MAIZE SILAGE RESEARCH 2025

PIONEER®
BRAND · PRODUCTS

CONTENTS

Welcome to the Pioneer Maize Silage Research update for 2025.

Inside, you will find comprehensive hybrid yield data to help growers make informed decisions on which hybrid to plant. Our research programme covers more than just hybrid evaluation. Each year we conduct a range of agronomic, farm system and environmental research projects. In this publication, we've summarised a recently published paper evaluating summer pasture and chicory yields in the Waikato, and a summary on optimising nitrogen application for maize silage production.

Long-term breeding delivers higher yields

The annual rate of maize silage yield gain in New Zealand is estimated to have been over 300 kgDM/ha/year over almost 60 years (Figure 1). Crop management and genetic improvement have both made significant contributions to yield increases.

To maximise returns, silage growers should look to introduce suitable new hybrids regularly. Desired harvest timing, soil type, cultivation methods and agronomic traits such as early growth, drought tolerance, stalk and root strength, disease resistances and silage quality are all important considerations to include in the hybrid selection process.

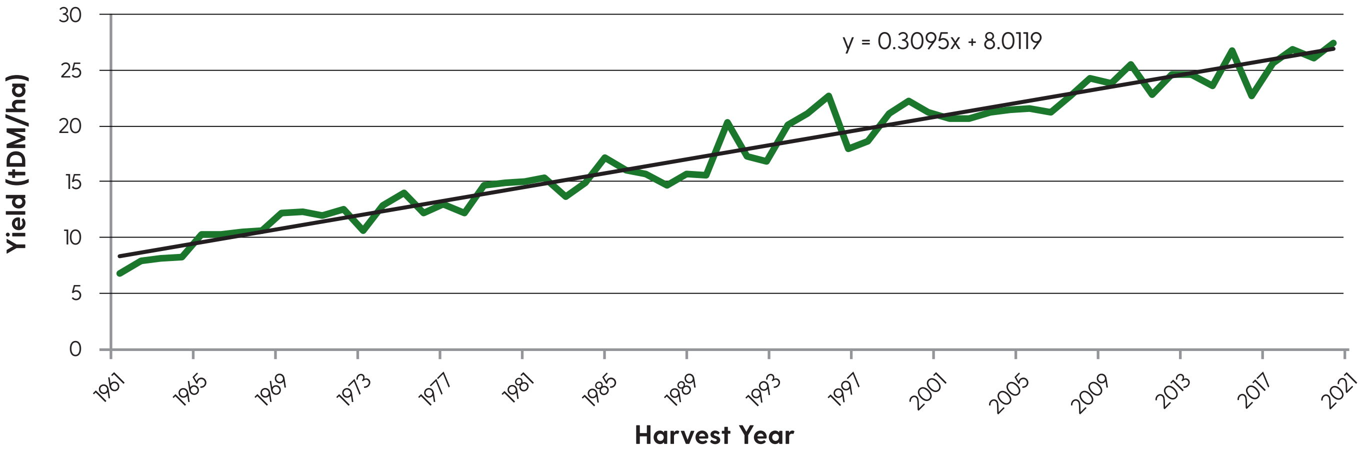
The most reliable way to select superior hybrids is to consider trial yield data gathered over several seasons from a wide range of locations within a growing region. An individual on-farm trial result should not be used to select a hybrid because in isolation, it is not a reliable predictor of future hybrid performance. Hybrids should be planted and harvested at the same time. Trial data should be statistically analysed to determine if there is a real yield difference between the hybrids.

This publication provides a summary of the investment made to evaluate the silage yield performance of Pioneer® brand maize silage hybrids in five defined growing regions;

1) Northland and north Auckland **2)** Waikato **3)** Bay of Plenty, Gisborne and northern Hawke's Bay **4)** Lower North Island and Taranaki **5)** South Island.

Summarised hybrid comparison data published in this book has been collected from field trials conducted over one or more growing seasons up to and including the 2024 harvest. The most recent regional Hybrid Performance Information (HPI) can be found at pioneer.nz.

Figure 1: New Zealand maize silage yield trend



Source: New Zealand Year Book (1961 to 1996) and Pioneer® brand products New Zealand Research Programme (1997 to 2021).

Interpreting the hybrid comparison t-test

The table below presents a summary of the possible t-test outcomes.

P value	Confidence level	Scientific designation	Level of significance	Yield advantage	Interpretation
<0.001	>99.9%	★★★	Very highly significant	YES	**Hybrid superiority for yield <u>can be claimed</u>.** Can confidently plant the winning hybrid providing no key agronomic traits are limiting. Check the trait ratings for any considerations.
<0.01	>99.0%	★★	Highly significant	YES	
<0.05	>95.0%	★	Significant	YES	
<0.10	>90.0%	CA	Commercially acceptable	YES	May be regarded as a commercially acceptable basis for a decision.
>0.10	<90.0%	NS	Not significant	NO	**Hybrid superiority for yield <u>cannot be claimed</u>.** Ignore the yield comparison and refer primarily to important trait ratings to select between the hybrids.

The more stars (★) present for the comparison, the more confident we can be that the measured average yield difference is due to an actual genetic yield difference between the two hybrids rather than just chance.

Where a result is commercially acceptable **(CA)**, the P value is <0.10 indicating the result is suitable for making a hybrid decision based on yield. Key agronomic traits must always be considered.

Where a result is not significant **(NS)**, we cannot conclude there is a yield difference between the hybrids. There are two principle explanations;

1. Where the yields are very similar and the comparison has been made over a large number of locations, no significance may indicate there is little measurable difference between the two hybrids or;
2. Where there appears to be a large yield difference, no significance likely indicates there are too few trial locations, or there have been inconsistent or fluctuating results. It is therefore not possible to indicate that the difference is real.

In both instances above, growers should use regionally important hybrid trait ratings to select which hybrid to plant.

In other comparisons, yield differences may appear to be relatively small but still achieve significance – this happens in cases where yield data quality is high, and the number of trial locations is large.

An analysis of statistical significance is carried out on all Pioneer hybrid comparisons, and we take great care to base our product yield statements and recommendations on the outcome.

NEW

PIONEER® BRAND

P7179

CRM 71

Quickest option for the coolest growing regions.

Feature hybrid	Comparison hybrid	Number of trials	Drymatter difference (%)[1]	Yield advantage to P7179 (kgDM/ha)[2]	Statistical significance[3]
			NATIONAL		
P7179	P7124	26	5.75	-1,659	★★
P7179	P7364	42	3.29	-2,344	★★★
P7179	P7524	37	6.58	-1,419	★★
			SOUTH ISLAND		
P7179	P7124	12	4.16	-1,608	CA
P7179	P7364	19	3.15	-2,510	★★★
P7179	P7524	16	4.68	-1,694	★
			LOWER NORTH ISLAND		
P7179	P7124	14	7.12	-1,703	★
P7179	P7364	23	3.41	-2,206	★★★
P7179	P7524	21	8.03	-1,209	★

Recommended growing regions

Recommended established plant populations (000's/ha)

Challenging yield environments	110
Medium yield environments	120
High yield environments	130

[1]Positive DM differences means the bolded hybrid was drier at harvest, negative DM differences mean it was wetter. [2]A positive yield advantage means the bolded hybrid produced more yield, a negative yield advantage means it produced less. [3]For information on interpreting hybrid comparison data and statistical significance see page 3.

