Measuring harvest loss in New Zealand 2025

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Introduction

Between January and May 2025, Foundation of Arable Research (FAR) and Harvester Specialists conducted a comprehensive study across the North and South Islands of New Zealand to measure harvest losses. Building on the success of previous harvester set-up workshops and in-field collaboration with Primary Sales and FAR in 2023–2024, this study aimed to quantify the grain left in the paddock by New Zealand growers and identify opportunities to optimise harvester performance. The findings presented in this report provide valuable insights drawn from a diverse range of crops and locations, offering practical guidance for improving operational efficiency and reducing harvest losses.

Overview

The study reflects a good cross selection of growers from different regions, the variety of different crops harvested, and the range of machines / brands used.

- 47 Individual Growers involved in testing
- 179 Test conducted in total
- 14 different crops

Number of tests by region

Region	Number of Tests
Mackenzie County	2
Mid Canterbury	67
North Otago	9
Palmerston North	4
Pukekohe	3
South Canterbury	44
Southland	1
Southland	4
Wairarapa	25
Waikato	20
Grand Total	**179**

Number of tests by combine harvester

Type of Combine	Number of Tests	% of tests
Case	35	20%
Claas	54	30%
JD	24	13%
New Holland	66	37%
Grand Total	179	100%

Number of tests by crop

Type of Crop	Number of Tests
Barley	47
Canola	11
***Clover**	20
****Grass**	6
Maize	23
Oats	7
Peas	6
Ryegrass	13
Small Seed	6
Wheat	38
Rye Corn	2
Grand Total	179

*Clover includes: white and red clover

**Grass includes turf grass and browntop

***Small seed includes: plantain, spinach

Average yield (t/ha) per crop

Type of Crop	Average yield (t/ha)
Barley	9.72
Browntop	0.44
Canola	3.88
Clover	0.74
Maize	16.13
Oats	7.00
Peas	3.50
Plantain	2.40
Red clover	0.80
Rye corn	2.70
Ryegrass	2.09
Spinach seed	1.80
Wheat	11.00
White clover	0.40

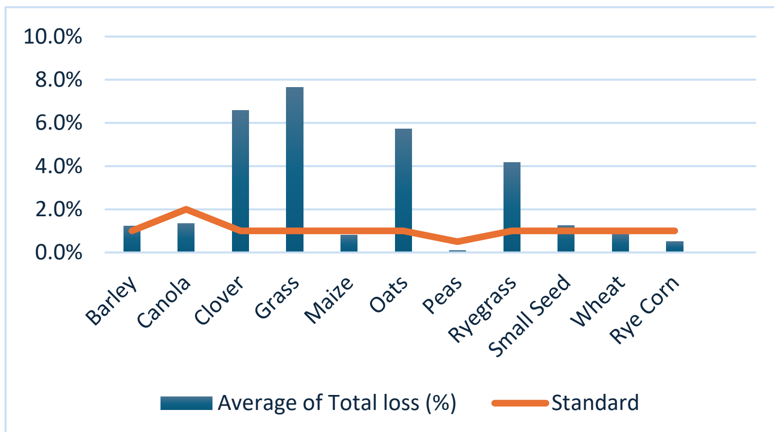
Comment: 2025 was a difficult year for harvesting, with weather events and moisture content of crops affecting the harvesting window available. Small Seeds such as spinach, plantain and grass such as Browntop and Turf Grass did not have enough testing to be considered. Factors such as uneven crop ripening, variety differences and late morning dew affect harvest losses.

Machine losses

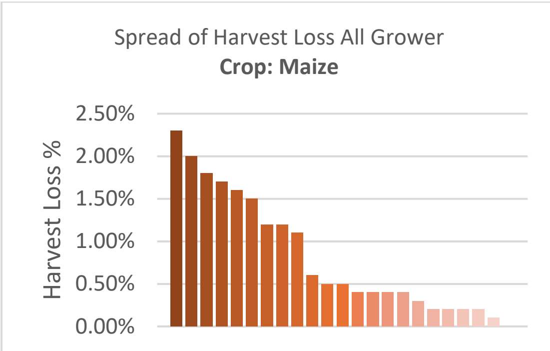
The American Society of Agricultural and Biological Engineers (ASABE) recommend that machine loss should be 1% of grain yield. With Grains Research & Development Corporation (n.d.) studies finding losses to be around 2-3% for Canola and small grain, under 1% for cereals and 0.5-1% for pulse crops. Based on the above table losses for Barley (cereal), Clover (small seed), Grass, Oats and Ryegrass were above the standard for losses. Canola, Wheat, Peas, Maize and Small seeds such as Plantain and Spinach Seed were within the acceptable range for machine losses.

