exited the plant. Movement of ASW larvae between maize seedlings is rare and larval development is usually completed in a single seedling. Almost all ASW damage occurs during the first four weeks of plant growth.

Control

The use of Integrated Pest Management (IPM) methods should be considered when trying to reduce the risk of ASW damage. IPM offers an opportunity to move away from a routine broad-spectrum insecticide-based approach to pest management by considering cultural and biological strategies. For full details of IPM methods and considerations refer to the FAR Focus 12, Integrated Pest Management (although it does not refer specifically to Argentine stem weevil).

Cultural control

The best method of controlling ASW larvae is the implementation of a fallow period of six weeks prior to planting. The fallow period starts only when all the grass is completely buried. Cultivate to achieve a fine, even seedbed ensuring that all clods are broken up to hasten vegetation breakdown. During the six-week fallow period, the ASW larvae move to the soil surface where they die from starvation and desiccation. In no-till or strip-till systems, a chemical fallow can be used to terminate the winter crop six weeks before maize sowing.

Chemical control - seed treatment

If crops are planted into areas at risk of ASW damage without a six-week fallow period an insecticide should be used. Treated seed is the best option for ASW control in maize and several are available. Trials undertaken on neonicotinoid products containing clothianidin prior to registration being granted have shown them to be more effective than imidacloprid products, however more recent field trials have found insecticides containing the two active ingredients have similar efficacy.

Concern around off-target impacts of neonicotinoid insecticides (acetamiprid, clothianidin, imidacloprid, thiacloprid, thiamethoxam) has led to public concern about their use in crops and seed treatments. It is important that as an industry, we are able to show that these, and all chemicals, are only ever handled and applied using best practice. Support your industry by adhering to best practice. If you have any concerns or queries about neonicotinoid use on any crop, contact your agrichemical representative or expert. Refer to the FAR publication General Principles for Good Management Practices - Neonicotinoids, for full details.

There is also a granular insecticide available, turbufos (Counter® 20G) which can be placed in the seed slot in a band about 2 - 3 cm above the seed. Extreme care should be taken in handling all these insecticides and the correct safety equipment must be worn. Seed treatments give superior ASW control compared to insecticide granules.

Biological control

A small wasp, *Microctonus hyperodae*, was introduced and released in New Zealand in 1990 as a biological control agent. It established well in most areas and in combination with endophyte infected ryegrasses has reduced the impact this weevil has on New Zealand pastures. This wasp is a parasitoid, and lays its eggs inside adult weevils, sterilising and eventually killing them. Unfortunately, recent studies have shown that the effectiveness of this biological control agent has diminished.

Acknowledgements

This update is a revision of FAR Maize Update 21, published in 2000. Thanks to Paul Addison, Nufarm, for assistance with this Maize Update.

Henderson Site

FAR’s on farm trials

FAR currently has three on farm cover crop and maize establishment systems trials in the Waikato. These trials have been running for 3 – 4.5 years and are investigating the benefits of alternative maize production systems over a five-year period. Trial objectives include collecting information on:

- Cover crop and maize yields, and overall gross margin
- Nitrogen requirements or savings
- Changes in soil quality

Henderson trial

Trial started, October 2022. Treatments include four cover crop treatments (Table 2) x three maize establishment methods (Cultivated, Strip till and No till), each treatment combination is replicated four times.

Winter crop is grazed once in winter, typically mid-July, and then harvested for silage in early October. Maize silage is planted Mid October.

Soil physical properties are very good (bulk density of 0.8-0.9 g /cm3), and soil texture is a silt loam.

Key Learnings from 24/25

1) Adding ryegrass to the Mix winter crop improved regrowth after grazing and provided greater silage cut yields.
2) No till maize silage yielded less than cultivated and strip till

