

SPot Farm Results 19 January, 2021

Desiccation: how effective are diquat alternatives for potato crops?

Mark Stalham (Coordinator)

With contributions from staff at NIAB CUF, Richard Austin Agriculture Ltd, Scottish Agronomy & Crop and Environment Research Centre



POTATOES

2019/2020 Aim

Aim

To find the best alternative(s) to diquat for desiccation of potato haulm, focussing on indeterminate and seed crops

In 2020, this included demonstrating effective N management using RB209 to ensure canopies are maximising the efficiency with which N is used and allowing rapid skinset to shorten the period to harvest

Skin-set summary 2019 (3 weeks post-T1): 5 experiments + 2 demonstrations

<15 % is skinset for harvesting

Treatment	Skinning (% SA)
Control (None)	33.0
Reglone	19.9
Pelargonic acid	23.8
Spotlight/Gozai	22.9
Flail/haulm pulling	19.7
(Saltex) [†]	(16.4) [†]

[†]5 trials only.

Realistically, the differences are only 1-2 days

Skin-set summary **2019**: large site differences (3 weeks post-T1; % SA skinned): all sites

Treatment	SPot North (seed)	SPot Scotland (seed)	SPot North (ware)	Elveden (ware)	SPot Scotland (ware)	SPot SW (ware)	SPot West (ware)
Control (None)	52	48	8.3	23	39	5.6	61
Reglone	32	31	5.0	11	34	3.3	27
Pelargonic acid	36	33	6.5	16	39	3.9	36
Spotlight/Gozaï	37	31	5.8	12	37	3.6	39
Flail/haulm pulling	28	23	5.4	12	24	3.7	42
(Saltex)†			5.7	13	29	4.1	35

<15 % is skinned for harvesting

Practical recommendations from 2019

- Differences in the rate of foliage death between treatments did not correlate well with skinset
- There was, on average, a 1-2 day delay in skinset for Spotlight/Gozai compared to Reglone, flail, haulm-pulling or Saltex, and this should be factored into any harvesting schedule
- Crops showing signs of active senescence responded rapidly to chemical desiccation

Sites in 2020

Site	Variety	Use	RB209 N (kg/ha)	RB209 – 15 % (kg/ha)
East	Lanorma	Ware	185	157
North	Maris Piper	Ware	135	115
West	Royal	Ware	160	136
Scotland	Daisy	Seed	85	72