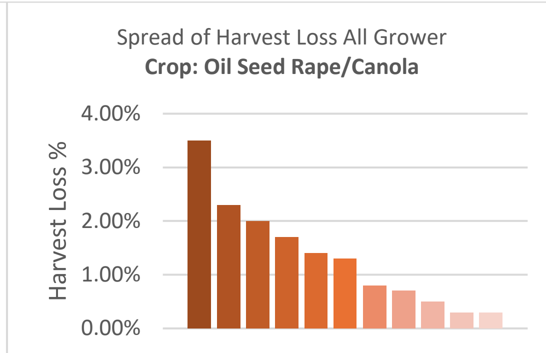
Machine loss by crop

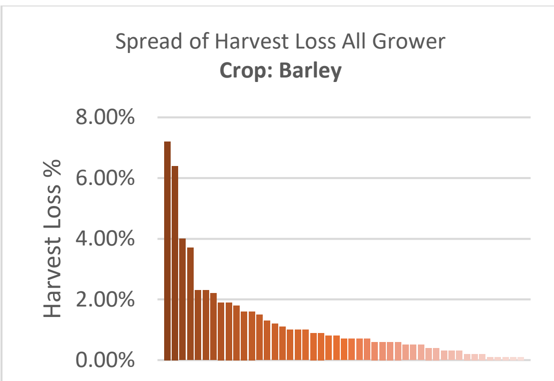
	Average of Total loss (%)
Barley	1.23%
Canola	1.35%
Clover	6.58%
Grass	7.65%
Maize	0.82%
Oats	5.73%
Peas	0.08%
Ryegrass	4.18%
Small Seed	1.25%
Wheat	0.87%
Rye Corn	0.50%
Grand Total	**2.15%**

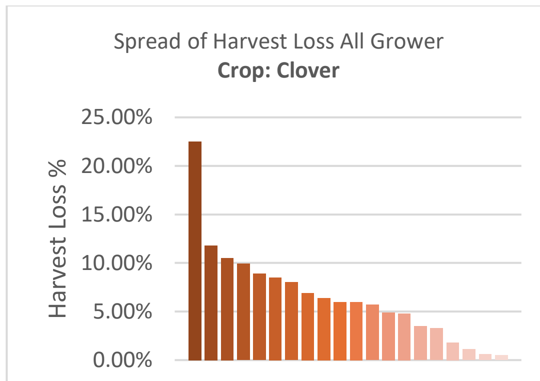


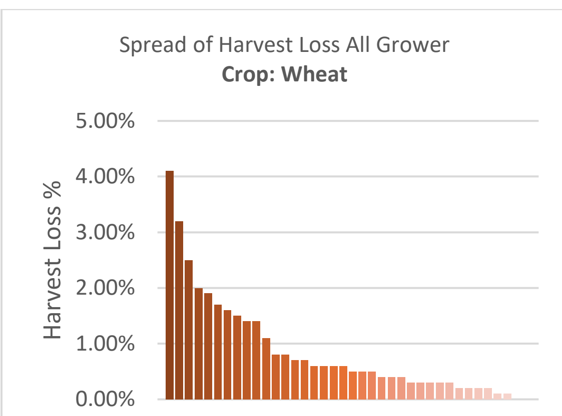
Spread of harvest loss across all growers, per crop.

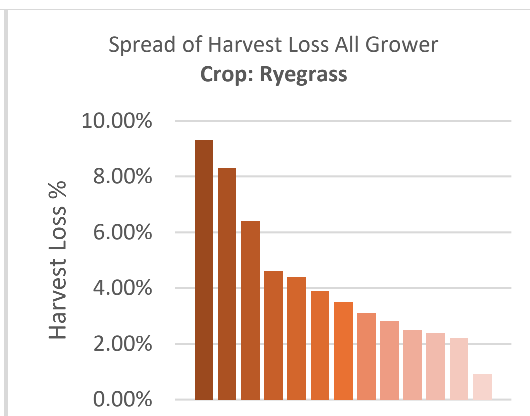












In number of key crops (wheat, barley and canola), the harvest losses are at the acceptable benchmark, the range of losses show from very high to zero show that there is opportunity for all growers to reduce their harvest losses and put more Dollars in their bin. NZ growers even raised the issue that there is a need to consider the actual Dollar value of the loss

"…1% loss might be acceptable in wheat, but I'm not happy with leaving $70 per Hectare when my yield is 12-15 tonnes."

Average total loss in value terms by crop type

Crop Type	Average of Average yield (t/ha)	Estimated average harvest commodity Price ($/t)	Average of Total loss (%)	Average value measured lost ($/ha)	NZ Final Production in tonnes 2024 (tonnes)	Extrapolated harvest losses NZ 2024 production
Barley	9.72	$450.00	1.2%	$53.90	261,600	$1,450,210
Canola	3.88	$900.00	1.3%	$47.01	10,000	$121,091
Clover	0.67	$7,500.00	6.6%	$329.07	3,500	$1,727,250
Grass	0.44	x	7.7%	x	x	x
Maize	16.13	$505.00	0.8%	$66.58	111,4600	$4,600,874
Oats	7.00	$474.00	5.7%	$190.07	11,700	$317,695
Peas	3.50	x	0.1%	x	x	x
Ryegrass	2.09	$1,750.00	4.2%	$152.94	8,500	$621,317
Small Seed	2.10	x	1.3%	x	x	x
Wheat	11.00	$486.00	0.9%	$46.43	299,000	$1,261,937
Rye Corn	2.70	x	0.5%	x	x	x
Grand Total			2.2%			x

Comment: Some information was not able to be sourced for all crop types. These are average values for MAY 2025.