Table 1. Henderson trial cover crop management information, 2023 and 2024

	Cover crop management information for 2024	Cover crop management information for 2025
Drilling	3 April 2024, Great Plains triple disk	21 March 2025, Great Plains triple disk
Slug bait	4 April 2024, 5 kg/ha Axcela®	24 March 2025, 5 kg/ha Axcela®
Fertiliser	13 August 2024; SustaiN® applied to Annual ryegrass, Mixed species and Alternating mixed species (triticale) at 100 kg/ha	13 August 2025; SustaiN® applied to Annual ryegrass and Mixed species at 100 kg/ha
First cover crop sampling	5 and 6 July 2024	2 July 2025
Grazing	11 and 12 July 2024	6 July 2025
Herbicide	6 May 2024, Strip plant and Annual ryegrass received 3 l/ha Thistrol® Plus (375 g/l MCPA and 25 g/l MCPB) and 50 g/ha Valdo® 800WG (800 g/kg flumetsulam). 2 September 2024, Strip-till and No-till Annual ryegrass treatments strip sprayed with 2.4l/ha Crucial™ and 100ml/100 l water Pulse®.	14 May 2025, Annual ryegrass, Strip plant and Alternating mix received 1.5 l/ha Bentazone and 0.5 l/100 l water; Alternating mix also received 0.5 l/ha Sequence
Second cover crop sampling	25 and 26 September 2024	25 September 2025

Table 2. Henderson trial cover crop treatment information 2024 and 2025

Cover crop treatment and species	Cultivar	2024 Seeding rate (kg/ha)	2025 Seeding rate (kg/ha)	Treatment description
<u>Annual ryegrass</u>	Jivet	25	25	Grower standard
<u>Strip plant</u>				Annual ryegrass and annual clovers drilled in strips. Maize planted on clover strips.
Annual ryegrass	Jivet	25 (in respective row)	25 (in respective row)	
Berseem clover	Alex	5 (in respective row)	5 (in respective row)	
Crimson clover	W3129	5 (in respective row)	5 (in respective row)	
<u>Mix</u>				High biomass species from varied plant groups (legume, brassica and grass) grazed out and succeeded by species with a longer vegetative phase
Tick bean	unknown	28	11	
Rape	Titan	1.3	0.6	
Triticale	Kudos	42	22.5	
Annual ryegrass	Jivet		7.5	
Berseem clover	Alex		3	
Crimson clover	Unknown		3	
<u>Alternating Mix species</u>				Each year a different species from Mix treatment
2024 Triticale	Kudos	150		
Tick bean	unknown		32	
Berseem clover	Alex		4	
Crimson clover	unknown		4	


Mix treatment, image taken 2/7/2025


Strip plant treatment, image taken 25/9/2025

Table 3. Maize management information, Henderson trial, 2024/25.

	Maize management information for 2024/25
Planting	22 October 2024, John Deere 4 row planter with a range of modifications for reduced tillage (hydraulic down force, Furrow force closing system)
Hybrid	P0937 with L400+ seed treatment at 100 k seeds/ha
Fertiliser	9 October 2024, 250 kg/ha Muriate of potash. 15 October 2024, 400 kg/ha YaraMila complex, Strip till worked into strip, Cultivated and No till banded on soil along row. 22 October 2024, 200 kg/ha Yaramila Complex starter fertiliser, 25 l/ha ammonium polyphosphate and 10 l/ha Biotek applied at 55 l/ha water rate in wings of Furrow jet system. Various side dress N rates depending on V3 deep N soil test results (Appendix, Table 4)
Herbicide	23/10/2024, 3 l/ha Roustabout, 150g/ha Sharpen, 2.4 l/ha Crucial™ and 100ml/100 l water Pulse®. 26/11/2024, 200ml/ha Arietta, 1 l/ha Atrazine and 1 l/ha bonza
Slugbait	22 October 2024, 7 kg/ha Axcela; 7 November 2024, 5 kg/ha Axcela
Harvest	6 and 7 March 2025

Winter crop details and dry matter yield

Following maize silage harvest soil mineral N testing was undertaken in autumn 2025. In the annual ryegrass treatments (Cultivation, Strip till and No till) mineral N levels of 25-36 kg N/ha were measured on 14/5/2025, the decision was made to not apply autumn N. On 13/8/2025, 100 kg/ha of SustaiN (46% N) was applied to Annual ryegrass and Mix treatments.

Two cover crop dry matter cuts were made, the first on 2/7/2025 and the second on 25/9/2025. The trial was grazed heavily on 6/7/2025 by a milking herd.

Following grazing, annual ryegrass regrew well, in contrast triticale, rape and tic bean largely did not regrow, the annual clovers had moderate regrowth (Figure 1). No statistics available yet.

