

MAIZE GRAIN RESEARCH 2025



PIONEER
BRAND PRODUCTS

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INTRODUCTION

Welcome to the Pioneer Maize Grain Research update for 2025.

Inside, you will find comprehensive hybrid yield data to help growers make informed decisions on which Pioneer hybrid to plant. Our research programme covers

more than just hybrid evaluation. Each year, we conduct a range of agronomic projects. In this publication, we've provided a summary on maize leaf defoliation.



Long-term breeding delivers higher yields

The annual rate of maize grain yield gain in New Zealand is estimated to have been over 180 kg/ha/year over almost 60 years (Figure 1). Crop management and genetic improvement have both made significant contributions to yield increases.

To maximise returns, grain 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 grain 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

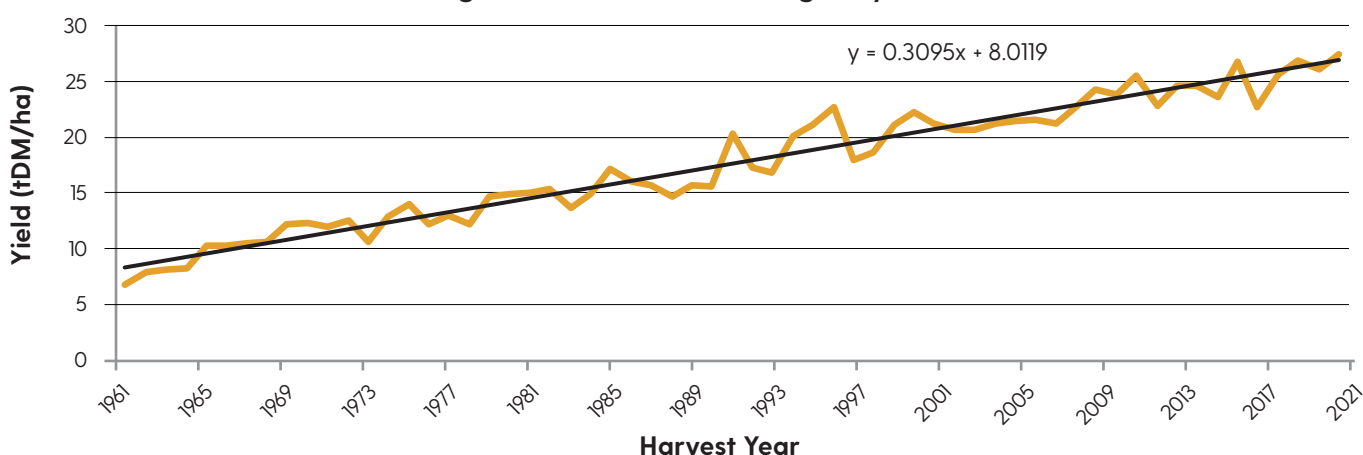
hybrid performance. Hybrids should be planted and harvested at the same time. Trial data should be statistically analysed to determine if there is a real yield difference between the hybrids.

This publication provides a summary of the investment made to evaluate the grain yield performance of Pioneer® brand maize grain 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 grain 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 can be claimed. 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 cannot be claimed. 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**CRM 80**

Dependable early hybrid with strong agronomics.

Feature hybrid	Comparison hybrid	Number of trials	Harvest moisture difference (%) ¹	Grain yield advantage (kgDM/ha)	Statistical significance	Test weight difference (kg/hl)
LOWER NORTH ISLAND						
P8086	P8000	19	-0.45	651	★	-1.33
P8086	P8240	19	-0.33	-761	CA	-0.65
P8086	P8333	20	-0.55	-27	NS	-0.95
P8086	P8666	20	-0.46	-563	NS	-0.87

**Recommended
growing regions**



**Recommended established
plant populations (000's/ha)**

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

¹Positive harvest moisture differences indicate that the bolded Pioneer hybrid had a lower average moisture percentage at harvest than the comparison hybrid. Such hybrids are usually earlier in maturity or faster to drydown than the comparison hybrid. Negative moisture differences indicate that the bolded Pioneer hybrid had a higher average moisture percentage at harvest. Such hybrids are usually later in maturity or slower to drydown than the comparison hybrid. Positive yield and / or test weight differences indicate the bolded Pioneer hybrid had higher yield and / or grain test weight.



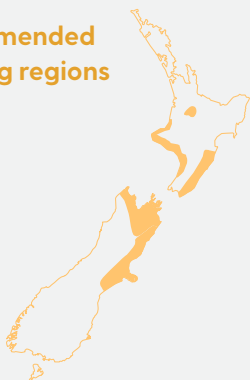
CRM 82



Higher yields for southern growers.

Pioneer hybrid	Comparison hybrid	Number of trials	Harvest moisture difference (%) ¹	Grain yield advantage (kgDM/ha)	Statistical significance	Test weight difference (kg/hl)
LOWER NORTH ISLAND & SOUTH ISLAND						
P8240	P8000	34	-0.28	1,642	★★★	-1.66
P8240	P8086	19	0.33	761	CA	0.65
P8240	P8333	34	-0.34	703	★★	-1.11
P8240	P8666	38	-0.04	104	NS	0.23
P8240	P8711	30	0.87	-1,296	★★★	0.20

Recommended growing regions



Recommended established plant populations (000's/ha)

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

¹Positive harvest moisture differences indicate that the bolded Pioneer hybrid had a lower average moisture percentage at harvest than the comparison hybrid. Such hybrids are usually earlier in maturity or faster to drydown than the comparison hybrid. Negative moisture differences indicate that the bolded Pioneer hybrid had a higher average moisture percentage at harvest. Such hybrids are usually later in maturity or slower to drydown than the comparison hybrid. Positive yield and / or test weight differences indicate the bolded Pioneer hybrid had higher yield and / or grain test weight.



Productive option for cooler regions.