Growers who had pans vs didn't have pans average total loss.

Average of Total loss (%)	No Pan	Yes-Own Pan
Grand Total	2.84%	1.24%

To quantify the benefit of using pans in dollars, for the average grower harvesting 100 hectares of barley the saving of using pans would be $6,998, every year.

While this was limited data, it shows a trend that growers who are measuring with a pan have lower losses, due to awareness and focus on reducing losses. (Results from 1st test of each grower visited). This is also supported by results from GRDC Harvester Loss Studies 2022 and 2023.

In-field changes to impact productivity

During in-field testing, specialists collaborated with growers to implement changes aimed at reducing harvest loss and improving productivity.

Change in losses

Measuring harvest loss has given growers the insight as well as the confidence to make small in-field adjustment to harvester settings that enable them to increase ground speed or simply to go faster.

The examples below demonstrate impact of change to harvest loss:

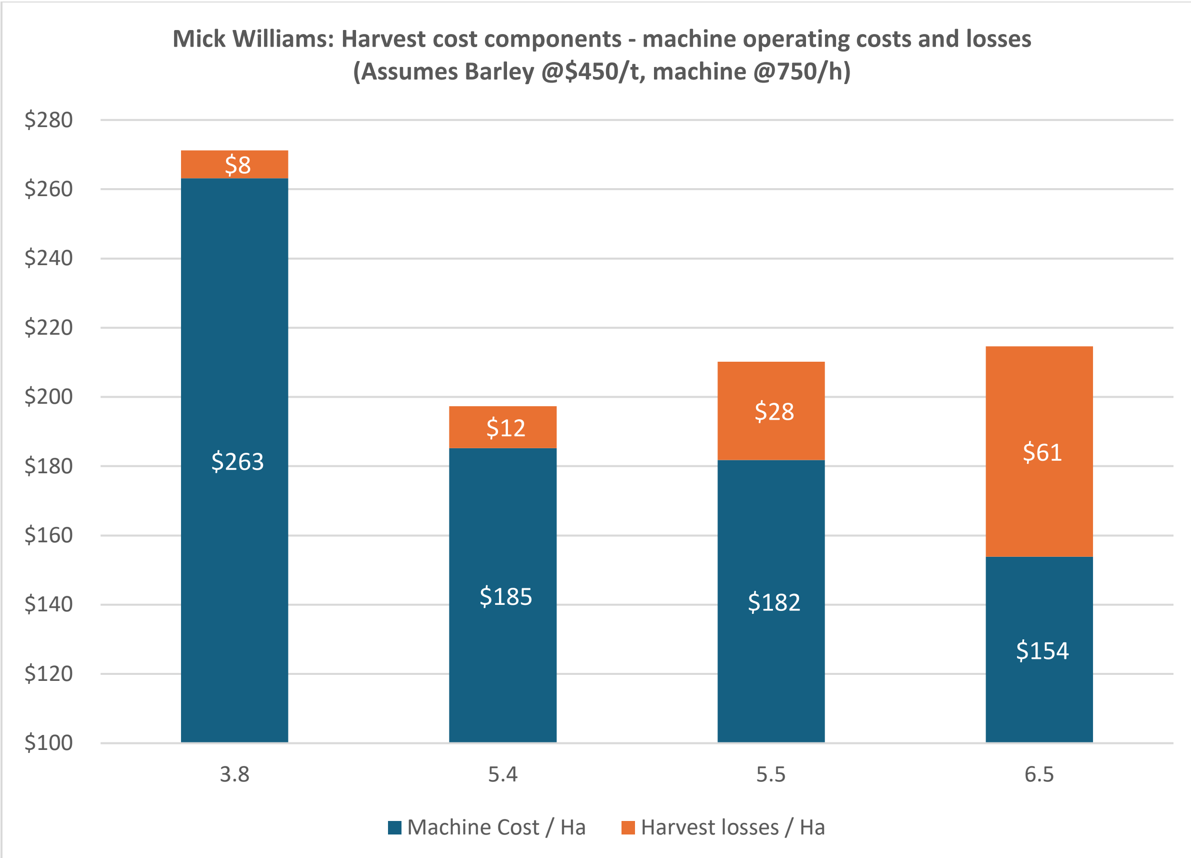
> Earl Worsfold grower from Mid Canterbury harvested Red Clover with an initial loss value of 22.5% (180kg/ha) after changing his concave in position 3 from Large Wire OEM to a Round bar, as well as some setting changes, he reduced his losses to 0.6%. This is a saving of $1,314 per hectare (based on the above chart).
>
> A grower (Grower L) from South Canterbury harvested Wheat with an initial loss value of 1.4% (144 kg/ha) after increasing his rotor speed from 850 to 1150 the loss decreased to 0.4%. Though a small percentage change, for Grower L over a 100ha programme he would save $486.

Increase in ground speed

A small increase in ground speed, across a crop programme, can significantly reduce the total duration of harvest.