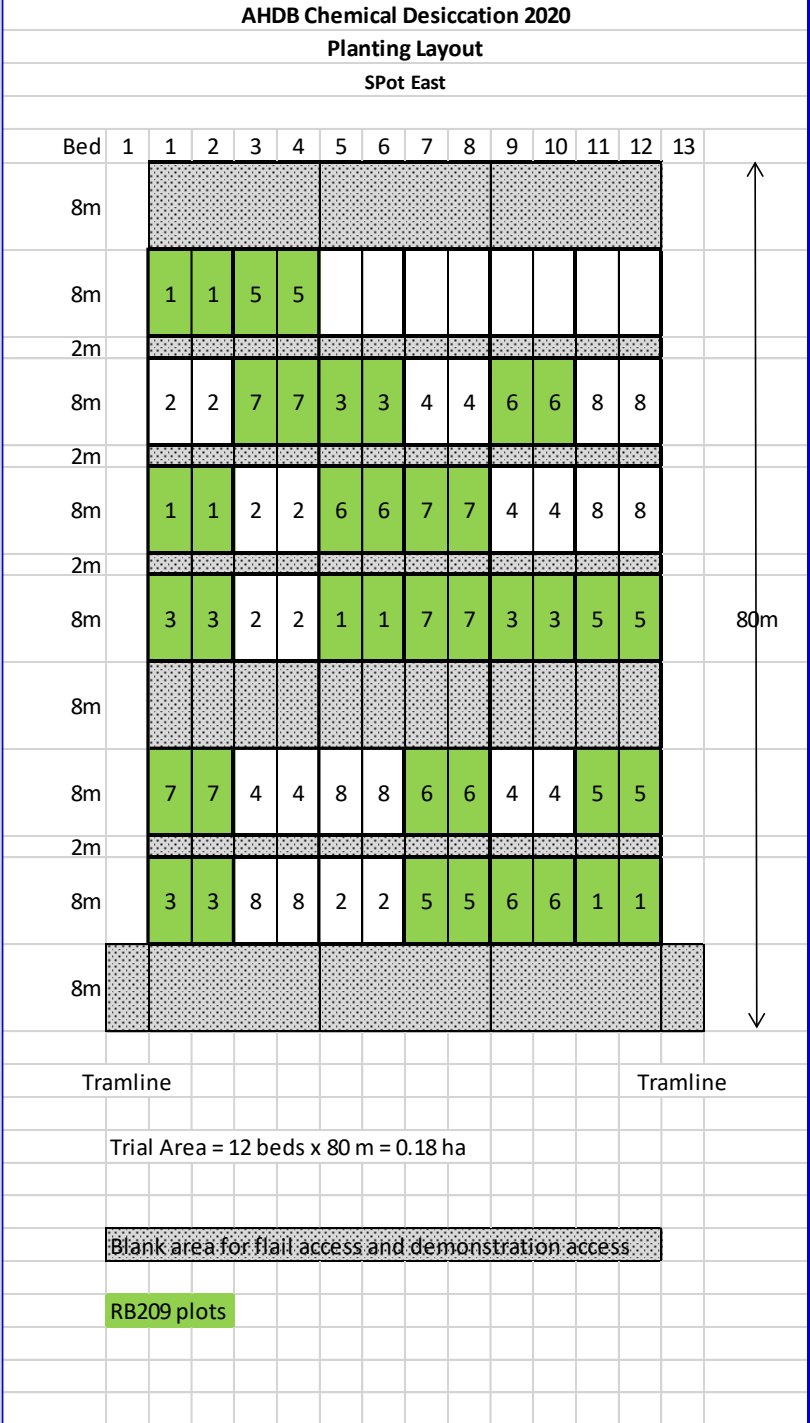
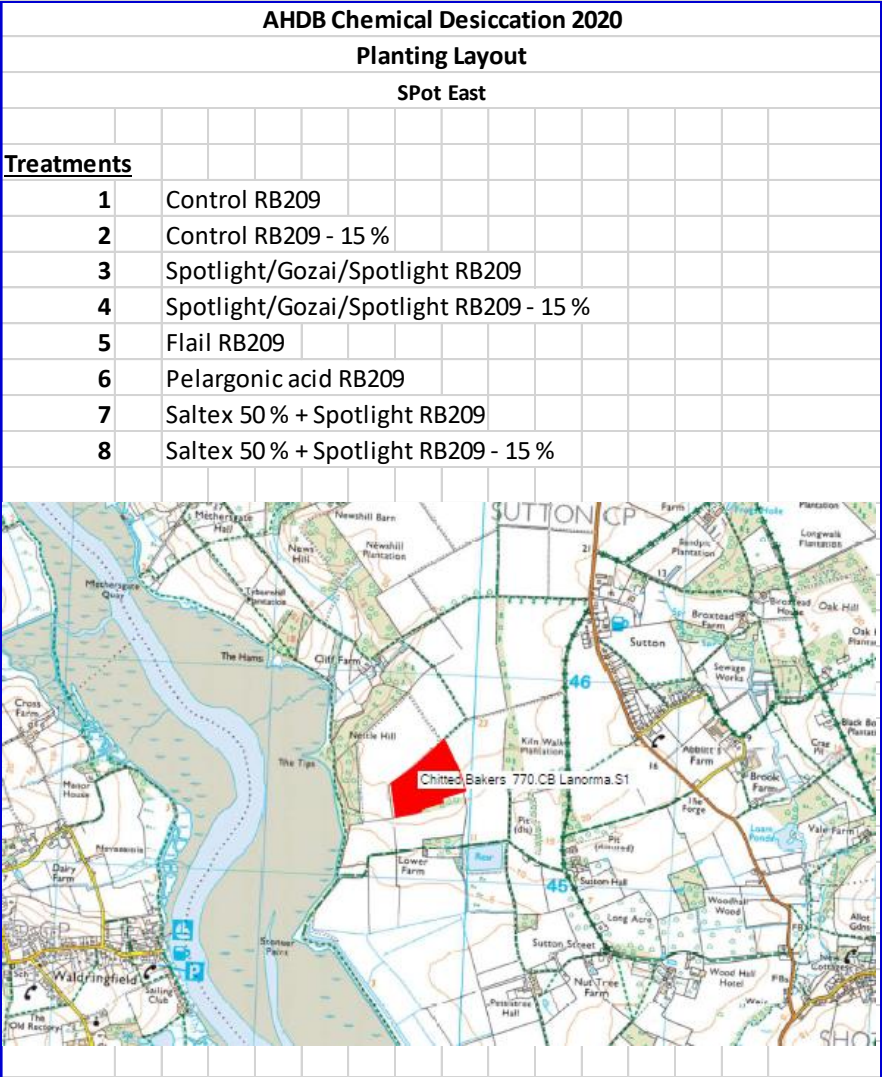