Pioneer hybrid	Comparison hybrid	Number of trials	Harvest moisture difference (%) ¹	Grain yield advantage (kgDM/ha)	Statistical significance	Test weight difference (kg/hl)
LOWER NORTH ISLAND & SOUTH ISLAND						
P8333	P8000	56	-0.07	1,373	★★★	-0.94
P8333	P8086	20	0.55	27	NS	0.95
P8333	P8240	34	0.34	-703	★★	1.11
P8333	P8666	61	0.40	-460	★	1.40
P8333	P8711	33	1.33	-1,860	★★★	1.42

Recommended growing regions



Recommended established plant populations (000's/ha)

Challenging yield environments	85
Medium yield environments	95
High yield environments	105

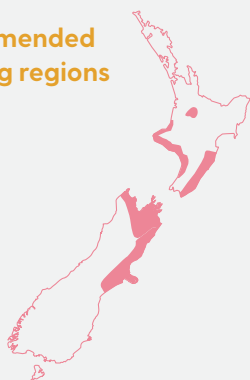
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Widely adapted hybrid with strong agronomic properties.

Pioneer hybrid	Comparison hybrid	Number of trials	Harvest moisture difference (%) ¹	Grain yield advantage (kgDM/ha)	Statistical significance	Test weight difference (kg/hl)
LOWER NORTH ISLAND & SOUTH ISLAND						
P8666	P8240	38	0.04	-104	NS	-0.23
P8666	P8333	61	-0.40	460	★	-1.40
P8666	P8711	43	1.36	-1,482	★★★	-0.06
P8666	P8805	60	-0.27	19	NS	0.46

Recommended growing regions



Recommended established plant populations (000's/ha)

Challenging yield environments	85
Medium yield environments	95
High yield environments	105

¹Positive harvest moisture differences indicate that the bolded Pioneer hybrid had a lower average moisture percentage at harvest than the comparison hybrid. Such hybrids are usually earlier in maturity or faster to drydown than the comparison hybrid. Negative moisture differences indicate that the bolded Pioneer hybrid had a higher average moisture percentage at harvest. Such hybrids are usually later in maturity or slower to drydown than the comparison hybrid. Positive yield and / or test weight differences indicate the bolded Pioneer hybrid had higher yield and / or grain test weight.



Defensive winner with game-changing yields.

Pioneer hybrid	Comparison hybrid	Number of trials	Harvest moisture difference (%) ¹	Grain yield advantage (kgDM/ha)	Statistical significance	Test weight difference (kg/hl)
NATIONAL						
P8711	P8240	49	-1.03	1,300	★★★	-0.02
P8711	P8333	56	-1.04	1,822	★★★	-1.24
P8711	P8666	92	-1.10	1,456	★★★	0.04
P8711	P9127	53	-0.94	329	NS	2.16
P8711	P92575	63	0.56	-635	★	1.99
WAIKATO						
P8711	P8240	16	-1.33	1,376	★★★	0.32
P8711	P8333	15	-0.44	1,339	★★	-0.91
P8711	P8666	29	-0.78	1,631	★★★	0.16
P8711	P9127	21	-0.57	544	NS	2.22
P8711	P92575	28	0.52	-627	NS	2.76
BAY OF PLENTY GISBORNE & HAWKE'S BAY						
P8711	P8666	15	-1.16	1,400	★★	0.41
P8711	P92575	12	0.03	-493	NS	2.32
LOWER NORTH ISLAND & SOUTH ISLAND						
P8711	P8240	30	-0.87	1,296	★★★	-0.20
P8711	P8333	33	-1.33	1,860	★★★	-1.42
P8711	P8666	43	-1.36	1,482	★★★	0.06
P8711	P9127	21	-1.71	496	NS	2.00
P8711	P92575	20	1.01	-600	★	1.05

Recommended growing regions



Recommended established plant populations (000's/ha)

Challenging yield environments	90
Medium yield environments	100
High yield environments	110

¹Positive harvest moisture differences indicate that the bolded Pioneer hybrid had a lower average moisture percentage at harvest than the comparison hybrid. Such hybrids are usually earlier in maturity or faster to drydown than the comparison hybrid. Negative moisture differences indicate that the bolded Pioneer hybrid had a higher average moisture percentage at harvest. Such hybrids are usually later in maturity or slower to drydown than the comparison hybrid. Positive yield and / or test weight differences indicate the bolded Pioneer hybrid had higher yield and / or grain test weight.



CRM 92



NEW

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

Pioneer hybrid	Comparison hybrid	Number of trials	Harvest moisture difference (%) ¹	Grain yield advantage (kgDM/ha)	Statistical significance	Test weight difference (kg/hl)
NATIONAL						
P92575	P8666	58	-1.68	1,886	★★★	-1.27
P92575	P8711	63	-0.56	635	★	-1.99
P92575	P9127	49	-1.76	1,691	★★★	-0.72
P92575	P9400	92	-1.31	981	★★★	-3.29
P92575	P9650	81	0.03	235	NS	-2.06
P92575	P9721	55	-0.94	665	★★	-0.57
WAIKATO						
P92575	P8666	23	-1.28	1,834	★★★	-1.30
P92575	P8711	28	-0.52	627	NS	-2.76
P92575	P9127	20	-1.44	1,717	★★★	-1.38
P92575	P9400	32	-1.20	718	★	-3.58
P92575	P9650	33	0.20	-29	NS	-2.52
P92575	P9721	22	-0.90	542	★	-0.51
BAY OF PLENTY GISBORNE & HAWKE'S BAY						
P92575	P8666	13	-1.01	1,976	★★★	-1.67
P92575	P8711	12	-0.03	493	NS	-2.32
P92575	P9400	13	-0.54	1,226	★★	-2.24
P92575	P9650	14	0.24	569	NS	-2.18
LOWER NORTH ISLAND						
P92575	P8666	18	-2.89	1,963	★★★	-1.04
P92575	P8711	20	-1.01	600	★	-1.05
P92575	P9127	21	-2.62	2,325	★★★	-0.46
P92575	P9400	43	-1.65	1,034	★★★	-3.49
P92575	P9650	30	-0.30	325	NS	-1.50
P92575	P9721	24	-1.09	833	★	-0.83