An example typical from the field:

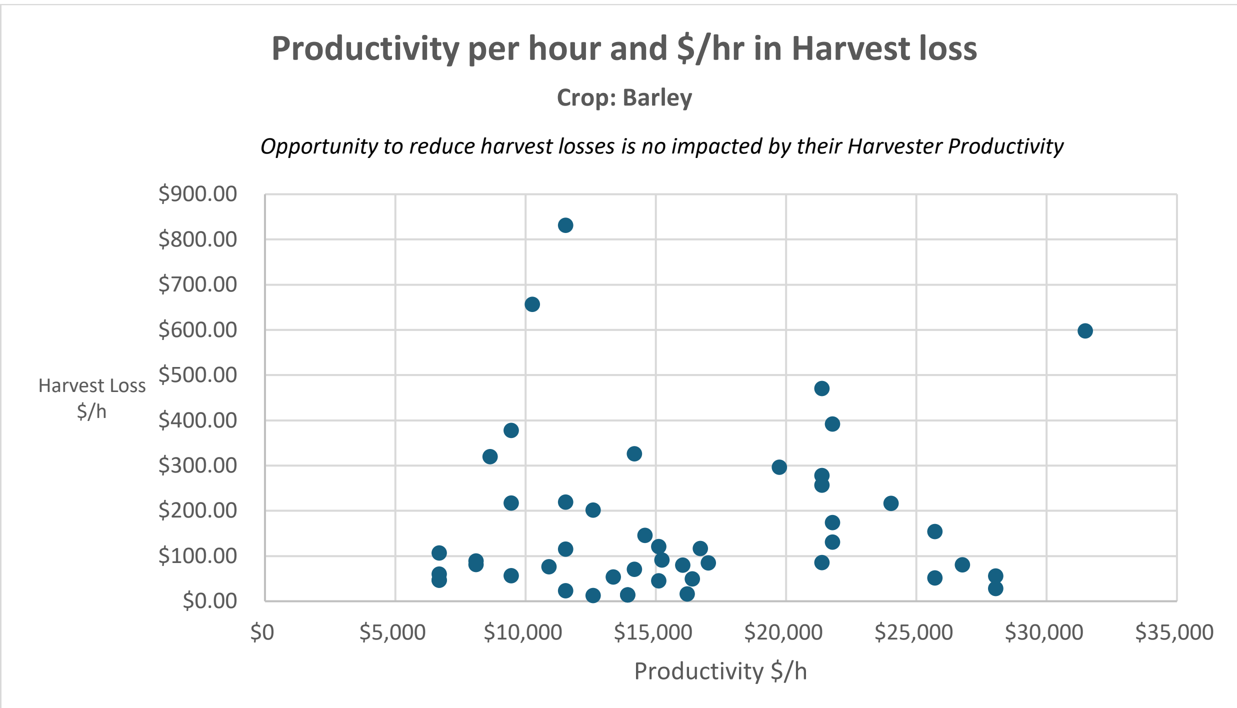
> Mick Williams a grower from Wairarapa was harvesting Barley at 3.8km/h, after measuring losses and found their losses at an acceptable value of 0.2% increased their speed to 5.4km/h. This is an overall increase of 42% in productivity with no change in harvest losses.
>
> Tonnes per hour = Yield x ground speed x front width / 10
>
> Initial: 27.6 T/hr = 9.7 x 3.8 x 7.5 / 10
>
> Change: 39.3 T/hr = 9.7x 5.4 x 7.5/ 10
>
> Based 50 hectares of crop to harvest at a cost of $750/ hour to run a harvester, the grower’s saving of 5.2hr of working time equates to a dollar operational saving of $3,900.


Mick Williams: Harvest cost components - machine operating costs and losses
(Assumes Barley @$450/t, machine @750/h)
$280
$260
$240
$220
$200
$180
$160
$140
$120
$100
$8
$263
$12
$185
$28
$182
$61
$154
3.8
5.4
5.5
6.5
Machine Cost / Ha
Harvest losses / Ha

Balancing productivity and losses

Increasing grower productivity requires balancing harvester throughput (ground speed) and harvest losses (machine + front losses). Not all losses go down with decrease ground speed, going faster can also reduce losses. The below graph shows no strong correlation and indicates that high or low productivity does not inherently predict higher or lower losses. Some harvesters with similar productivity have vastly different loss levels, indicating potential for improvement through better machine settings, operator training, or equipment maintenance.