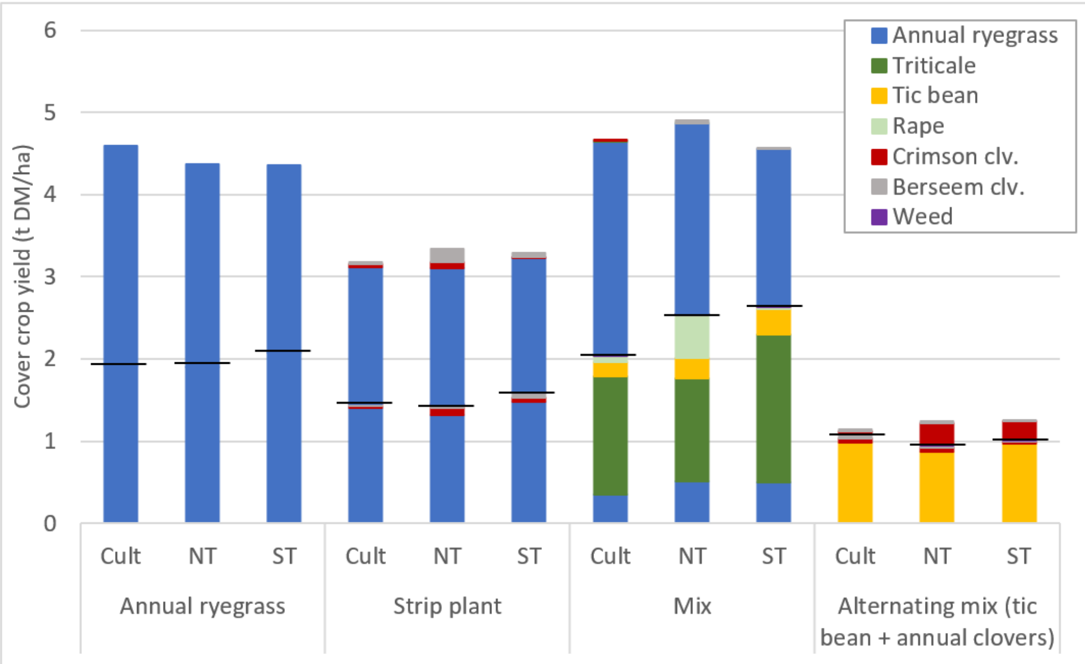

Figure 1. Henderson trial, 2025 winter crop DM yield results. Area below black horizonal line is from the first sampling (2/7/2025) just before grazing, area above line is from the second sampling (25/9/2025) just before mowing for silage. Cultivation (Cult), No till (NT) and Strip till (ST). Statistical analysis not yet available.

Maize silage 2024/2025 season and results

Insect pressure, 2024/25 was a challenging year for cut worm pressure across a range of crops and this was observed at this research trial. Rene van Tilburg will provide an update on cutworm pressure, what to scout for and control options this season…

Left: Insect killed seedling, image taken 28/11/2024 **Right:** Insect damaged seedlings, image taken 28/11/2024

Maize silage yield

In 2024/2025 Cultivated (25.9 t DM/ha) and Strip till (26.1 t DM/ha) produced greater (P=0.033) maize silage yields than No till (23.5 t DM/ha), LSD=1.61 (Figure 2). No differences were caused by cover crop (P=0.229) or maize establishment by cover crop (P=0.615)