Recommended growing regions



Recommended established plant populations (000's/ha)

Challenging yield environments	85
Medium yield environments	95
High yield environments	105

¹Positive harvest moisture differences indicate that the bolded Pioneer hybrid had a lower average moisture percentage at harvest than the comparison hybrid. Such hybrids are usually earlier in maturity or faster to drydown than the comparison hybrid. Negative moisture differences indicate that the bolded Pioneer hybrid had a higher average moisture percentage at harvest. Such hybrids are usually later in maturity or slower to drydown than the comparison hybrid. Positive yield and / or test weight differences indicate the bolded Pioneer hybrid had higher yield and / or grain test weight.



Security with performance.

Pioneer hybrid	Comparison hybrid	Number of trials	Harvest moisture difference (%) ¹	Grain yield advantage (kgDM/ha)	Statistical significance	Test weight difference (kg/hl)
NATIONAL						
P9650	P0021	55	-0.04	197	NS	0.92
P9650	P9127	16	-1.16	2,224	★★★	1.27
P9650	P92575	81	-0.03	-235	NS	2.06
P9650	P9400	63	-0.96	797	★★★	-0.69
P9650	P9721	41	-1.09	497	★	1.86
P9650	P9978	84	0.22	-565	★★★	2.47
WAIKATO						
P9650	P0021	27	-0.05	363	CA	1.30
P9650	P92575	33	-0.20	29	NS	2.52
P9650	P9400	22	-1.40	945	★★★	-0.53
P9650	P9978	42	0.09	-601	★★	2.66
BAY OF PLENTY GISBORNE & HAWKE'S BAY						
P9650	P0021	8	-0.02	705	★	1.40
P9650	P92575	14	-0.24	-569	NS	2.18
P9650	P9400	8	-0.16	1,489	★★	-0.06
P9650	P9978	14	-0.17	-300	NS	2.43
LOWER NORTH ISLAND						
P9650	P0021	17	-0.01	-377	NS	0.47
P9650	P9127	7	-0.66	2,493	★	1.92
P9650	P92575	30	0.30	-325	NS	1.50
P9650	P9400	29	-0.79	445	NS	-1.06
P9650	P9978	26	0.61	-757	★★	2.21

Recommended growing regions



Recommended established plant populations (000's/ha)

Challenging yield environments	85
Medium yield environments	95
High yield environments	110

¹Positive harvest moisture differences indicate that the bolded Pioneer hybrid had a lower average moisture percentage at harvest than the comparison hybrid. Such hybrids are usually earlier in maturity or faster to drydown than the comparison hybrid. Negative moisture differences indicate that the bolded Pioneer hybrid had a higher average moisture percentage at harvest. Such hybrids are usually later in maturity or slower to drydown than the comparison hybrid. Positive yield and / or test weight differences indicate the bolded Pioneer hybrid had higher yield and / or grain test weight.



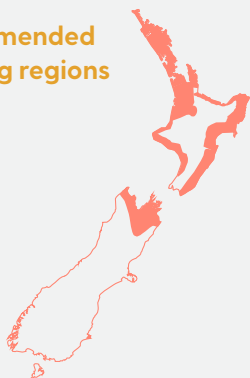
CRM 99



Defensive. Stable. Productive.

Pioneer hybrid	Comparison hybrid	Number of trials	Harvest moisture difference (%) ¹	Grain yield advantage (kgDM/ha)	Statistical significance	Test weight difference (kg/hl)
NATIONAL						
P9978	P0021	253	-0.52	942	***	-2.09
P9978	P0200	270	0.15	682	***	-1.59
P9978	P0362	281	0.73	479	***	-1.89
P9978	P0547	91	-0.49	936	***	-1.95
P9978	P9400	113	-1.72	1,756	***	-3.71
P9978	P9650	84	-0.22	565	***	-2.47
P9978	P9721	126	-1.41	1,141	***	-0.54
NORTHLAND						
P9978	P0021	24	-0.41	151	NS	-3.13
P9978	P0200	32	0.39	155	NS	-2.39
P9978	P0362	34	0.55	219	NS	-2.72
WAIKATO						
P9978	P0021	80	-0.41	1,102	***	-1.94
P9978	P0200	90	0.27	712	***	-1.33
P9978	P0362	93	0.81	481	**	-1.86
P9978	P9400	50	-1.68	1,868	***	-4.49
P9978	P9650	42	-0.09	601	**	-2.66
BAY OF PLENTY GISBORNE & HAWKE'S BAY						
P9978	P0021	57	-0.36	1,138	***	-2.17
P9978	P0200	64	0.03	660	***	-2.18
P9978	P0362	69	0.64	493	**	-2.02
P9978	P9400	20	-1.18	2,256	***	-2.96
P9978	P9650	14	0.17	300	NS	-2.43
P9978	P9721	29	-0.99	1,128	***	-0.35
LOWER NORTH ISLAND						
P9978	P0021	90	-0.74	912	***	-1.90
P9978	P0200	82	0.01	886	***	-1.15
P9978	P0362	84	0.78	585	***	-1.50
P9978	P0547	80	-0.54	1,006	***	-2.07
P9978	P9400	34	-2.19	1,557	***	-3.52
P9978	P9650	26	-0.61	757	**	-2.21
P9978	P9721	48	-1.71	1,122	***	-0.85

Recommended growing regions



Recommended established plant populations (000's/ha)

Challenging yield environments	85
Medium yield environments	95
High yield environments	105

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Solid plant delivering yield stability.