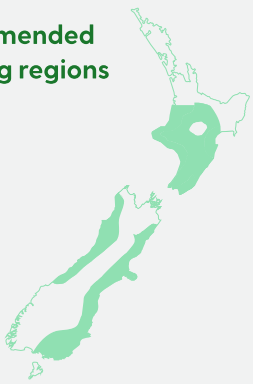
CRM 73

NEW

The new standard for yield & earliness.

Feature hybrid	Comparison hybrid	Number of trials	Drymatter difference (%)[1]	Yield advantage to P7364 (kgDM/ha)[2]	Statistical significance[3]
NATIONAL					
P7364	P7179	42	-3.29	2,344	★★★
P7364	P7524	55	3.58	708	★
P7364	P7647	42	0.61	-661	★
SOUTH ISLAND					
P7364	P7179	19	-3.15	2,510	★★★
P7364	P7524	24	1.02	904	NS
P7364	P7647	19	0.13	-875	NS
LOWER NORTH ISLAND & TARANAKI					
P7364	P7179	23	-3.41	2,206	★★★
P7364	P7524	31	5.56	556	NS
P7364	P7647	23	1.01	-484	NS

Recommended growing regions



Recommended established plant populations (000's/ha)

Challenging yield environments	110
Medium yield environments	120
High yield environments	130

[1]Positive DM differences means the bolded hybrid was drier at harvest, negative DM differences mean it was wetter. [2]A positive yield advantage means the bolded hybrid produced more yield, a negative yield advantage means it produced less. [3]For information on interpreting hybrid comparison data and statistical significance see page 3.

NEW

PIONEER
BRAND
P7647

CRM 76

Delivers superior yields of top-quality silage.

Feature hybrid	Comparison hybrid	Number of trials	Drymatter difference (%)[1]	Yield advantage to P7647 (kgDM/ha)[2]	Statistical significance[3]
NATIONAL					
P7647	P7364	42	-0.61	661	★
P7647	P7524	37	2.57	1,640	★★★
P7647	P8000	32	3.82	378	NS
P7647	P8086	31	3.56	-1,656	★★★
SOUTH ISLAND					
P7647	P7364	19	-0.13	875	NS
P7647	P7524	16	1.17	1,961	★
P7647	P8000	15	3.52	316	NS
P7647	P8086	13	2.91	-1,081	CA
LOWER NORTH ISLAND & TARANAKI					
P7647	P7364	23	-1.01	484	NS
P7647	P7524	21	3.64	1,395	★★
P7647	P8000	17	4.09	433	NS
P7647	P8086	18	4.03	-2,070	★★★

Recommended growing regions

Recommended established plant populations (000's/ha)

Challenging yield environments	105
Medium yield environments	110
High yield environments	115

[1]Positive DM differences means the bolded hybrid was drier at harvest, negative DM differences mean it was wetter. [2]A positive yield advantage means the bolded hybrid produced more yield, a negative yield advantage means it produced less. [3]For information on interpreting hybrid comparison data and statistical significance see page 3.

CRM 80

PIONEER BRAND

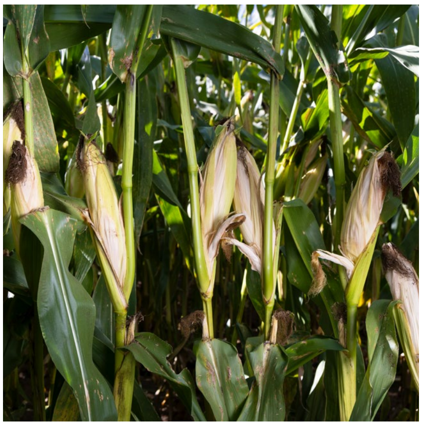
P8086

NEW

Reliable early hybrid with excellent feed value.

Feature hybrid	Comparison hybrid	Number of trials	Drymatter difference (%)[1]	Yield advantage to P8086 (kgDM/ha)[2]	Statistical significance[3]
			SOUTH ISLAND		
P8086	P7647	13	-2.91	1,081	CA
P8086	P8000	18	0.43	1,106	★
P8086	P8240	18	3.21	-270	NS
P8086	P8333	18	1.09	-1,370	★★
			LOWER NORTH ISLAND & TARANAKI		
P8086	P7647	18	-4.02	2,070	★★★
P8086	P8000	20	-1.17	2,266	★★★
P8086	P8240	22	1.22	-1,041	CA
P8086	P8333	21	-0.46	-436	NS
			NATIONAL		
P8086	P7647	31	-3.56	1,656	★★★
P8086	P8000	38	-0.41	1,717	★★★
P8086	P8240	52	2.04	-669	CA
P8086	P8333	42	0.44	-845	★★

Recommended growing regions



Recommended established plant populations (000's/ha)

Challenging yield environments	105
Medium yield environments	115
High yield environments	125

[1]Positive DM differences means the bolded hybrid was drier at harvest, negative DM differences mean it was wetter. [2]A positive yield advantage means the bolded hybrid produced more yield, a negative yield advantage means it produced less. [3]For information on interpreting hybrid comparison data and statistical significance see page 3.

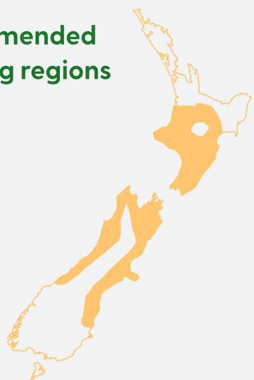
PIONEER BRAND P8240

CRM 82

Bulk and energy to fill the vat.

Feature hybrid	Comparison hybrid	Number of trials	Drymatter difference (%)[1]	Yield advantage to P8240 (kgDM/ha)[2]	Statistical significance[3]
NATIONAL					
P8240	P8086	52	-2.04	653	CA
P8240	P8333	94	-1.41	213	NS
P8240	P8666	115	0.26	104	NS
SOUTH ISLAND					
P8240	P8086	18	-3.21	270	NS
P8240	P8333	39	-1.24	-639	CA
P8240	P8666	40	0.27	-725	★
LOWER NORTH ISLAND & TARANAKI					
P8240	P8086	22	-0.45	1,041	CA
P8240	P8333	37	-1.84	1,099	★★
P8240	P8666	43	-0.16	358	NS
WAIKATO					
P8240	P8086	12	-0.97	517	NS

Recommended growing regions



Recommended established plant populations (000's/ha)

Challenging yield environments	100
Medium yield environments	110
High yield environments	120

[1]Positive DM differences means the bolded hybrid was drier at harvest, negative DM differences mean it was wetter. [2]A positive yield advantage means the bolded hybrid produced more yield, a negative yield advantage means it produced less. [3]For information on interpreting hybrid comparison data and statistical significance see page 3.

CRM 83

PIONEER P8333

Highly productive mid-maturity option.

Feature hybrid	Comparison hybrid	Number of trials	Drymatter difference (%)[1]	Yield advantage to P8333(kgDM/ha)[2]	Statistical significance[3]
			NATIONAL		
P8333	P8086	42	-0.44	845	★★
P8333	P8240	94	1.41	-213	NS
P8333	P8666	135	1.38	-700	★★★
P8333	P8711	58	4.33	-873	★★★
			SOUTH ISLAND		
P8333	P8086	18	-1.09	1,370	★★
P8333	P8240	39	1.24	639	CA
P8333	P8666	48	1.04	-413	NS
P8333	P8711	20	3.98	203	NS
			LOWER NORTH ISLAND & TARANAKI		
P8333	P8086	21	0.26	436	NS
P8333	P8240	37	1.58	-1,099	★★
P8333	P8666	60	1.44	-714	★
P8333	P8711	21	3.71	-713	CA

Recommended growing regions

Recommended established plant populations (000's/ha)

Challenging yield environments	100
Medium yield environments	110
High yield environments	115

[1]Positive DM differences means the bolded hybrid was drier at harvest, negative DM differences mean it was wetter. [2]A positive yield advantage means the bolded hybrid produced more yield, a negative yield advantage means it produced less. [3]For information on interpreting hybrid comparison data and statistical significance see page 3.