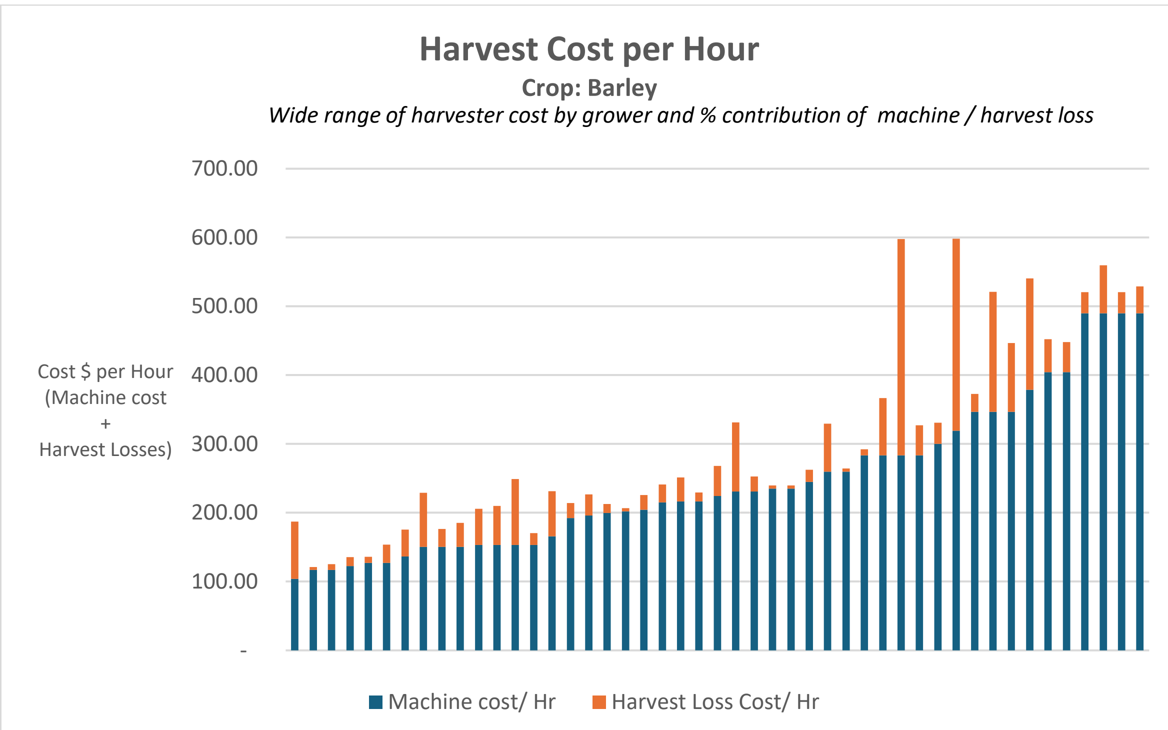
Productivity per hour in $/hr in Harvest loss



Grower harvest cost per hour varies widely and is individual to grower machinery, crops and conditions. However, this cost is something growers can impact in field by changes to setting of the harvester. As the graph below shows, the wide range of machine costs show variance in harvest losses; there is no correlation in loss to machine cost.

Growers need to be testing harvest losses and assessing where they can improve their ground speed (and therefore reducing their harvester machine cost per hour).

Harvest cost per hour in barley

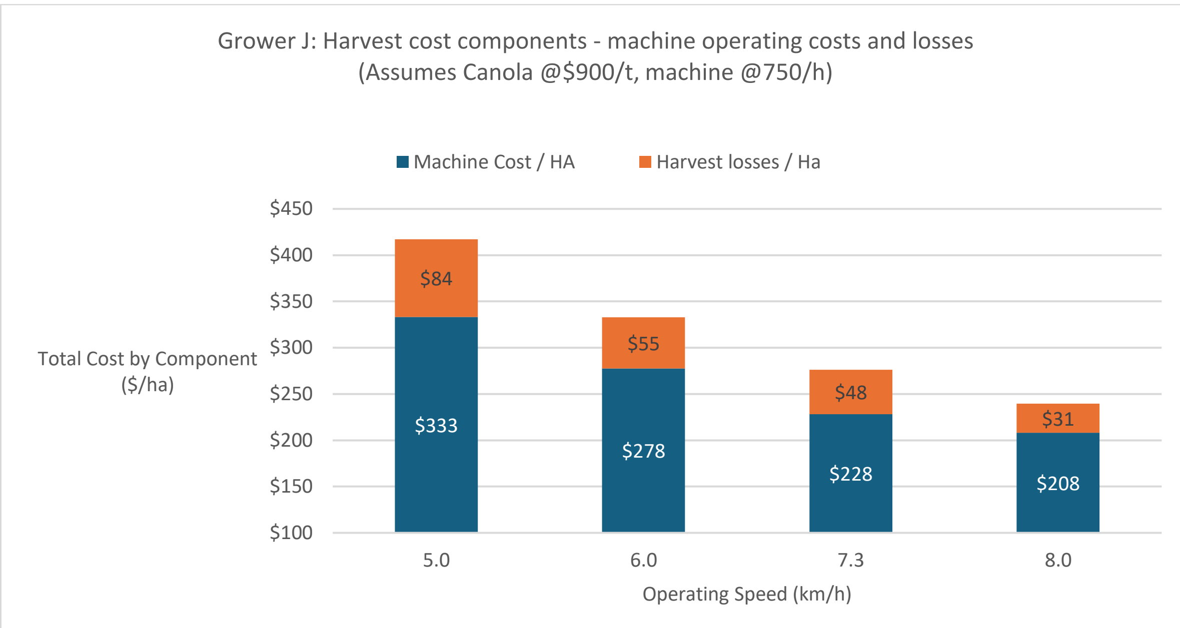


The harvest loss testing showed that growers can lower their total harvest costs by improving ground speed and by lowering harvest losses. As the examples from the study demonstration.