Pioneer hybrid	Comparison hybrid	Number of trials	Harvest moisture difference (%) ¹	Grain yield advantage (kgDM/ha)	Statistical significance	Test weight difference (kg/hl)
NATIONAL						
P0200	P0021	226	-0.62	210	★	-0.50
P0200	P0362	243	0.62	-270	★	-0.12
P0200	P0547	64	-0.52	35	NS	-0.61
P0200	P0640	180	0.59	-998	★★★★	2.17
P0200	P9721	85	-1.45	338	★	0.91
P0200	P9978	270	-0.15	-682	★★★★	1.59
NORTHLAND						
P0200	P0021	25	-0.78	139	NS	-0.85
P0200	P0362	31	0.23	6	NS	-0.64
P0200	P0640	31	0.30	-824	CA	2.19
P0200	P9978	32	-0.39	-155	NS	2.39
WAIKATO						
P0200	P0021	79	-0.70	220	NS	-0.46
P0200	P0362	86	0.55	-316	NS	-0.24
P0200	P9721	34	-1.60	201	★★★★	0.97
P0200	P9978	90	-0.27	-712	★★	1.33
BAY OF PLENTY GISBORNE & HAWKE'S BAY						
P0200	P0021	51	-0.35	572	★★	-0.35
P0200	P0362	57	0.63	-95	NS	0.63
P0200	P0547	34	0.66	-222	NS	3.01
P0200	P9978	64	-0.03	-660	★★★★	2.18
LOWER NORTH ISLAND						
P0200	P0021	69	-0.64	-28	NS	-0.76
P0200	P0362	68	0.88	-465	★★	-0.07
P0200	P0547	57	-0.54	13	NS	-0.83
P0200	P9721	22	-1.40	339	NS	-0.29
P0200	P9978	82	-0.01	-886	★★★★	1.15

Recommended growing regions



Recommended established plant populations (000's/ha)

Challenging yield environments	85
Medium yield environments	95
High yield environments	105

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Robust hybrid with standability, foliar health and “eye appeal”.

Pioneer hybrid	Comparison hybrid	Number of trials	Harvest moisture difference (%) ¹	Grain yield advantage (kgDM/ha)	Statistical significance	Test weight difference (kg/hl)
NORTHLAND						
P0362	P0021	45	-0.89	327	CA	-0.37
P0362	P0200	31	-0.23	-6	NS	0.64
P0362	P0640	64	0.16	-471	★★	2.13
P0362	P0891	14	0.57	737	★	-2.49
P0362	P9978	34	-0.55	-219	NS	2.72
WAIKATO						
P0362	P0021	105	-1.41	639	★★★	-0.28
P0362	P0200	86	-0.55	316	★	0.24
P0362	P0640	125	0.27	-1,205	★★★	2.03
P0362	P0891	60	0.29	-266	NS	-3.28
P0362	P9978	93	-0.81	-481	★★	1.86
BAY OF PLENTY GISBORNE & HAWKE'S BAY						
P0362	P0021	79	-1.22	429	★★	-0.17
P0362	P0200	57	-0.63	95	NS	-0.28
P0362	P0640	112	0.06	-330	★	2.27
P0362	P0891	85	0.27	364	★	-3.42
P0362	P9978	69	-0.64	-493	★★	2.02
LOWER NORTH ISLAND						
P0362	P0021	119	-1.69	490	★★★	-0.53
P0362	P0200	68	-0.88	465	★★	0.07
P0362	P0547	122	-1.38	193	CA	-0.73
P0362	P0640	59	-0.19	-292	CA	1.95
P0362	P9721	60	-2.68	426	★★	0.75
P0362	P9978	84	-0.78	-585	★★★	1.50

Recommended growing regions



Recommended established plant populations (000's/ha)

Challenging yield environments	85
Medium yield environments	95
High yield environments	105

¹Positive harvest moisture differences indicate that the bolded Pioneer hybrid had a lower average moisture percentage at harvest than the comparison hybrid. Such hybrids are usually earlier in maturity or faster to drydown than the comparison hybrid. Negative moisture differences indicate that the bolded Pioneer hybrid had a higher average moisture percentage at harvest. Such hybrids are usually later in maturity or slower to drydown than the comparison hybrid. Positive yield and / or test weight differences indicate the bolded Pioneer hybrid had higher yield and / or grain test weight.



Leaf disease champion delivering yield stability.

Pioneer hybrid	Comparison hybrid	Number of trials	Harvest moisture difference (%) ¹	Grain yield advantage (kgDM/ha)	Statistical significance	Test weight difference (kg/hl)
NATIONAL						
P0640	P0021	380	-1.35	868	★★★	-2.74
P0640	P0362	361	-0.11	645	★★★	-2.11
P0640	P0891	498	0.47	398	★★★	-5.59
P0640	P0900	219	0.85	265	★★	-0.87
P0640	P0937	320	0.70	-277	★★	0.02
NORTHLAND						
P0640	P0200	31	-0.30	824	CA	-2.19
P0640	P0362	64	-0.16	471	★★	-2.13
P0640	P0891	53	0.24	532	★★	-5.78
P0640	P0900	26	0.50	672	★★	-1.12
P0640	P0937	42	0.49	-82	NS	-0.61
WAIKATO						
P0640	P0021	137	-1.40	1,338	★★★	-2.80
P0640	P0200	70	-0.81	1,408	★★★	-1.91
P0640	P0362	125	-0.27	1,205	★★★	-2.03
P0640	P0891	195	0.41	488	★★★	-5.13
P0640	P0900	88	0.81	431	★★	-0.68
P0640	P0937	126	0.67	-63	NS	0.03
BAY OF PLENTY GISBORNE & HAWKE'S BAY						
P0640	P0201	115	-1.11	660	★★★	-2.79
P0640	P0200	54	-0.59	659	★★	-2.88
P0640	P0362	112	-0.06	330	★	-2.27
P0640	P0891	220	0.42	315	★★★	-6.00
P0640	P0900	88	0.90	-92	NS	-0.99
P0640	P0937	130	0.69	-522	★★★	0.20

Recommended growing regions



Recommended established plant populations (000's/ha)

Challenging yield environments	85
Medium yield environments	95
High yield environments	100

¹Positive harvest moisture differences indicate that the bolded Pioneer hybrid had a lower average moisture percentage at harvest than the comparison hybrid. Such hybrids are usually earlier in maturity or faster to drydown than the comparison hybrid. Negative moisture differences indicate that the bolded Pioneer hybrid had a higher average moisture percentage at harvest. Such hybrids are usually later in maturity or slower to drydown than the comparison hybrid. Positive yield and / or test weight differences indicate the bolded Pioneer hybrid had higher yield and / or grain test weight.