Grows well, yields very well and feeds even better.

Feature hybrid	Comparison hybrid	Number of trials	Drymatter difference (%)[1]	Yield advantage to P8666 (kgDM/ha)[2]	Statistical significance[3]
			NATIONAL		
P8666	P8240	115	-0.26	-104	NS
P8666	P8333	135	-1.38	700	★★★
P8666	P8711	125	2.47	-87	NS
			WAIKATO		
P8666	P8240	28	-0.72	-879	NS
P8666	P8333	25	-2.03	1,200	★★
P8666	P8711	36	2.80	-1,347	★★★
			LOWER NORTH ISLAND & TARANAKI		
P8666	P8240	43	0.00	-358	NS
P8666	P8333	60	-1.44	714	★
P8666	P8711	55	2.24	319	NS
			SOUTH ISLAND		
P8666	P8240	40	-0.27	725	★
P8666	P8333	48	-1.04	413	NS
P8666	P8711	28	1.44	911	NS

Recommended growing regions

Recommended established plant populations (000's/ha)

Challenging yield environments	100
Medium yield environments	110
High yield environments	115

[1]Positive DM differences means the bolded hybrid was drier at harvest, negative DM differences mean it was wetter. [2]A positive yield advantage means the bolded hybrid produced more yield, a negative yield advantage means it produced less. [3]For information on interpreting hybrid comparison data and statistical significance see page 3.

CRM 87

PIONEER
P8711

Yield with superb quality for Northern Regions.

Feature hybrid	Comparison hybrid	Number of trials	Drymatter difference (%)[1]	Yield advantage to P8711 (kgDM/ha)[2]	Statistical significance[3]
NATIONAL					
P8711	P8333	58	-4.33	873	★★
P8711	P8666	125	-2.47	87	NS
WAIKATO					
P8711	P8666	36	-2.80	1,347	★★★
LOWER NORTH ISLAND & TARANAKI					
P8711	P8333	21	-3.71	713	CA
P8711	P8666	55	-2.24	-319	NS
SOUTH ISLAND					
P8711	P8333	20	-3.98	-203	NS
P8711	P8666	28	-1.44	-911	NS

Recommended growing regions

Recommended established plant populations (000's/ha)

Challenging yield environments	100
Medium yield environments	110
High yield environments	115

[1]Positive DM differences means the bolded hybrid was drier at harvest, negative DM differences mean it was wetter. [2]A positive yield advantage means the bolded hybrid produced more yield, a negative yield advantage means it produced less. [3]For information on interpreting hybrid comparison data and statistical significance see page 3.

NEW

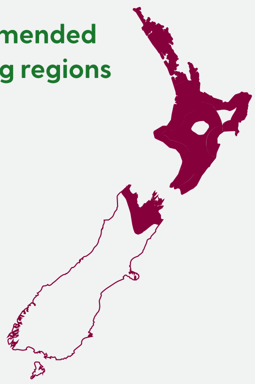
PIONEER® BRAND P92575

CRM 92

Solid, balanced hybrid, with top-of-the-line foliar health.

Feature hybrid	Comparison hybrid	Number of trials	Drymatter difference (%)[1]	Yield advantage to P92575 (kgDM/ha)[2]	Statistical significance[3]
			NATIONAL		
P92575	P9127	52	-2.75	154	NS
P92575	P9400	93	-1.47	664	★★★
P92575	P9650	62	-0.75	235	NS
			WAIKATO		
P92575	P9127	25	-3.53	787	NS
P92575	P9400	50	-1.90	985	★★★
P92575	P9650	33	-0.66	318	NS
			LOWER NORTH ISLAND & TARANAKI		
P92575	P9127	24	-2.05	-394	NS
P92575	P9400	35	-0.91	329	NS
P92575	P9650	22	-0.62	583	CA

Recommended growing regions



Recommended established plant populations (000's/ha)

Challenging yield environments	95
Medium yield environments	110
High yield environments	120

[1]Positive DM differences means the bolded hybrid was drier at harvest, negative DM differences mean it was wetter. [2]A positive yield advantage means the bolded hybrid produced more yield, a negative yield advantage means it produced less. [3]For information on interpreting hybrid comparison data and statistical significance see page 3.

PIONEER P9400

Stands tall – delivers big time.

Feature hybrid	Comparison hybrid	Number of trials	Drymatter difference (%)[1]	Yield advantage to P9400 (kgDM/ha)[2]	Statistical significance[3]
			NATIONAL		
P9400	P92575	93	-0.03	-664	★★★
P9400	P9650	59	1.74	-522	CA
P9400	P9721	246	0.81	-50	NS
			WAIKATO		
P9400	P92575	50	1.90	-985	★★★
P9400	P9650	31	0.98	-806	★
P9400	P9721	109	2.41	1	NS
			LOWER NORTH ISLAND & TARANAKI		
P9400	P92575	35	0.91	-329	NS
P9400	P9650	24	0.44	-347	NS
P9400	P9721	121	1.94	-66	NS

Recommended growing regions

Recommended established plant populations (000's/ha)

Challenging yield environments	100
Medium yield environments	108
High yield environments	115

[1]Positive DM differences means the bolded hybrid was drier at harvest, negative DM differences mean it was wetter. [2]A positive yield advantage means the bolded hybrid produced more yield, a negative yield advantage means it produced less. [3]For information on interpreting hybrid comparison data and statistical significance see page 3.

NEW

PIONEER P9650

CRM 96

Security with performance.

Feature hybrid	Comparison hybrid	Number of trials	Drymatter difference (%)[1]	Yield advantage to P9650(kgDM/ha)[2]	Statistical significance[3]
			NATIONAL		
P9650	P92575	62	0.75	-235	NS
P9650	P9400	59	-0.66	522	CA
P9650	P9911	42	2.36	-1,080	★★
P9650	P9978	53	1.87	-1,127	★★★
			WAIKATO		
P9650	P92575	33	0.66	-318	NS
P9650	P9400	31	-0.98	806	★
P9650	P9911	21	1.20	91	NS
P9650	P9978	24	1.44	-978	★
			LOWER NORTH ISLAND & TARANAKI		
P9650	P92575	22	0.62	-583	CA
P9650	P9400	24	-0.44	347	NS
P9650	P9911	21	3.52	-2,252	★★★
P9650	P9978	25	2.38	-1,554	★★★

Recommended growing regions

Recommended established plant populations (000's/ha)

Challenging yield environments	95
Medium yield environments	110
High yield environments	120

[1]Positive DM differences means the bolded hybrid was drier at harvest, negative DM differences mean it was wetter. [2]A positive yield advantage means the bolded hybrid produced more yield, a negative yield advantage means it produced less. [3]For information on interpreting hybrid comparison data and statistical significance see page 3.

CRM 99

PIONEER BRAND P9911

Optimum AQUAmax

Top yielding, drought buster.