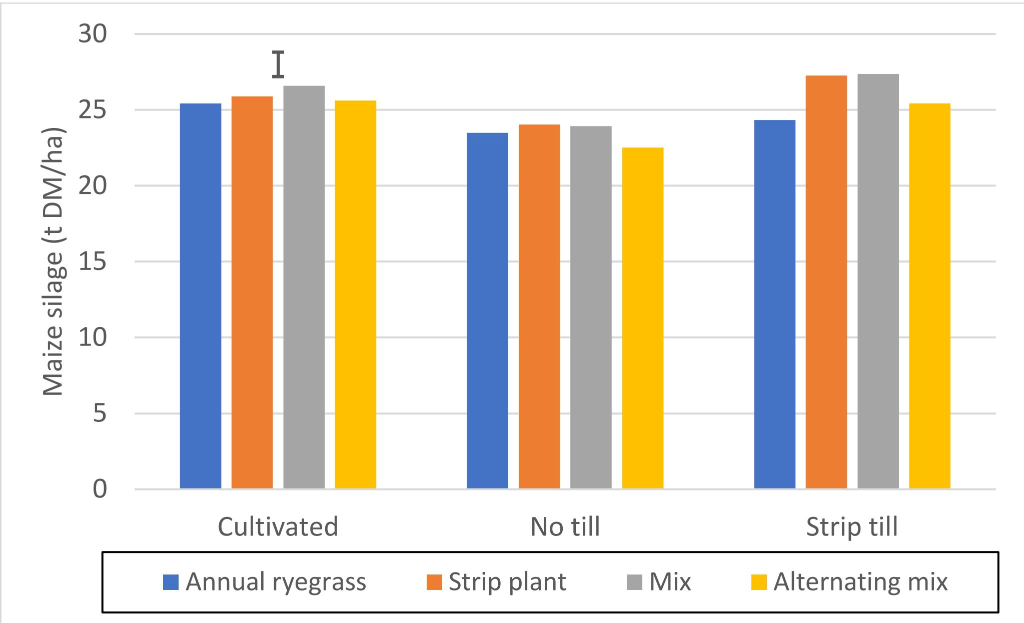

Figure 2. Henderson trial maize silage 2024/25 yield. Silage harvested from within a 2 row x 2.5 m area on 6 and 7 March 2025. Error bar represents maize establishment method LSD (0.05).

Maize silage population

Differences (P=0.027) in harvest maize population were found in maize establishment method by cover crop treatments. Maize populations in No till Mix, No till Alternating mix, and Strip till Mix were lower than at least some treatments (LSD=11,043) (Figure 3).

Greasy cutworm was thought to be the main cause of lost population this year.

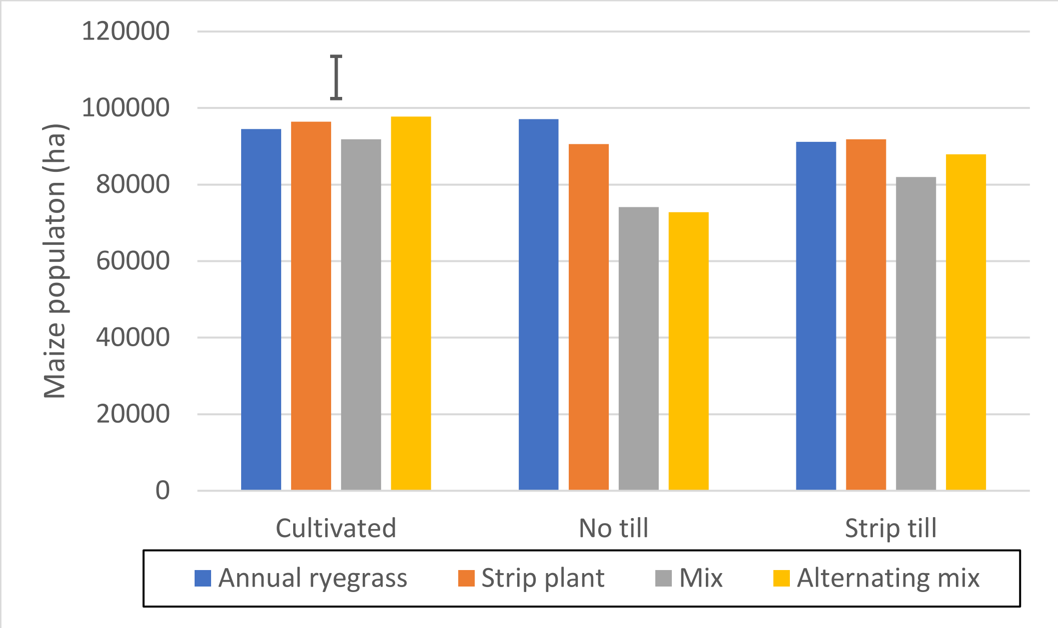

Figure 3. Henderson trial maize population 2024/25. Plants counted within 2 row x 2.5 area at harvest. Error bar represents interaction of maize establishment method by cover crop treatment LSD (0.05)

Maize silage gross margin

Gross margin was calculated on maize silage with the key differences in cost being soil preparation, side-dress N rates (Figure 4). Maize silage income calculated at 27c/kgDM.