CRM 107

Optimum
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**NEW**

Exceptional foliar health and yield stability – wet or dry!

Pioneer hybrid	Comparison hybrid	Number of trials	Harvest moisture difference (%) ¹	Grain yield advantage (kgDM/ha)	Statistical significance	Test weight difference (kg/hl)
NATIONAL						
P0710	P0200	83	-0.86	1,102	★★★	-2.53
P0710	P0362	86	-0.34	595	★★★	-2.08
P0710	P0640	109	-0.43	-322	NS	-0.58
P0710	P0900	92	0.31	222	NS	-0.79
P0710	P0937	92	0.13	-157	NS	0.44
NORTHLAND						
P0710	P0640	12	-0.04	-376	NS	-0.03
P0710	P0900	11	0.03	251	NS	-1.14
P0710	P0937	10	0.34	277	NS	-0.08
WAIKATO						
P0710	P0362	37	-0.35	808	★★	-2.59
P0710	P0640	46	-0.21	-401	NS	-1.04
P0710	P0900	35	0.65	97	NS	-0.76
P0710	P0937	35	0.22	-153	NS	0.38
BAY OF PLENTY GISBORNE & HAWKE'S BAY						
P0710	P0200	24	-0.92	1,130	★	-2.47
P0710	P0362	25	-0.21	417	NS	-2.12
P0710	P0640	35	-0.55	-324	NS	-0.30
P0710	P0900	29	0.13	72	NS	-0.44
P0710	P0937	30	0.01	-200	NS	1.07

Recommended
growing regions



Recommended established
plant populations (000's/ha)

Challenging yield environments	80
Medium yield environments	95
High yield environments	110

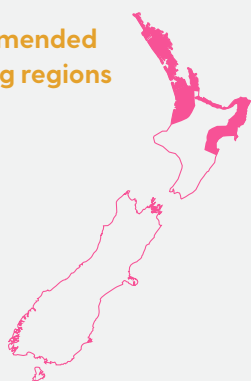
¹Positive harvest moisture differences indicate that the bolded Pioneer hybrid had a lower average moisture percentage at harvest than the comparison hybrid. Such hybrids are usually earlier in maturity or faster to drydown than the comparison hybrid. Negative moisture differences indicate that the bolded Pioneer hybrid had a higher average moisture percentage at harvest. Such hybrids are usually later in maturity or slower to drydown than the comparison hybrid. Positive yield and / or test weight differences indicate the bolded Pioneer hybrid had higher yield and / or grain test weight.



Stable, all-round hybrid.

Pioneer hybrid	Comparison hybrid	Number of trials	Harvest moisture difference (%) ¹	Grain yield advantage (kgDM/ha)	Statistical significance	Test weight difference (kg/hl)
NATIONAL						
P0900	P0362	107	-0.69	416	★	-0.82
P0900	P0640	219	-0.85	-265	★★	0.87
P0900	P0891	159	-0.53	421	★★★	-4.28
P0900	P0937	256	-0.20	-376	★★★	1.03
NORTHLAND						
P0900	P0362	11	-0.50	-178	NS	-0.44
P0900	P0640	26	-0.50	-672	★★	1.12
P0900	P0891	16	-0.69	501	★	-4.39
P0900	P0937	26	-0.16	-413	★	0.37
WAIKATO						
P0900	P0362	39	-0.69	803	★	-1.20
P0900	P0640	88	-0.81	-431	★★	0.68
P0900	P0891	68	-0.54	248	NS	-3.59
P0900	P0937	101	-0.24	-341	★	1.03
BAY OF PLENTY GISBORNE & HAWKE'S BAY						
P0900	P0362	36	-0.47	324	NS	-0.60
P0900	P0640	88	-0.90	92	NS	0.99
P0900	P0891	74	-0.49	546	★★	-4.90
P0900	P0937	105	-0.21	-302	★	1.20

Recommended growing regions



Recommended established plant populations (000's/ha)

Challenging yield environments	80
Medium yield environments	90
High yield environments	110

¹Positive harvest moisture differences indicate that the bolded Pioneer hybrid had a lower average moisture percentage at harvest than the comparison hybrid. Such hybrids are usually earlier in maturity or faster to drydown than the comparison hybrid. Negative moisture differences indicate that the bolded Pioneer hybrid had a higher average moisture percentage at harvest. Such hybrids are usually later in maturity or slower to drydown than the comparison hybrid. Positive yield and / or test weight differences indicate the bolded Pioneer hybrid had higher yield and / or grain test weight.



Solid hybrid with next generation grain yield.