Feature hybrid	Comparison hybrid	Number of trials	Drymatter difference (%)[1]	Yield advantage to P9911(kgDM/ha)[2]	Statistical significance[3]
			NATIONAL		
P9911	P0362	136	1.03	75	NS
P9911	P9650	42	-2.36	1,080	★★
P9911	P9721	258	-1.84	1,307	★★★
P9911	P9978	121	-1.24	-417	★
			WAIKATO		
P9911	P0362	73	1.46	67	NS
P9911	P9650	21	-1.20	-91	NS
P9911	P9978	53	-0.85	-612	★
			LOWER NORTH ISLAND & TARANAKI		
P9911	P0362	51	0.49	204	NS
P9911	P9650	21	-3.52	2,252	★★★
P9911	P9978	58	-1.38	-99	NS

Recommended growing regions

Recommended established plant populations (000's/ha)

Challenging yield environments	**100**
Medium yield environments	**108**
High yield environments	**115**

[1]Positive DM differences means the bolded hybrid was drier at harvest, negative DM differences mean it was wetter. [2]A positive yield advantage means the bolded hybrid produced more yield, a negative yield advantage means it produced less. [3]For information on interpreting hybrid comparison data and statistical significance see page 3.

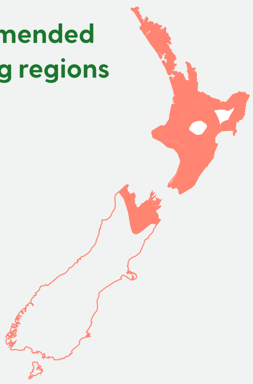
CRM 99

PIONEER P9978

Defensive. Stable. Productive.

Feature hybrid	Comparison hybrid	Number of trials	Drymatter difference (%)[1]	Yield advantage to P9978 (kgDM/ha)[2]	Statistical significance[3]
NATIONAL					
P9978	P0362	79	2.68	-159	NS
P9978	P9650	53	-1.87	1,127	★★★
P9978	P9721	53	-0.43	1,402	★★★
P9978	P9911	121	1.24	417	★
NORTHLAND					
P9978	P9911	10	2.52	1,233	★
WAIKATO					
P9978	P0362	44	2.86	-473	CA
P9978	P9650	24	-1.44	978	★
P9978	P9911	53	0.85	612	★
LOWER NORTH ISLAND & TARANAKI					
P9978	P9650	30	2.12	220	NS
P9978	P9721	25	-2.38	1,554	★★★
P9978	P9911	58	1.38	99	NS

Recommended growing regions



Recommended established plant populations (000's/ha)

Challenging yield environments	95
Medium yield environments	110
High yield environments	120

[1]Positive DM differences means the bolded hybrid was drier at harvest, negative DM differences mean it was wetter. [2]A positive yield advantage means the bolded hybrid produced more yield, a negative yield advantage means it produced less. [3]For information on interpreting hybrid comparison data and statistical significance see page 3.

CRM 106

PIONEER P0640

Leaf disease champion delivering silage yield stability.

Feature hybrid	Comparison hybrid	Number of trials	Drymatter difference (%)[1]	Yield advantage to P0640 (kgDM/ha)[2]	Statistical significance[3]
NATIONAL					
P0640	P0362	80	-1.09	1,077	★★★
P0640	P0900	85	0.60	662	★
P0640	P0937	91	1.78	1,134	★★★
P0640	P1315	37	1.58	-38	NS
NORTHLAND & SOUTH AUCKLAND					
P0640	P0891	29	-2.76	-262	NS
P0640	P0900	12	-0.77	433	NS
P0640	P0937	12	0.10	701	NS
WAIKATO					
P0640	P0362	58	-0.79	1,417	★★★
P0640	P0900	65	0.97	891	★★
P0640	P0937	75	1.86	1,295	★★★
P0640	P1315	30	2.01	-34	NS

Recommended growing regions

Recommended established plant populations (000's/ha)

Challenging yield environments	95
Medium yield environments	105
High yield environments	110

[1]Positive DM differences means the bolded hybrid was drier at harvest, negative DM differences mean it was wetter. [2]A positive yield advantage means the bolded hybrid produced more yield, a negative yield advantage means it produced less. [3]For information on interpreting hybrid comparison data and statistical significance see page 3.

NEW

Optimum AQUAmax

PIONEER P0710

CRM 107

Exceptional foliar health and yield stability – wet or dry!

Feature hybrid	Comparison hybrid	Number of trials	Drymatter difference (%)[1]	Yield advantage to P0710 (kgDM/ha)[2]	Statistical significance[3]
			NATIONAL		
P0710	P0900	48	1.43	-290	NS
P0710	P0937	35	2.59	457	CA

Recommended growing regions

Recommended established plant populations (000's/ha)

Challenging yield environments	85
Medium yield environments	95
High yield environments	115

[1]Positive DM differences means the bolded hybrid was drier at harvest, negative DM differences mean it was wetter. [2]A positive yield advantage means the bolded hybrid produced more yield, a negative yield advantage means it produced less. [3]For information on interpreting hybrid comparison data and statistical significance see page 3.

CRM 107

PIONEER P0891

Reliable veteran.

Feature hybrid	Comparison hybrid	Number of trials	Drymatter difference (%)[1]	Yield advantage to P0891 (kgDM/ha)[2]	Statistical significance[3]
			NATIONAL		
P0891	P0640	143	1.45	6	NS
P0891	P0900	82	1.62	-451	NS
P0891	P0937	113	3.12	-25	NS
P0891	P1315	27	2.55	-2,245	★★★
			NORTHLAND		
P0891	P0640	29	2.76	262	NS
P0891	P0900	13	1.65	539	NS
P0891	P0937	19	3.14	1,481	★★★
			WAIKATO		
P0891	P0640	115	0.98	-394	CA
P0891	P0900	68	1.39	-843	★
P0891	P0937	89	2.66	-543	★
P0891	P1315	36	2.34	-2,234	★★★

Recommended growing regions

Recommended established plant populations (000's/ha)

Challenging yield environments	95
Medium yield environments	105
High yield environments	110

[1]Positive DM differences means the bolded hybrid was drier at harvest, negative DM differences mean it was wetter. [2]A positive yield advantage means the bolded hybrid produced more yield, a negative yield advantage means it produced less. [3]For information on interpreting hybrid comparison data and statistical significance see page 3.

Optimum AQUAmax

PIONEER BRAND P0900

CRM 109

A proven, stable, all-round hybrid.

Feature hybrid	Comparison hybrid	Number of trials	Drymatter difference (%)[1]	Yield advantage to P0900 (kgDM/ha)[2]	Statistical significance[3]
			NATIONAL		
P0900	P0640	85	-0.60	-662	★
P0900	P0710	48	-1.03	-290	NS
P0900	P0937	117	1.24	285	NS
P0900	P1315	53	0.57	-448	NS
P0900	P1636	50	2.48	-1,588	★★★
			NORTHLAND		
P0900	P0640	12	0.69	-433	NS
P0900	P0937	17	1.59	-389	NS
			WAIKATO		
P0900	P0710	40	-1.30	193	NS
P0900	P0891	68	-1.39	843	★★
P0900	P0937	88	0.96	520	★
P0900	P1315	49	0.61	-550	CA
			BAY OF PLENTY		
P0900	P0937	11	2.85	-537	NS

Recommended growing regions

Recommended established plant populations (000's/ha)

Challenging yield environments	85
Medium yield environments	95
High yield environments	115

[1]Positive DM differences means the bolded hybrid was drier at harvest, negative DM differences mean it was wetter. [2]A positive yield advantage means the bolded hybrid produced more yield, a negative yield advantage means it produced less. [3]For information on interpreting hybrid comparison data and statistical significance see page 3.