Gross margin soil preparation costs:

Cultivation	$278.5 $/ha
Strip till	$214.2 $/ha
No till	$0

Side-dress applied as SustaiN ($1,038/t) application rates varied for each treatment depending on deep N soil testing (application rates in Figure 5).

No differences were found in maize silage gross margins by maize establishment treatment (P=0.105), cover crop treatment (P=0.16) or maize establishment by cover crop treatment (P=0.627).

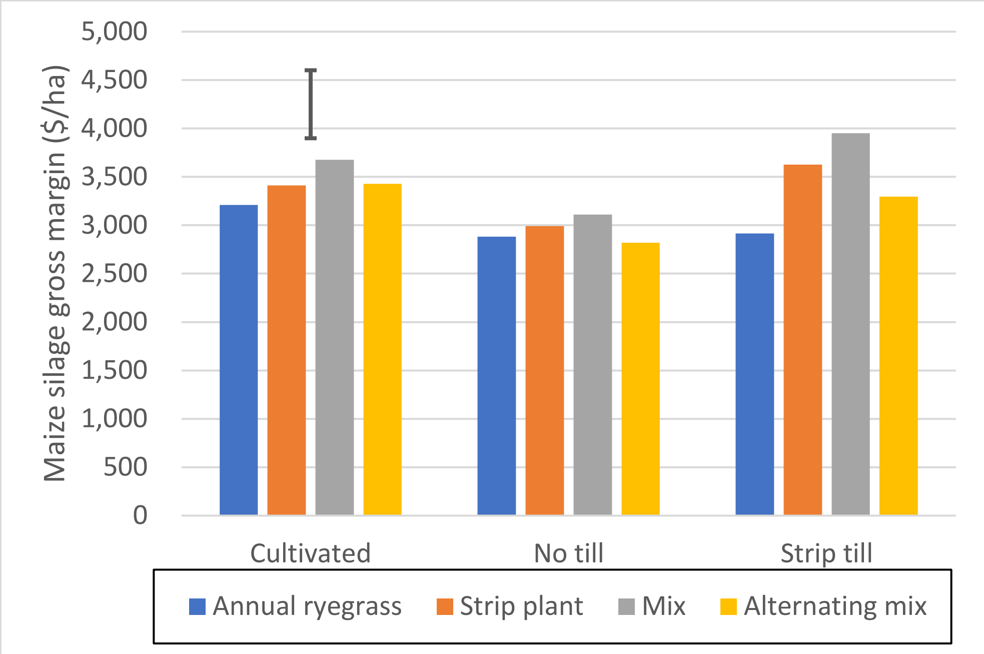

Figure 4. Henderson trial maize silage 2024/2025 gross margin. Calculations based on 2004/2025 season contractor rates. Input differences outlined below. Error bar represents interaction of maize establishment method by cover crop treatment LSD (0.05), 702.5.

Appendix

Table 4. Soil mineral N testing results, Henderson trial 2024/25. Sampled 0-60 cm, 27 and 28/11/2024.

Treatment	Soil mineral N result, 0-60 cm (mg/kg)	Soil mineral N result, 0-60 cm (kg N/ha)	Side dress applied N (kg N/ha)
Annual rye, Cult	25	99	101
Annual rye ST	17	67	129
Annual rye NT	15	59	138
Strip plant Cult	32	127	69
Strip plant ST	8	32	165
Strip plant NT	10	40	156
Mix Cult	41	162	34
Mix ST	41	162	34
Mix NT	28	111	92
Alternating mix Cult	44	174	23
Alternating mix ST	28	111	92
Alternating mix NT	31	123	73

Maize side dress N rates were calculated and applied for each of the 12 treatments. Side dress N rates varied substantially (Table 4 and Figure 5). These results suggest the various side dress rates did not clearly affect yield (statistical analysis not possible).