Pioneer hybrid	Comparison hybrid	Number of trials	Harvest moisture difference (%) ¹	Grain yield advantage (kgDM/ha)	Statistical significance	Test weight difference (kg/hl)
NATIONAL						
P0937	P0362	206	-0.76	1,030	★★★	-2.09
P0937	P0640	320	-0.70	277	★★	-0.02
P0937	P0891	242	-0.46	1,092	★★★	-5.45
P0937	P0900	256	0.20	376	★★★	-1.03
NORTHLAND						
P0937	P0362	26	-0.40	948	★★	-1.17
P0937	P0640	42	-0.49	82	NS	0.61
P0937	P0891	25	-0.44	1,136	★★	-4.49
P0937	P0900	26	0.16	413	★	-0.37
WAIKATO						
P0937	P0640	126	-0.67	63	NS	-0.03
P0937	P0891	96	-0.53	923	★★★	-4.95
P0937	P0900	101	0.24	341	★	-1.03
BAY OF PLENTY GISBORNE & HAWKE'S BAY						
P0937	P0362	76	-0.57	942	★★★	-2.16
P0937	P0640	130	-0.69	522	★★★	-0.20
P0937	P0891	120	-0.42	1,223	★★★	-6.04
P0937	P0900	105	0.21	302	★	-1.20
P0937	P1253	114	0.02	934	★★★	-5.57
LOWER NORTH ISLAND						
P0937	P0362	37	-1.43	1,004	★★★	-2.19
P0937	P0547	31	-3.11	1,383	★★★	-2.42
P0937	P0640	21	-1.35	440	★	-0.12
P0937	P0900	23	-0.04	829	★★	-1.03

Recommended growing regions



Recommended established plant populations (000's/ha)

Challenging yield environments	85
Medium yield environments	95
High yield environments	110

¹Positive harvest moisture differences indicate that the bolded Pioneer hybrid had a lower average moisture percentage at harvest than the comparison hybrid. Such hybrids are usually earlier in maturity or faster to drydown than the comparison hybrid. Negative moisture differences indicate that the bolded Pioneer hybrid had a higher average moisture percentage at harvest. Such hybrids are usually later in maturity or slower to drydown than the comparison hybrid. Positive yield and / or test weight differences indicate the bolded Pioneer hybrid had higher yield and / or grain test weight.

MAIZE LEAF DEFOLIATION

Maintaining leaf health or structure throughout the growing season is one of the keys to maximising maize grain yields. Maize yields or drymatter production are greatly influenced by the amount of sunlight harvested by the leaf canopy through a process called photosynthesis. The harvested sunlight provides the energy required for drymatter production.

Any stress that reduces leaf area, health, development or longevity will affect photosynthesis, reducing the energy source required for maize yield accumulation. These factors include, but are not limited to, leaf damage from frost, drought, pest, disease or hail. Impact on grain yield and quality can be significant, especially if they occur early during the reproductive stages. Though occurrence is unpredictable and variable both spatially and temporally, climate change is likely to increase their frequency, highlighting the

need to quantify the influence of leaf damage on crop production.

In recent years, northern leaf blight (NLB) has been reported in areas where it had never been seen before. Likewise, fall armyworm (FAW), a tropical pest never seen in New Zealand before, has been observed across the country, and a potential outbreak if the right conditions exist, is not out of question. Like hail and frost, NLB and FAW can significantly impact maize yields through leaf death or defoliation.

Field studies to quantify the impact of leaf damage on yield are usually difficult to implement due to the unpredictable and non-uniform nature of pest, disease or weather damage. Leaf defoliation studies (Picture 1) can, however, be used as a proxy for leaf damage or death due to physical or biological impact.



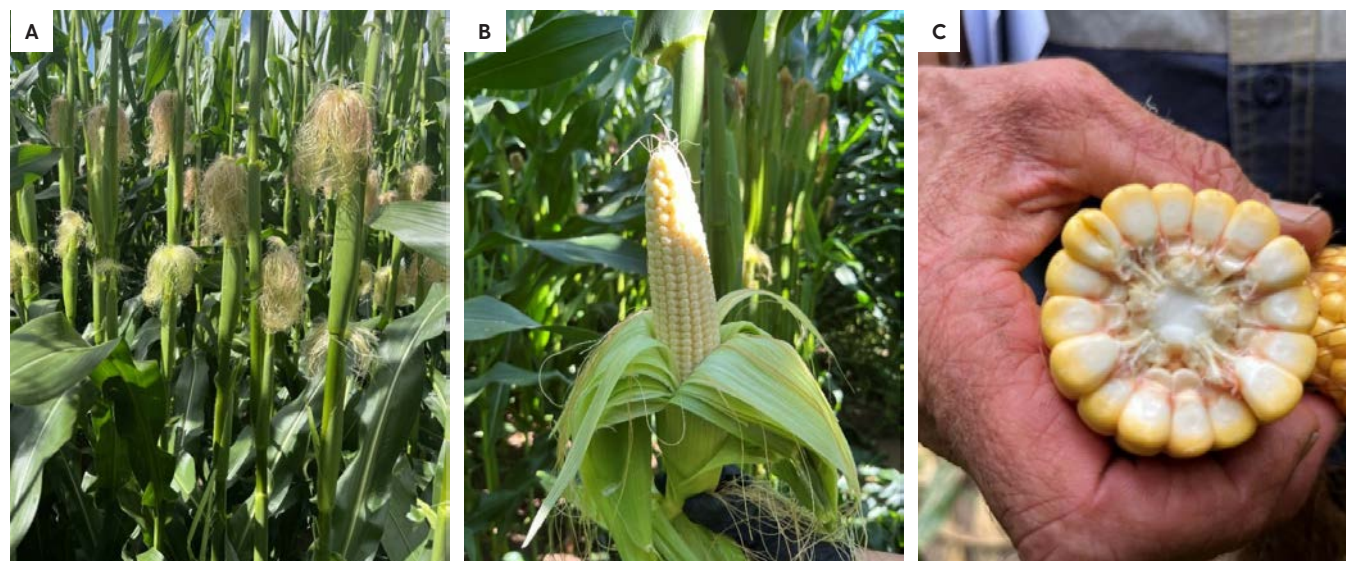
Picture 1: Maize plants showing defoliation treatment applied about two weeks after silking (end of lag phase).

Replicated maize trials were established at two Waikato sites over two seasons (2023-24 and 2024-25) to determine the effect of leaf defoliation on maize grain yield. Whole leaf blades were manually removed at three timings: (i) silking, (ii) end of lag phase or beginning of effective grain filling, which occurs approximately two weeks after silking and (iii) dough stage (about four to five weeks after silking; Pictures 2a-c). Leaf removal treatments included (i) control (no leaf removal), (ii) all leaves, (iii) all leaves above or (iv) below the ear

centre rows were harvested for maize grain. Mean treatment yields were then calculated to estimate the impact of defoliation on maize grain yield relative to control plots.