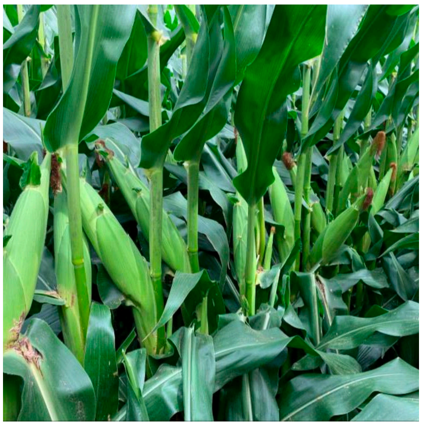
CRM 109

PIONEER P0937

Solid hybrid with great standability and foliar health.

Feature hybrid	Comparison hybrid	Number of trials	Drymatter difference (%)[1]	Yield advantage to P0937 (kgDM/ha)[2]	Statistical significance[3]
NATIONAL					
P0937	P0640	91	-1.78	-1,134	★★★
P0937	P0710	35	-2.59	-457	CA
P0937	P0900	117	-1.24	-285	NS
P0937	P1315	57	-0.69	-1,504	★★★
NORTHLAND					
P0937	P0640	12	-0.98	-701	NS
P0937	P0891	19	-3.14	-1,481	★★
P0937	P0900	17	-1.59	389	NS
WAIKATO					
P0937	P0640	75	-1.86	-1,295	★★★
P0937	P0900	88	-0.96	-520	★
P0937	P1315	51	-0.41	-1,338	★★★
BAY OF PLENTY, GISBORNE & HAWKE'S BAY					
P0937	P0900	11	-2.85	537	NS

Recommended growing regions



Recommended established plant populations (000's/ha)

Challenging yield environments	90
Medium yield environments	100
High yield environments	115

[1]Positive DM differences means the bolded hybrid was drier at harvest, negative DM differences mean it was wetter. [2]A positive yield advantage means the bolded hybrid produced more yield, a negative yield advantage means it produced less. [3]For information on interpreting hybrid comparison data and statistical significance see page 3.

PIONEER
P1315

CRM 110

Defensive from Northland to Hawke's Bay.

Feature hybrid	Comparison hybrid	Number of trials	Drymatter difference (%)[1]	Yield advantage to P1315 (kgDM/ha)[2]	Statistical significance[3]
			NATIONAL		
P1315	P1185	9	0.74	-765	NS
P1315	P1636	25	2.11	257	NS
			WAIKATO		
P1315	P0891	36	-2.34	2,234	★★★
P1315	P0900	49	-0.61	550	CA
P1315	P0937	51	0.41	1,338	★★★
P1315	P1636	58	1.88	-774	★
			BAY OF PLENTY		
P1315	P1477W	25	2.51	-785	NS
P1315	P1636	25	1.81	-519	NS

Recommended growing regions

Recommended established plant populations (000's/ha)

Challenging yield environments	80
Medium yield environments	90
High yield environments	100

[1]Positive DM differences means the bolded hybrid was drier at harvest, negative DM differences mean it was wetter. [2]A positive yield advantage means the bolded hybrid produced more yield, a negative yield advantage means it produced less. [3]For information on interpreting hybrid comparison data and statistical significance see page 3.

CRM 112

PIONEER® P1636

Enjoy the agronomics of this top-yielding hybrid.

Feature hybrid	Comparison hybrid	Number of trials	Drymatter difference (%)[1]	Yield advantage to P1636(kgDM/ha)[2]	Statistical significance[3]
NATIONAL					
P1636	P0900	50	-2.48	1,588	★★★
P1636	P0937	66	-1.03	1,979	★★★
P1636	P1315	108	-1.92	476	CA
P1636	P1477W	155	1.11	-474	★
P1636	P1837	53	1.62	681	★
NORTHLAND & SOUTH AUCKLAND					
P1636	P1185	7	-1.34	-1,679	CA
P1636	P1315	25	-2.11	-257	NS
P1636	P1477W	41	0.11	-873	CA
P1636	P1837	13	1.27	859	NS
WAIKATO					
P1636	P0900	46	-2.57	1,761	★★★
P1636	P0937	55	-1.32	2,134	★★★
P1636	P1315	58	-1.88	774	★
P1636	P1477W	75	1.80	-125	NS
P1636	P1837	30	2.07	683	NS
BAY OF PLENTY, GISBORNE & HAWKE'S BAY					
P1636	P1315	25	-2.31	519	NS
P1636	P1477W	39	-1.92	-725	NS
P1636	P1837	10	0.91	446	NS

Recommended growing regions

Recommended established plant populations (000's/ha)

Challenging yield environments	95
Medium yield environments	105
High yield environments	110

[1]Positive DM differences means the bolded hybrid was drier at harvest, negative DM differences mean it was wetter. [2]A positive yield advantage means the bolded hybrid produced more yield, a negative yield advantage means it produced less. [3]For information on interpreting hybrid comparison data and statistical significance see page 3.

PIONEER
BRAND
P1837

CRM 115

Defensive full-season giant.

Feature hybrid	Comparison hybrid	Number of trials	Drymatter difference (%)[1]	Yield advantage to P1837(kgDM/ha)[2]	Statistical significance[3]
NATIONAL					
P1837	P1477W	54	-0.22	-1,226	★★
P1837	P1636	53	-1.62	-681	★
WAIKATO					
P1837	P1477W	33	-0.07	-987	CA
P1837	P1636	30	-2.07	-683	NS
BAY OF PLENTY, GISBORNE & HAWKE'S BAY					
P1837	P1477W	11	-1.53	-1,252	NS
P1837	P1636	13	-1.27	-859	NS

Recommended growing regions

Recommended established plant populations (000's/ha)

Challenging yield environments	NR
Medium yield environments	80
High yield environments	90

[1]Positive DM differences means the bolded hybrid was drier at harvest, negative DM differences mean it was wetter. [2]A positive yield advantage means the bolded hybrid produced more yield, a negative yield advantage means it produced less. [3]For information on interpreting hybrid comparison data and statistical significance see page 3.

YIELD AND ECONOMIC VALUE OF CHICORY GROWN ON FIVE WAIKATO DAIRY FARMS[1]

Introduction

Chicory has become a popular forage crop for dairy farmers due to its high expected yield and nutritional benefits for livestock. Outside of being part of a pasture renewal program, farmers have opted to grow chicory to supply quality feed (energy and protein) during the summer months when pasture yield and quality is expected to decline on most dairy farms.

However, there is little information available to quantify the drymatter yield of pure chicory swards vs pasture when included in a grazed farm system. Given the costs associated with establishing chicory, and that farmers ideally require a minimum of 10% of the farm area in chicory to supply >3kg DM/cow, it is important to know whether chicory is yielding as expected and improving farm productivity.

The objective of this trial was to determine chicory and pasture yields from October to May in dairy systems and to consider the cropping costs against alternative options to supply summer feed.

Method

The study was conducted during the 2022-23 and 2023-24 seasons on five commercial dairy farms between Hamilton and Te Awamutu in the Waikato. The farms varied in scale, system intensity and proportion of chicory inclusion (Table 1). Chicory crops were established between the 28th September and 20th October and sprayed out between the 12th March and 19th April of the following year before pasture renewal. Chicory was primarily strip grazed 3-6 times between December and April, providing 1 to 3 kgDM of the daily dairy cow diet during the summer period.