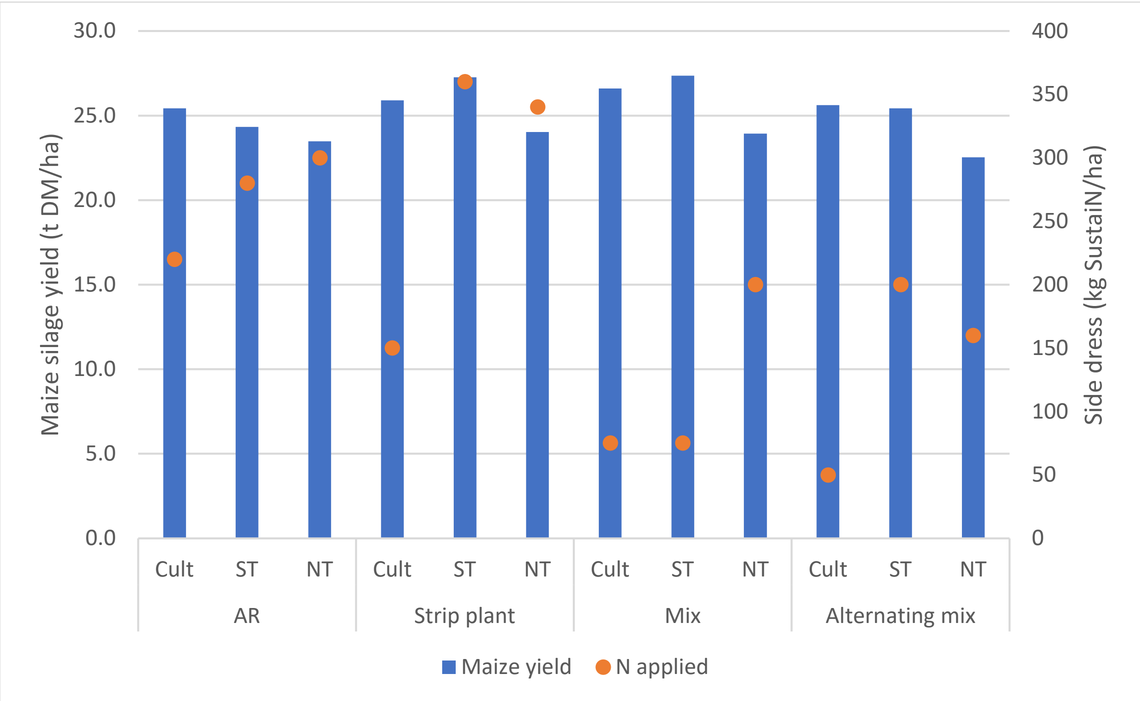

Figure 5. Henderson trial maize silage yield and side dress N rates. One combined soil sample (0-60 cm) submitted from each treatment (Table 4). Statistical analysis not possible.

At maize silage harvest visual observations were made of maize N deficiency, no differences were found by maize establishment method, cover crop or maize establishment method x cover crop (P=0.316, P=0.343 and P=0.754 respectively). This measurement showed the various N rates applied did not affect maize N deficiency symptoms.

September 2020

Arable Update

Maize: Issue 83

Greasy cutworm control in maize

Introduction

Greasy cutworm (*Agrotis ipsilon*) has a very wide host range including many vegetables, maize, sweetcorn and other cereals, grasses, lucerne, white clover, and weeds such as docks and plantains. Cutworm occurs in all maize growing regions in New Zealand.

Lifecycle

Greasy cutworm produce two or three generations each year in New Zealand. The breeding season starts in spring when adult females deposit around 600 - 800 eggs on vegetation, plant debris or into cracks in the ground. Newly laid eggs are whitish-yellow but turn brown and become darker as hatching approaches. During windy periods eggs are usually laid on the leeward side of shelter (trees, hedges etc.) meaning subsequent crop damage is often worst in these areas.

Greasy cutworm generally spend four to six weeks as larvae and another two to three weeks as pupae. The normal summer life cycle takes from 7 - 12 weeks depending on location and climate. Both larvae and pupae over-winter and may take up to six months to complete development.

Larvae are brownish-black to greyish-green in colour. Larger larvae are typically greyish-green with two yellowish longitudinal stripes down the body (Figure 1). Their skin has a shiny, greasy appearance, hence their name.