Grower J case study

Grower J from South Canterbury harvesting Canola decreased his harvesting cost by making incremental changes to settings (drum, fan and ground speed). Graph below shows that he increased speed and drop losses to achieve an increase in productivity of 60%, saving 8.3hrs of harvest time equating to $4,326 over 50ha programme.

Graph of harvest cost components for Grower J

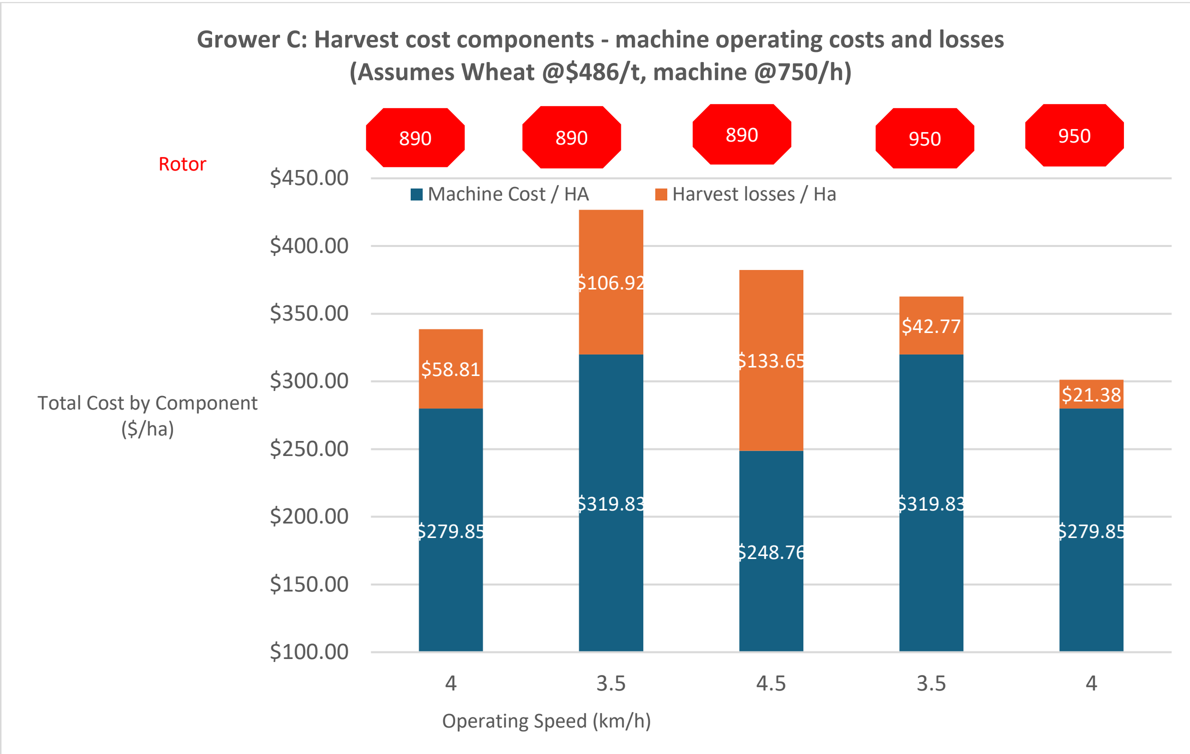


Determining the optimal balance between ground speed and harvest losses to maximize productivity is specific to each grower and requires measuring losses to identify the right settings for their crop and conditions, as demonstrated in the examples below. It is therefore important to encourage growers to measure their in-field harvest loss, try different speed and harvester settings to find the right balance for their programme.

Grower C case study

Grower C adjusted their operating speed and their rotor speed. Based on the above chart operating at 4 km/h with a rotor speed of 950 was the optimum settings for their wheat crop and conditions.