Results

Yield response to the defoliation treatments was similar between the two sites. Results reported here are hence an average of the two sites. Though leaf defoliation resulted in maize



Picture 2: Timing of maize leaf defoliation (A – silking; B – Lag phase; C – Dough stage).

(cob), (v) all, but the five leaves around the ear and (vi) five leaves around the ear.

It is known that maize hybrids may respond differently to leaf defoliation, and hence the selection of P9978, a hybrid that possesses a canopy structure representative of the majority of Pioneer® brand maize hybrids.

At harvest maturity, two x 5 m long buffered

grain yield loss, the severity of yield impact was determined by the position and timing of leaf defoliation (Table 1).

Across the three timings, defoliating the whole leaf canopy (Picture 2a) resulted in the greatest yield losses (70%), whereas removal of the bottom leaves (Picture 2b) had the least yield impact (8%, Figure 1).

Table 1: Impact of maize leaf removal from variable canopy positions at three maize growth stages on maize grain yield (t/ha).

Leaf defoliation	Silking	End of lag phase*	Dough stage*	Mean
treatment	Maize grain yield, t/ha (14% moisture)			
Control (no leaf removal)	19.4			
All leaves	1.4	5.4	11.2	6.0
Five around ear	13.8	14.8	17.0	15.2
All above ear	14.4	14.9	16.5	15.3
All but 5 around ear	15.4	16.5	18.2	16.7
All below ear	16.8	17.8	18.8	17.8
Mean	12.4	13.9	16.3	14.2

*End of lag phase or dough stage occurs about 2 or 4-5 weeks after silking, respectively.

Removing leaves above the ear (Picture 2c) or the five around the ear (Picture 2d) had a similar impact on yield, reducing grain yields by about 20%. These results highlight the significance of top leaves or the ones around the ear in determining maize grain yields.

longer, whereas lower leaves usually gradually senesce with age due to poor light conditions. This increases energy consumption for respiration, which negatively impacts biomass yield accumulation.

Due to their larger leaf area and proximity to the



Picture 3: Maize defoliation treatments showing leaf removal (A) throughout the canopy, (B) below the ear, (C) above the ear, (D) around the ear.

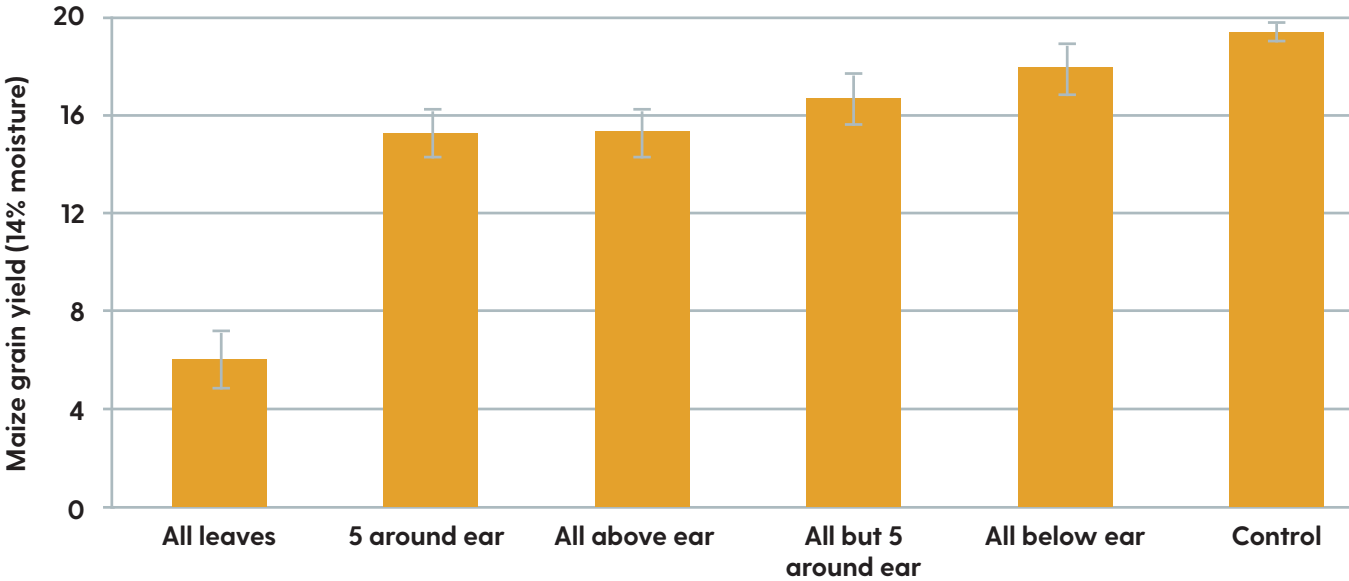


Figure 1: The effect of leaf defoliation across a range of canopy positions on maize grain yields.

Leaves in the centre and upper canopy are the main yield drivers since they receive the most sunlight, which increases the efficiency of converting light into biomass. Increased light absorption is either due to position on the canopy (top leaves) or greater size (centre leaves). These leaves naturally stay green

ear, leaves at the middle part of the maize canopy contribute more photosynthates to grain, requiring less energy or delay. The leaves are usually the main functional leaves for drymatter production, and they obtain more solar radiation when the leaves in the upper canopy are upright.