In spring, designated chicory paddocks were sprayed out, and five herbage cages (1 m^2) were placed onto the chicory paddocks after they were sown. Five herbage cages were placed on an adjacent permanent pasture paddock that represented average pasture production on the farm. These cages prevented dairy cows from grazing, allowing for the assessment of drymatter production without animal interference. After each grazing event of the pasture paddocks, the vegetation under each cage was mown to a height of 4 cm using a standard lawnmower. Once the chicory paddocks were established and had grown sufficiently to be grazed (December-April), the same measurement method was applied.

Cut grass and chicory were collected and weighed to determine the fresh weight. A subsample was submitted to a commercial laboratory for drymatter assessment. After samples were collected, cages were moved onto the grazed area so regrowth was representative of the grazed area.

Chicory cuts finished when the paddock was sprayed out. Pasture cage cuts were taken at every grazing event until 1st May, when the chicory paddocks returned to the grazing rotation.

Farm	Farm area (ha)	Number of cows	Stocking rate	Chicory area (ha)	Farm system (1-5)
A	52	165	3.2	5	3
B	124	415	3.4	15	5
C	213	850	4.0	36	5
D	140	535	3.8	7	4
E	92	316	3.4	4	2

Table 1: Trial farm system details.

Results

During the 2022/23 summer, January-March rainfall was 369 mm (Waikato Regional Council environmental data hub), 185% of the long-term average (199 mm). In the 2023/24 summer, Jan-Mar rainfall dropped back to 219 mm, 110% of the long-term average. Consequently, monthly pasture growth rates (Jan-Mar) for the 2022/23 and 2023/24 seasons were consistently higher than the expected average (based on pasture growth rate data from nearby Owl Farm).

Growth rates

On average, the chicory area produced substantially less yield than perennial ryegrass during the establishment phase from October to December and a similar yield from January to March (Figure 1).

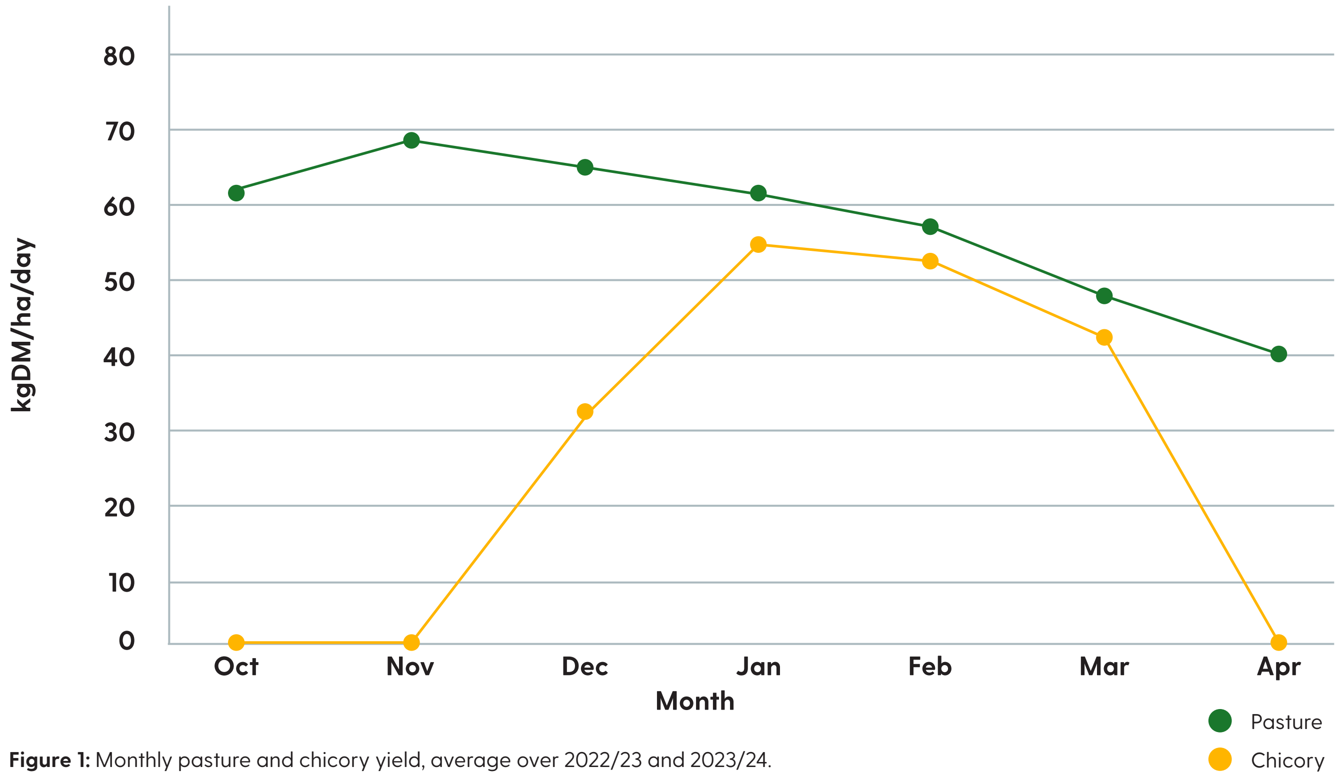


Figure 1: Monthly pasture and chicory yield, average over 2022/23 and 2023/24.

Over the two years of the trial, chicory produced an average of 6,771 kgDM/ha, while perennial ryegrass yielded an average of 11,508 kgDM/ha, meaning that chicory yielded around 4,700 kgDM/ha less than pasture per year (Figure 2).