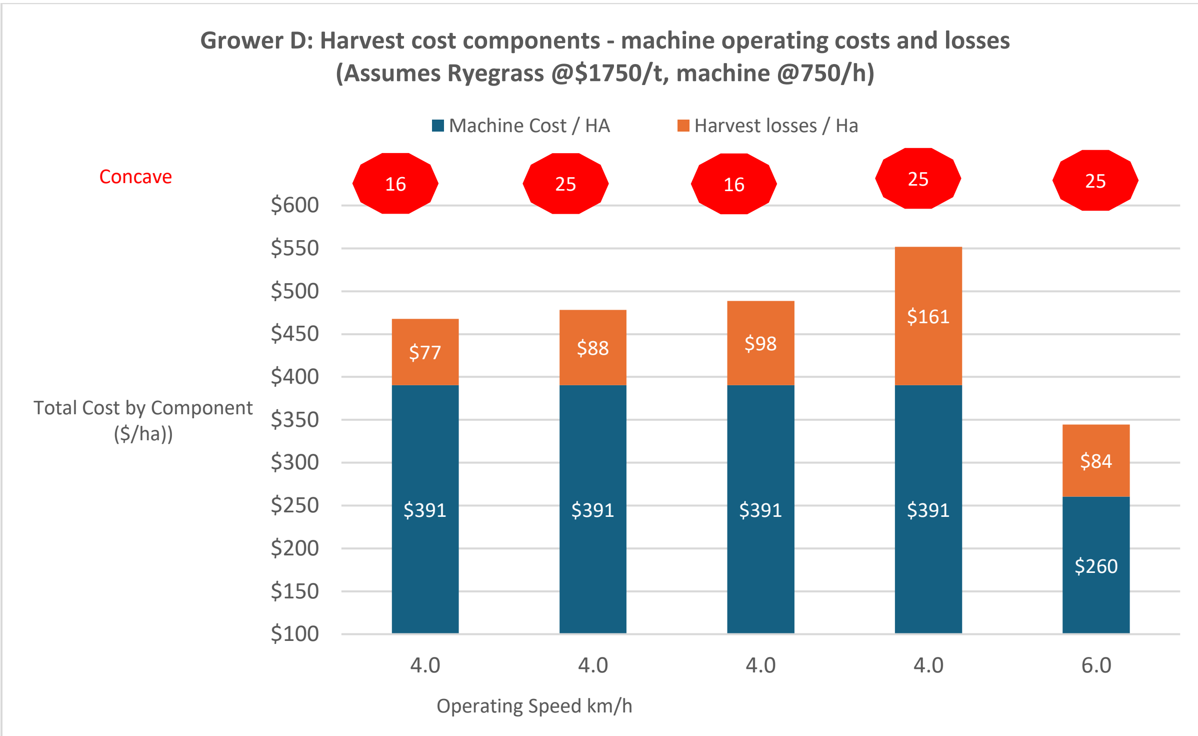
Graph of harvest cost components for Grower C



Grower D case study

Grower D adjusted their operating speed and their concave settings. Based on the chart below operating at 6km/h with a concave open to 25 was the optimum settings for their Ryegrass and conditions.

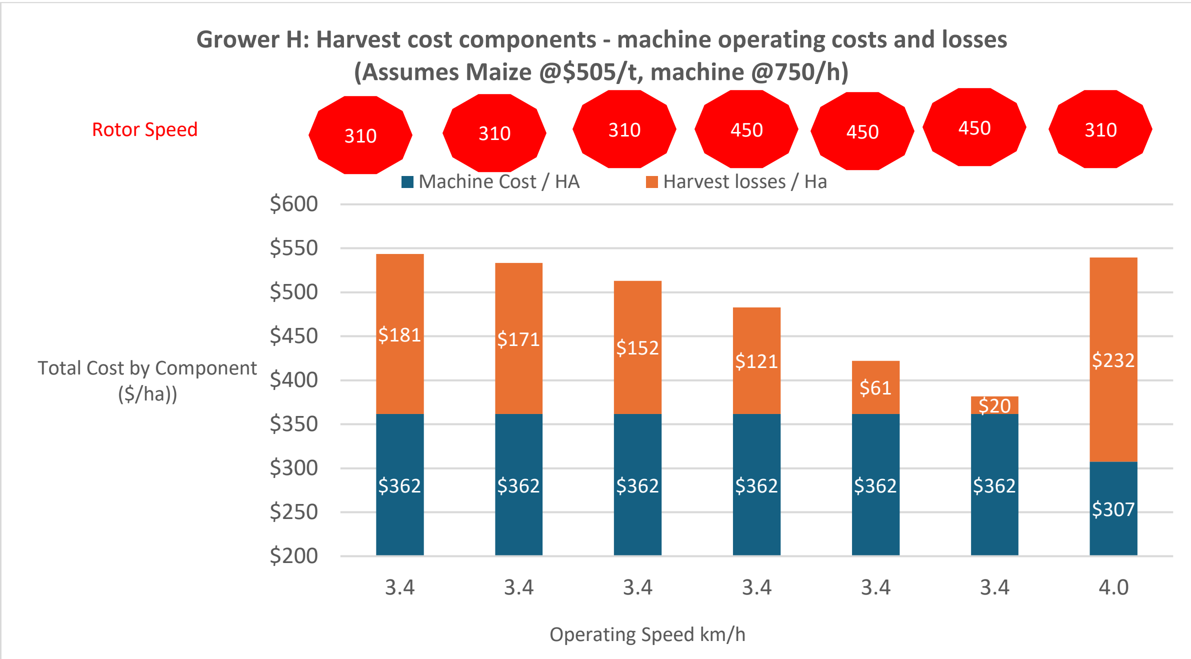
Graph of harvest cost components Grower D



Grower H case study

Grower H adjusted their operating speed, top sieve, rotor speed. Based on the chart below, operating at 3.4km/h with a rotor speed of 450 will be the optimum speed for that combine and conditions.