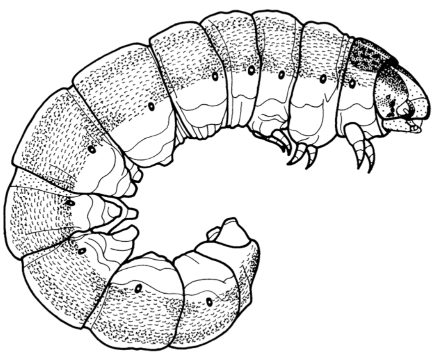

Figure 1. Greasy cutworm larvae.
Images by: Left, Des Helmore, Manaaki Whenua – Landcare Research; Right, Rasbak.

Larvae/caterpillars forage on leaves until they are about one third grown then move to the ground where they lie curled up, 25 - 50 mm below the soil surface, during the day and emerge at night to feed. They go through five to seven instars (moult stages), with the final instar larvae being up to 50 mm long. When fully grown, the larva starts the pre-pupal stage by ceasing to feed and making an earthen cell in the top 50 mm soil.

Key points

- Cutworm attack maize, sweetcorn, cereals, grasses, many vegetables, lucerne, white clover, and weeds such as docks and plantains.
- Greasy cutworm damage can begin before maize emerges but most occurs after emergence.
- Maize seedlings are typically cut at ground level and felled.
- Each cutworm can destroy 2 - 5 plants, and adult female moths lay 600 - 800 eggs each.
- Damage is worst after a short fallow period and in weedy fields, therefore use a six-week fallow period before planting maize.
- Neonicotinoid seed treatments can provide short term (several weeks) control.
- Scout crops regularly from emergence for damage and apply insecticide to the seedlings and soil if required.
- Synthetic pyrethroids are the most cost-effective insecticides for cutworm control.

Figure 2. Greasy cutworm pupae.
Photo by Merle Shepard, Bugwood.org

Figure 3. Greasy cutworm moth.
Photograph by Jerzy Strzelecki.

Pupae are 17 - 25 mm long and reddish-brown in colour (Figure 2), until just before the moth emerges, when they change to almost black. Adults moths are brown to greyish-brown with wingspans of 35 - 50 mm. The forewings are long and narrow with black dashes and are darker than the hindwings (Figure 3).

The moths are nocturnal, can fly strongly and are attracted to lights. During the day they hide amongst vegetation, but will fly if disturbed. Moths can be seen all year around, but numbers are highest from October to April.

Maize damage

Young larvae are foliar feeders while older larvae (from about the third instar stage onwards) feed on seedlings at, or below, ground level. Damage can start before maize emergence, but typically plants are cut and felled at ground level after emergence. Often the severed seedling is dragged into the cutworm's 'burrow'.

In larger maize plants cutworm can be found tunnelling inside the stem. Larval feeding often destroys the growing point, at the base of the plant, killing the seedling (Figure 4). Plants cut above the growing point usually survive but have greatly reduced yields. Cutworm infestations of 3% of plants before the two-leaf stage, or 6% at the two to four leaf stage can equate to losses of over 10,000 plants/ha.

Figure 4. Greasy cutworm larvae and damage to maize seedling. Photo by Frank Peairs, Colorado State University, United States.

Control

The use of Integrated Pest Management (IPM) methods should be considered when trying to reduce the risk of greasy cutworm damage. IPM offers an opportunity to move away from a routine broad-spectrum insecticide-based approach to pest management by considering cultural and biological strategies. For full details of IPM methods and considerations refer to the FAR Focus 12, Integrated Pest Management (although it does not refer specifically to greasy cut worm).

The success of any greasy cutworm control programme depends upon recognising field conditions that favour their development and undertaking frequent scouting, from seedling emergence, to enable early detection. If required, a properly timed application of an appropriate insecticide will achieve good control.

Cultural control

Destroying alternative hosts such as docks, or cultivating before planting will reduce cutworm numbers. A six-week fallow period before planting can also be beneficial.

Chemical control - seed treatment

Treating seed with the neonicotinoids gives short-term control, particularly where cutworm numbers are not high, and also has the added benefit of helping to control black beetle and Argentine stem weevil.