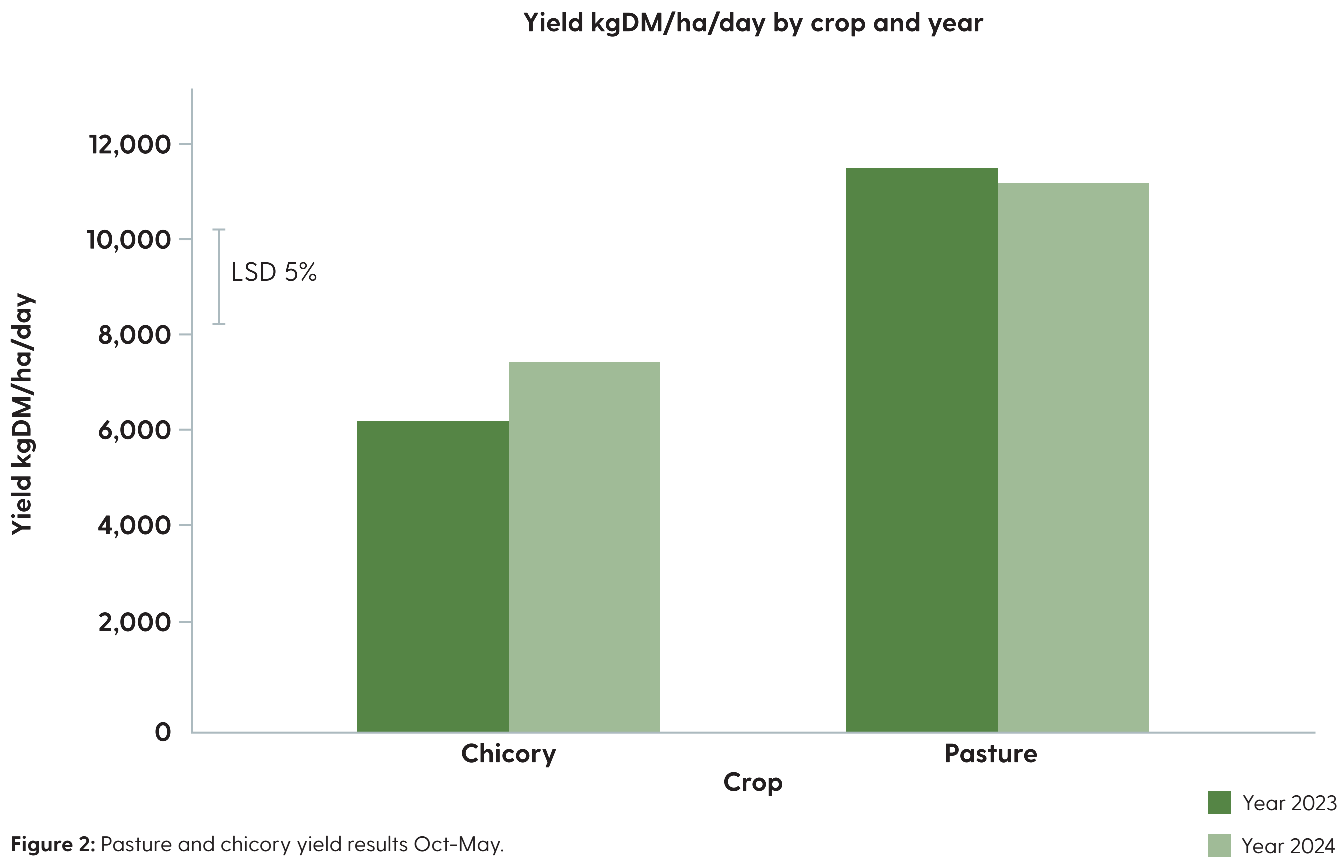


Figure 2: Pasture and chicory yield results Oct-May.

Financial

Over the two years of the trial, the average on-farm establishment cost for chicory was $1,052/ha and ranged between $740-$1,582/ha (Table 2). The most notable drivers behind the wide range in establishment costs were whether starter fertiliser was applied, the post-emergent weed control program and in the case of Farm D, having to replant the chicory crop due to failed germination.Discussion and conclusions

Farmers reasons for growing chicory include managing spring pasture surpluses, feeding youngstock, improving summer feed quantity and quality, weed control and assisting with pasture renewal.

During the two trial seasons, growing chicory shifted a surplus of feed from spring to summer/autumn but did not increase total drymatter production above that achieved from a well-managed ryegrass-clover pasture.

Long-term average pasture analysis data collected from ten Waikato dairy farms between January and March over 12 seasons shows an average energy content of 11.2 MJ/kgDM and crude protein of 24.8% (pers comm. Tim Sandbrook, Open Country Dairy). While this is slightly less energy (12.5 MJ/kgDM) and more protein (20.6%) than previously measured in chicory, it is still sufficient to support mid-to-late lactation milk production.

When the opportunity cost of lost pasture production was considered, chicory became uneconomic because it produced less drymatter than the pasture. When considering feed quantity, quality and establishment costs over the two years of the trial, farmers would have been better off to use the money invested in chicory to purchase a high-quality protein concentrate (e.g., dried distiller's grain) to provide additional energy and protein if required. Imported feed is more flexible and could be used when needed, at the required rates to strategically fill feed gaps without displacing pasture production.

The improvement in pasture production as a flow-on effect from growing a chicory crop was not included in the scope of this trial. If pastures had "run out" and were more than 40% below full production, then growing chicory followed by sowing new pasture would have a more positive impact on profitability, but would need to be balanced against alternative methods of pasture renewal. To ensure the best chance of a higher-yielding chicory crop, establishment costs should not be skimped.

Based on this analysis, for chicory to be an economically viable crop, farmers would have to have experienced a 30% reduction in pasture production (Oct-May) and a 30% lift in chicory production. This is a significant yield gap to bridge.

Farm	Year	Spray out ($/ha)	Fertiliser ($/ha)	Planting ($/ha)	Post-emergence weed control ($/ha)	Total cost ($/ha)	Chicory yield (tDM/ha)
Farm A	22/23	$135.12	$243.05	$634.80	$0.00	$1,012.97	6.2
	23/24	$115.00	$119.50	$676.85	$0.00	$911.35	7.4
Farm B	22/23						5.2
	23/24	$96.16	$130.00	$581.60	$131.00	$938.76	6.7
Farm C	22/23	$114.85	$0.00	$530.55	$94.79	$740.19	4.6
	23/24	$92.15	$0.00	$655.44	$97.20	$844.79	6.1
Farm D	22/23	$113.23	$0.00	$475.44	$371.10	$959.77	6.3
	23/24	$110.11	$0.00	$870.42	$601.19	$1,581.72	8.6
Farm E	22/23						8.5
	23/24	$161.50	$258.65	$859.50	$147.00	$1,426.65	8.0

Table 2: Breakdown of per-hectare establishment costs.

Acknowledgements

We greatly appreciate the five farmers involved and thank Logan Dawson, Andy Macky, Andrew McPherson, Dave Swney and David Warren for their time and feedback throughout the trial. Thanks also to David Baird for assistance with statistical analysis of the data.

[1]Bell, W.; Journeaux, P. 2024. Yield and economic value of chicory grown on five Waikato dairy farms. Proceedings of the Australasian Dairy Science Symposium 2024

OPTIMISING NITROGEN APPLICATION FOR MAIZE SILAGE PRODUCTION

Introduction

To maximise nitrogen (N) fertiliser efficiency in maize cropping, crop nutrient demand and uptake, as well as potential soil N supply, should be considered. Fertiliser strategy should optimise productivity and profit and enhance sustainability. Excessive and inefficient N fertiliser use can pollute waterways, acidify the soil, increase greenhouse gas emissions and reduce profitability. In contrast, applying significantly less N than crop demand can reduce yield and/or lead to depletion of soil organic matter (OM) levels over time.

Nitrogen management studies

An ongoing N management study was initiated on a Waikato ash soil in the spring of 2021 to help us understand N cycling in a long-term maize cropping system under NZ conditions. Historically, the paddock had been growing maize silage, followed by annual ryegrass. Before the start of the trial, no fertiliser N was applied to either maize or the annual ryegrass crop for two seasons in an attempt to minimise plot-to-plot N variability.

The paddock was split into replicated plots, with each plot receiving a different N fertiliser side dressing rate. Nitrogen was applied to the crop at the V5 stage of maize growth. The rates were: control (0 kg N/ha), low (160 kg N/ha), standard (250 kg N/ha), high (320 kg N/ha) and very (v) high (400 kg N/ha). Other than N, all other nutrients were applied according to the spring soil test result. The initial paddock soil OM measured in spring 2021 averaged 13.5%.

Maize yields and soil N balance

During the first two seasons of the study, residual soil mineral N levels (0 – 120 cm) measured prior to fertiliser N sidedressing and the seasonal potentially available N estimated from the Hill laboratory's anaerobic mineral N soil tests (0 – 15 cm) averaged 80 and 100 kg N/ha, respectively. These values did not vary much by season or fertiliser N treatment.

Assuming N removal rates of 12.8 kg N/t DM, mineral soil N measured at V5 and additional fertiliser N application (Table 1), the control and low N fertiliser plots would have been expected to yield, 6 and 19 tDM/ha total plant DM (includes roots and bottom 15 cm of the stem). This equates to 5 and 15 tDM/ha maize silage respectively. The greater yields obtained during the first two years (Table 1), highlight the soil's ability to release N from OM when needed. Despite the significantly higher than expected yields in control plots, 82 kg N/ha was measured as residual soil N post maize harvest. Theoretically, this amount should have been sufficient to grow the 3 tDM/ha required to match the yields obtained in fertilised plots. It is highly probable that it was not used because synchronisation between maize crop N demand and soil-N supply did not occur, highlighting the unreliability of solely depend on mineralised N to supply N to crops.

