

Seed Yield and Seed Loss With Different Swather Machines

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Background

- The loss of seed as a result of shattering can be an important constraint to yield.
- Shattered seed = volunteers.
- Yield losses in perennial ryegrass as a result of harvest activities averaged 24% in New Zealand (Rolston and Chynoweth, 2010).
- Work has been done to solve this problem, but only harvest timing strategies using seed moisture measurements, have proven to be useful.
- What is our situation in Oregon?



Shattered grass seed on the ground (TG Chastain photo)



Seed Yield Potential vs. Actual Yield

An example for perennial ryegrass



- Grass seed crops are biologically inefficient in the production of seed.
- Many flowers are produced by grasses yet relatively few of the flowers become seed.
- Research efforts are aimed at capturing a greater proportion of yield potential in grower's harvests.

Perennial ryegrass seed yield potential vs. actual (TG Chastain figure)



Study Objectives

- Evaluate swather machines in grass seed crops to compare:
 - Seed yield
 - Seed loss
- Better understand how much seed we lose in Oregon grass seed:
 - Tall Fescue
 - Perennial Ryegrass



Shattered grass seed on the ground (NP Anderson photo)

Methods – Seed Yield

- Large-scale (500 ft) replicated field trials were established in tall fescue (2) and perennial ryegrass (2).
- Seed moisture was determined at swathing (4:45 – 6:30am).
- Four uniquely different swathers
 - MD Single Auger
 - JD Double Auger
 - MD Draper
 - JD Rotary Disc
- Weigh wagon used to weigh each windrow and M2B Clipper cleaner used to determine clean seed yield.





Grass seed swathers (top) and weigh wagon harvest (bottom) (NP Anderson photos)

Swather Details

	Tractor	Header	Approximate	Cutting
Swather	Model	Model	Speed	Width
			MPH	Ft.
MD Single Auger	M1170	A40DX	4.5 - 5.0	15.75
JD Double Auger	4895	890	4.0 - 4.5	13.75
MD Draper	M1170	DX115/D65	4.5 - 5.5	14.25
JD Rotary Disc	W260	995	11.0 - 14.0	15.75

Additional machine information can be accessed online:

John Deer Windrowers and Draper Platforms, 2018 MacDon Swather Products, 2018





Four swather machines cutting turftype tall fescue (NP Anderson video)

Methods – Seed Loss

- Three 8 ft² areas per windrow vacuumed one week after cutting, before combining.
 - 50% under windrow / 50% outside windrow
- Residue, straw, and other debris was cleaned by NUMEROUS seed cleaning techniques.
- Percent loss determined from clean seed.

Methods for determining seed shatter losses in the field (NP Anderson photos)







Shattered grass seed samples from vacuuming the ground after swathing (NP Anderson photos)





Hand screens used to begin cleaning vacuum samples (NP Anderson photo)



Seed blower separating debris (NP Anderson photo)



Perennial ryegrass seed being cleaned on a table top Clipper cleaner (NP Anderson photo)



Lab-scale gravity table (NP Anderson photo)

Results – Tall Fescue Site 1

Seven year dryland tall fescue. Swathed July 6, 2018. Seed moisture = 24.7%.

	Clean Seed		
Swather	Yield	Seed Loss	Yield Loss
	(lb/a)	(lb/a)	(%)
MD Single Auger	1610 a*	230	14.4
JD Double Auger	1739 b	214	12.4
MD Draper	1841 b	168	9.1
JD Rotary Disc	1548 a	213	14.0

LSD = 0.05*



Results – Tall Fescue Site 2

Ten year dryland tall fescue. Swathed July 6, 2018. Seed moisture = 30.5%.

	Clean Seed		
Swather	Yield	Seed Loss	Yield Loss
	(lb/a)	(lb/a)	(%)
MD Single Auger	1225	66	5.3
JD Double Auger	1279	103	8.1
MD Draper	1282	71	5.5
JD Rotary Disc	1162	70	6.1

LSD = 0.05



Results – Perennial Ryegrass Site 1

Second year irrigated perennial ryegrass. Swathed July 13, 2018. Seed moisture = 14.6%.

	Clean Seed		
Swather	Yield	Seed Loss	Yield Loss
	(lb/a)	(lb/a)	(%)
MD Single Auger	2172	529	24.3 ab ⁺
JD Double Auger	1814	549	30.3 b
MD Draper	2012	273	13.5 a
JD Rotary Disc	1870	568	30.7 b

 $LSD = 0.10^{+}$



Results – Perennial Ryegrass Site 2

First year perennial ryegrass. Swathed July 13, 2018. Seed moisture = 28.2%.

	Clean Seed		
Swather	Yield	Seed Loss	Yield Loss
	(lb/a)	(lb/a)	(%)
MD Single Auger	2757 ab*	896 bc+	32.9 bc*
JD Double Auger	2549 a	976 c	38.3 c
MD Draper	3020 c	633 a	21.0 a
JD Rotary Disc	2842 bc	692 ab	24.4 bc

LSD = 0.05* LSD = 0.10+



Tall Fescue Summary

	Clean Seed		
Swather	Yield	Seed Loss	Yield Loss
	(lb/a)	(lb/a)	(%)
MD Single Auger	1417 ab	148	9.8
JD Double Auger	1509 bc	158	10.2
MD Draper	1562 c	120	7.3
JD Rotary Disc	1355 a	141	10.1

LSD = 0.05



Perennial Ryegrass Summary

	Clean Seed		
Swather	Yield	Seed Loss	Yield Loss
	(lb/a)	(lb/a)	(%)
MD Single Auger	2465 b	712 b	28.6 b
JD Double Auger	2182 a	763 b	34.3 b
MD Draper	2516 b	453 a	17.3 a
JD Rotary Disc	2356 ab	630 b	27.6 b

LSD = 0.05



Conclusions

- Variability in swather performance between fields. Some standouts.
- Windrow sizes and shapes were different.
- Seed loss was higher in PRG than TF:
 - 5 14% in TF
 - 21 33% in PRG
- Timely harvest is critical matters. Variety observations may be helpful.
- Shattered seed = volunteers.
- Next steps likely need to include phenotypic characteristics and plant breeders.
- Need to cut at high SMC near physiological maturity to maximize seed yield.







FOLLOW OSU Seed Moisture Recommendations

	Recommended seed	Moisture loss per
Crop	moisture for swathing	day
	(%)	(%)
Annual ryegrass	43-48	2.0 - 3.0
Orchardgrass	42-46	1.0
Tall Fescue (forage)	40-43	2.5 – 3.0
Tall Fescue (turf)	35-45	2.5 – 3.0
Perennial ryegrass	35-45	3.0
Chewings fescue	30	5.0
Creeping red fescue	25-35	4.0
Kentucky bluegrass	24-28	3.0 - 4.0

(Silberstein et al, 2010; Silberstein and Anderson, 2011)

.....AND KNOW YOUR VARIETIES !!!

A BIG THANKS

To a whole LOT of people who pulled this off with little time and no money.....

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Questions?



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