Concern around off-target impacts of neonicotinoid insecticides (acetamiprid, clothianidin, imidacloprid, thiacloprid, thiamethoxam) has led to public concern about their use in crops and seed treatments. It is important that as an industry, we are able to show that these, and all chemicals, are only ever handled and applied using best practice.

Support your industry by adhering to best practice. If you have any concerns or queries about neonicotinoid use on any crop, contact your agrichemical representative or expert. Refer to the FAR publication General Principles for Good Management Practices - Neonicotinoids for full details.

Scouting

It is important to scout paddocks on a regular basis for several weeks after maize emergence. Moths tend to congregate and lay eggs on the leeward side of shelter, so scouting these areas for seedling damage is important. Where seedlings have been felled recently, scratching carefully in the soil around the plant base will usually reveal the curled-up larva. Larvae size will give an indication of future crop damage. Very large larvae close to 50 mm long will soon pupate while smaller larvae will continue to feed and cause plant damage for longer.

Chemical control - after crop emergence

A range of insecticides have registration for cutworm control in maize and sweetcorn. The synthetic pyrethroids are the most effective because of their outstanding soil activity. A synthetic pyrethroid insecticide can be used in combination with pre-emergence herbicides in fields where cutworm is a perennial problem. It is important to note that the overuse of broad-spectrum insecticides can result in encourage the development of insecticide resistance and the loss of beneficial insects.

Acknowledgements

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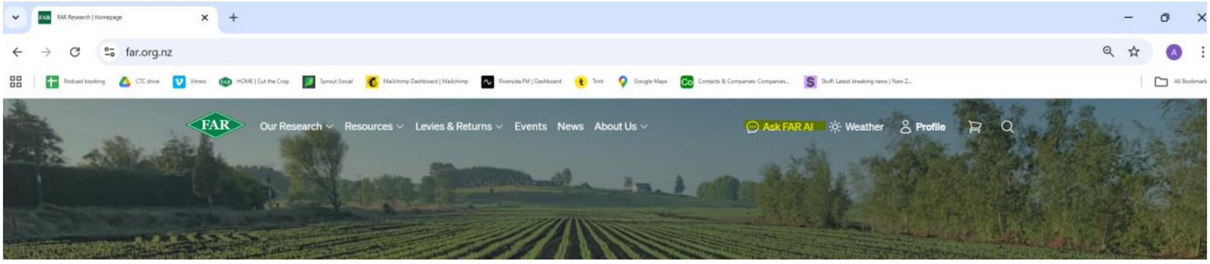

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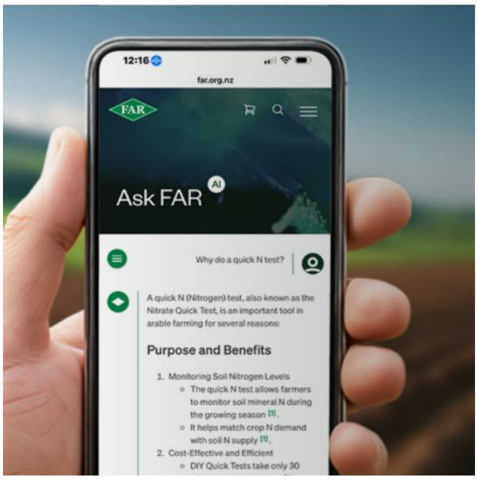

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Here's what the answers look like...

How do I know how much N a malting barley crop should use?

Determining Nitrogen Requirements for Malting Barley

Determining the appropriate nitrogen rate for malting barley requires careful consideration of several factors, as research results show that excessive nitrogen can compromise malting quality.

Key Quality Considerations

Critical threshold: Research results indicate that grain nitrogen concentrations ≥2% exceed the quality threshold required for malting barley [1]. This means you must balance yield potential with maintaining grain protein below this critical level for malting acceptance.

Nitrogen Rate Guidelines

Research trials have demonstrated varying nitrogen requirements:

- **Low nitrogen treatment:** 104 kg N/ha increased grain yield from 6.45 t/ha (control) to 9.40 t/ha [2]
- **Higher rates:** Applications up to 311 kg N/ha achieved 10.5 t/ha yield but resulted in grain nitrogen concentrations of 2.14%, which exceeds malting quality thresholds [1]

Notes:

Notes:

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