Graph of harvest cost components Grower H



Average grower profile

Extrapolating the data to an "average grower" with a 200-hectare cropping programme (40ha each of barley, 60ha wheat, 20ha canola/oilseed rape, 30ha ryegrass, 20ha clover, 30ha in small seed/other grasses) shows that growers have the opportunity to significantly increase profitability by optimizing harvester settings, adjusting ground speed, and performing proper maintenance.

Based on typical test data savings across the full 200ha programme:

$48/ha savings in barley =	$1,900
$117/ha in wheat =	$7,020
$200/ha in canola/oilseed rape =	$4,000
$250/ha in clover =	$5,000
$169/ha in ryegrass =	$5,070
$/ha in small seed and other grasses, data not available	
Total Potential Saving	**$23,010**

Additionally, for growers in Waikato with a 200ha maize programme, there's a potential saving of $100/ha, equating to $20,000.

These results reinforce the importance of measuring losses, fine-tuning equipment to crop and field conditions, and adopting best practices to maximize profitability.

Conclusion

From January to May 2025, FAR and Harvester Specialists carried out a detailed study across New Zealand's North and South Islands to measure harvest losses and identify opportunities for improving harvester efficiency. This work built on the momentum of previous harvester set-up workshops and field support delivered in collaboration with Primary Sales and FAR during 2024–2025.

The study confirmed that growers who owned and used a drop pan to measure harvest losses experienced, on average, half the losses of those who did not. This validates the assumption that increased awareness, supported by accurate measurement tools, enables growers to make informed adjustments and reduce losses.

Importantly, the data showed that reducing harvest loss does not always come at the cost of productivity. Instead, by comparing harvest loss with productivity, growers can identify the optimal balance for their specific conditions giving growers the confidence to make changes and improve their harvest productivity. In many cases, simple in-field adjustments—such as concave or settings changes, proved effective. On average, growers who measured and responded to their harvest losses had the potential to save around $60,000 through better equipment tuning and loss management.

Barley (cereal), Clover (small seed), Grass, Oats, and Ryegrass experienced harvest losses above the acceptable standard, indicating greater opportunity for improvement. In contrast, Canola, Wheat, Peas, Maize, and small seeds such as Plantain and Spinach Seed were found to be within acceptable machine loss thresholds, based on international standards. However, it still needs to be determined whether these thresholds are truly acceptable for New Zealand growers. Given the high input costs and the value of high-yielding crops, some growers expressed concern, noting that they would not be comfortable leaving that much potential revenue behind in the field.

This study mainly examined machine loss, further research into front loss (losses caused by the harvester front, such as shattering, poor cutting etc.) is encouraged, especially in high value crops such as clover. Assessing issues such as knife sharpness, reed speed, crop feeding and more, their impact on overall losses and where improvements can be made.

FAR's investment in harvester set-up workshops and in-field support has equipped growers with the practical tools, knowledge, and confidence needed to improve both their harvesting performance and overall profitability. Grower, Paul Johnston, provided feedback highlighting the value of this support. He reported an overall clearer understanding of harvester set-up, for better decision management at harvest through his improved knowledge of how his machine impacted his sample and losses.

By focusing on practical tools like drop pans and building growers' knowledge through in-field engagement, FAR and its partners have enabled meaningful improvements in harvest efficiency across New Zealand. While there is still work to be done, particularly in understanding front losses and refining what is considered "acceptable" for New Zealand condition, this work lays a solid foundation. Continued investment in grower education, machine optimisation, and on-farm research will be essential to further reduce losses and improve profitability for New Zealand growers.

Recommendations for New Zealand growers

Use drop pans regularly to measure losses
Growers who used drop pans experienced significantly lower harvest losses. Regular use during harvest allows timely adjustments and helps ensure grain is not unnecessarily left behind.

Measure front loss separately
It's important to distinguish between losses occurring at the front of the machine (e.g., shattering or poor cutting) and those from the separation system. Measuring front loss separately helps pinpoint where improvements are needed.

Establish your own acceptable loss threshold
While some crops may fall within industry-accepted machine loss standards, individual growers, especially those with high-input, high-value crops, should evaluate whether these levels are acceptable for their own operations.

Fine-tune harvester settings in-field
Simple adjustments to concave clearance, rotor/cylinder speed, sieve settings, and fan speed can significantly reduce losses without compromising productivity. Perform in-field testing when changing crops, conditions, or paddocks. It is important to change only one thing at a time.

Monitor conditions and calibrate for crop variability
Crop moisture, density, and straw load can all affect machine performance. Frequent calibration and adaptation to changing conditions can prevent excessive losses.

Invest in harvester training and set-up support
Continued participation in harvester set-up workshops or consulting with specialists can improve understanding of machine capabilities and refine operator techniques.

Benchmark performance against similar operations
Comparing harvest loss and productivity data with peers or industry benchmarks can help identify underperformance and opportunities for improvement.

Include harvest loss in profitability assessments
Treat harvest loss as a cost—calculate its impact per hectare or per hour. Factoring it into farm profitability models will encourage more deliberate focus on reduction strategies.

Record and review data across seasons
Keep detailed records of machine settings, losses, and weather conditions. Analysing this data over time will help inform better decisions and support continuous improvement.

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For further information

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