Table 1: Soil N dynamics and maize silage yields on a Waikato ash soil during the 2021-22 and 2022-23 maize growing seasons.

N fertiliser	V5 Total N (fertiliser + soil)	Maize crop N uptake	Soil N after maize[$]	Maize silage DM yield	Estimated soil-N supply*
	kg N/ha				
Nil	77	177	82	18	172
Low	241	192	121	21	40
Standard	321	211	154	22	33
High	401	206	216	21	11
V. High	481	192	334	20	-90
SE	*46.3*	*5.4*	*26.0*	*0.5*	*29.2*

A negative value indicates N that could not be accounted for at maize silage harvest. It is likely that this nitrogen was lost from the system.

*Value does not account for N immobilised into organic matter or lost from the system. SE = standard error.

The estimated soil N supply was significantly greater in control than fertilised plots. These results are consistent with other independent studies that concluded that under low soil N levels, microbes meet their N demand by depleting soil OM.

During the 2023-24 and 2024-25 growing seasons, average mineral and anaerobic soil N levels (across all treatments) at the V5 stage averaged 90 and 110 kg N/ha, respectively - sufficient to produce about 6 tDM/ha of maize silage, assuming no further N inputs. Estimated seasonal potential available N measured from anaerobic mineral N tests averaged 110 kg N/ha. Unlike the first two seasons where the control and low N treatments performed way above expectation, there was a clear relationship between crop performance and fertiliser N rate (Table 2). The low N plots achieved 20% less yield compared to the standard, whereas during the first two years, the yields were similar.

Table 2: Soil N dynamics on a Waikato ash soil during the 2023-24 and 2024-25 maize growing seasons.

N fertiliser	V5 Total N (fertiliser + soil)	Maize crop N uptake	Soil N after maize	Maize silage DM yield	Estimated soil-N supply*$
	kg N/ha				
Nil	88	98	50	10	35
Low	239	155	40	19	-48
Standard	317	215	51	23	-82
High	398	229	111	24	-96
V. High	477	218	187	24	-114
SE	*45.8*	*17.6*	*19.6*	*1.8*	*18.5*

A negative value indicates N amount that could not be accounted for at maize silage harvest. *Value does not account for N immobilised into organic matter or lost from the system. $Data based on the 2023/24 season only. SE = standard error.

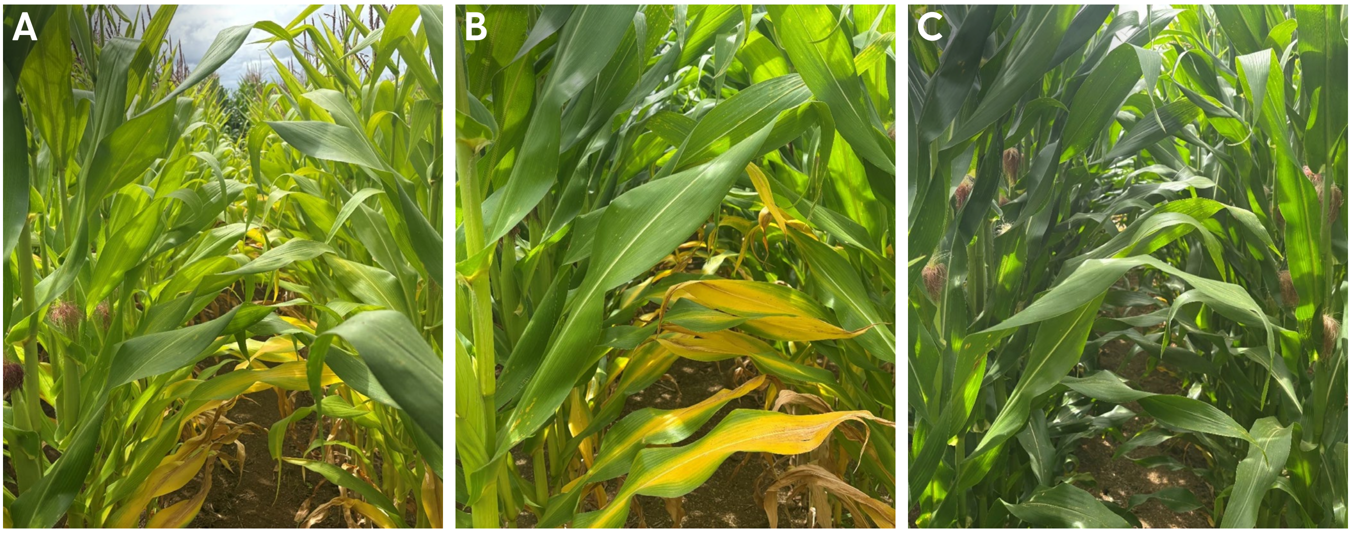
Unlike the first two seasons where N stress (evidenced by leaf yellowing) was only noticed in control plots, stress was also observed in the low N treatments as early as silking time (Figure 1b). This was despite total soil and fertiliser N levels averaging 239 kg N/ha at the V5 stage (i.e., excluding N mineralisation post V5). By silking, maize plant N uptake is about 60% of the total plant N requirement, which equates to about 120 kg N/ha and the observed deficiency symptoms likely suggest possible temporary N deficiency.

fertiliser N, otherwise they risk degrading soil OM. Our study indicated that under very low soil N situations, N mineralisation was very high initially but decreased significantly after a few years of "N mining".

Over-reliance on soil mineralisation for N supply, especially on long-term cropping ground, can result in nutrient deficiencies due to poor synchronisation between soil N supply and maize N requirement, even when there is theoretically enough soil N available. Weather variability makes it difficult to achieve synchronisation between N supply and crop demand key prerequisites to optimising production and protecting the environment.

This study suggests that to achieve optimum yields sustainably, it is best to apply the appropriate amount of fertiliser N, which is consistent with yield potential as well as paddock history and fertility. While applying less than the recommended N fertiliser and relying on soil supplied N may appear economical, our research indicates there could be a long-term yield penalty. Our recommendations on N management are as follows:

Figure 1: Maize plants from an ash soil with a soil mineral N level of 90 kg N/ha at V5, followed by nil (a), low (b) or standard fertiliser N/ha (c) during the 2023-24 season.



Similar to previous seasons, applying greater than standard rates did not result in maize yield increases but rather, a greater rate of unaccounted N. While there is no proof that non accounted N was lost from the system, research shows that excess N in the system increases the risk of N loss.

Summary

To optimise N use and enhance sustainability, it is important to customise N management for each cropping block. In high OM soils or those coming out of long-term pasture, fertiliser N can be reduced or omitted depending on fertility levels. In continuous cropping situations, growers should not skimp on

- Use your knowledge of the paddock and hybrid yield potential to estimate crop N demand.
- Estimate soil N supply by collecting and analysing representative soil samples.
- Where nitrogen is required, apply standard levels of starter fertiliser (around 30 kgN/ha) and sidedress the remainder of the crop's requirements around V5 - V6 when plant N demand is rising and the risk of N leaching is lower.
- Where possible, establish a cover crop immediately after maize harvest. Any excess soil N can be "mopped up" by the catch crop during the winter period, minimising the risk of leaching or denitrification N losses.

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Genetic Technologies Limited, Gisborne Office
328 Lytton Road, PO Box 214, Gisborne 4040. Phone: 06 869 0660 Fax: 06 867 0083

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