Effect of leaf defoliation timing on maize grain yields

Timing of leaf defoliation had a significant impact on crop performance, with grain yield reductions of 93% when all leaves were removed at silking vs a 42% yield reduction when leaves were removed at the dough stage.

importance of our findings. Yield impact is greatest if damage occurs within the first two weeks of silking, particularly if it is on the centre and/or top leaves. Damage that occurs about four weeks after silking or later, particularly if restricted to bottom leaves,

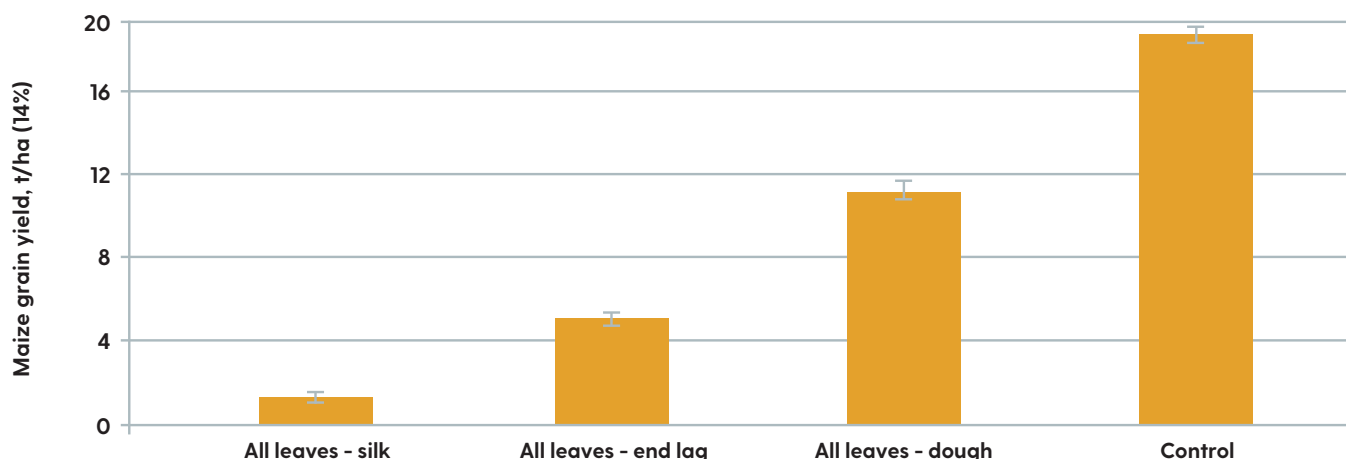


Figure 2: The effect of total leaf defoliation on maize grain yields.

Defoliating five leaves around the ear at silking had a greater yield impact (29%) compared to defoliation at the dough stage (12%; Figure 3). Leaf removal below the ear had the least impact on grain yield, resulting in a 13% grain yield reduction compared to a 25% or 29% yield reduction if either top or centre leaves were defoliated at silking, respectively (Table 1).

Our results indicate that post-dough stage, the yield contribution of lower leaves is marginal because

may not have a significant impact on grain yields.

Protecting the upper canopy particularly during early grain fill should be an important management consideration, especially when deciding on fungicide application and timing. Benefits from late chemical applications will likely be marginal and hence should be avoided where possible. Unnecessary sprays are not only costly but can also kill some beneficial insects.

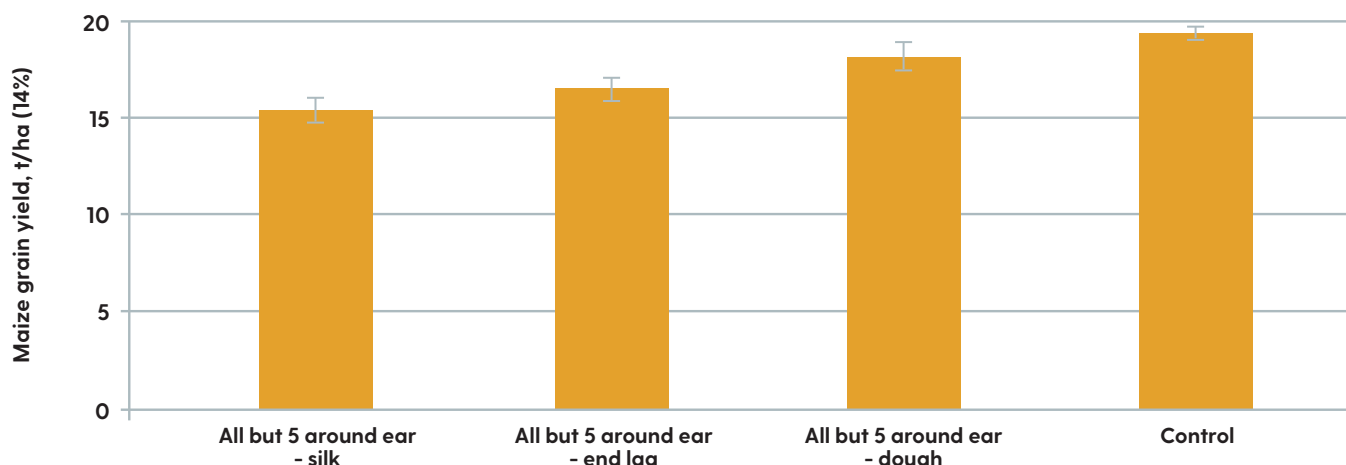


Figure 3: The effect of defoliating all leaves other than the five around the ear at different maize growth stages on maize grain yields.

the maize plant prioritises energy and resources to kernels, and the upper and centre leaves do the heavy lifting. Protecting leaf health of the central and upper leaf canopy during late grain fill stages is therefore critical to maximising maize grain yields.

Summary

Leaf damage due to physical or biological factors is unpredictable and can occur anytime during the growing season, hence the need to understand the

Weather, pest or disease damage to crops is often uneven and patchy. Our study involved completely and uniformly defoliating the whole leaf. In contrast, in real life, leaf damage may not necessarily destroy the whole leaf, allowing the remaining leaf fractions to continue photosynthesising, contributing toward yield production. Our findings should therefore only be used as a guide, rather than an accurate representation of real-world leaf damage. Adjustments will have to be made based on the severity and timing of the damage.



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