Experimental treatment and timings (n.b. no Reglone)

(All 400 l/ha volume, except Saltex 568 l/ha)

		Days after T1	0	3	7	10	14	21
No.	Treatment	N rate	T1	T2a	T2b	T3a	T3b	T4 (if reqd)
1	Control	RB209						
2	Control	RB209-15 %						
3	Spotlight-Gozai-Spotlight	RB209	Spotlight 1.0 l		Gozai 0.8 l		Spotlight 0.6 l	Gozai 0.8 l
4	Spotlight-Gozai-Spotlight	RB209-15 %	Spotlight 1.0 l		Gozai 0.8 l		Spotlight 0.6 l	Gozai 0.8 l
5	Flail RB209	RB209	Flail	Gozai 0.8 l		Spotlight 1.0 l		Gozai 0.8 l
6	Finalsan	RB209	Finalsan 67.5 l		Gozai 0.8 l		Spotlight 1.0 l	Gozai 0.8 l
7	Saltex	RB209	Saltex 562 l + Spotlight 1.0 l		Gozai 0.8 l			Gozai 0.8 l
8	Saltex	RB209-15 %	Saltex 563 l + Spotlight 1.0 l		Gozai 0.8 l			Gozai 0.8 l

Experimental layout



SPot East: Lanorma



Pre-
application



SPot North: Maris Piper



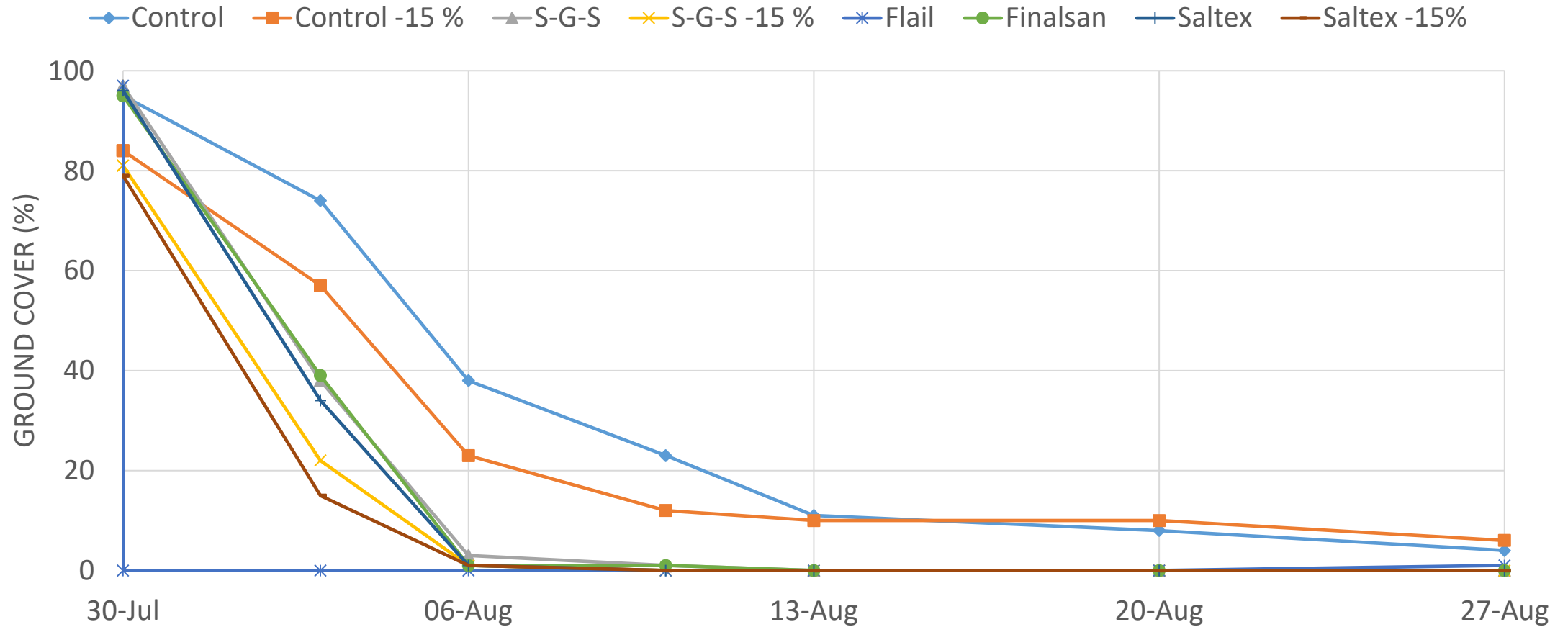
Pre-
application



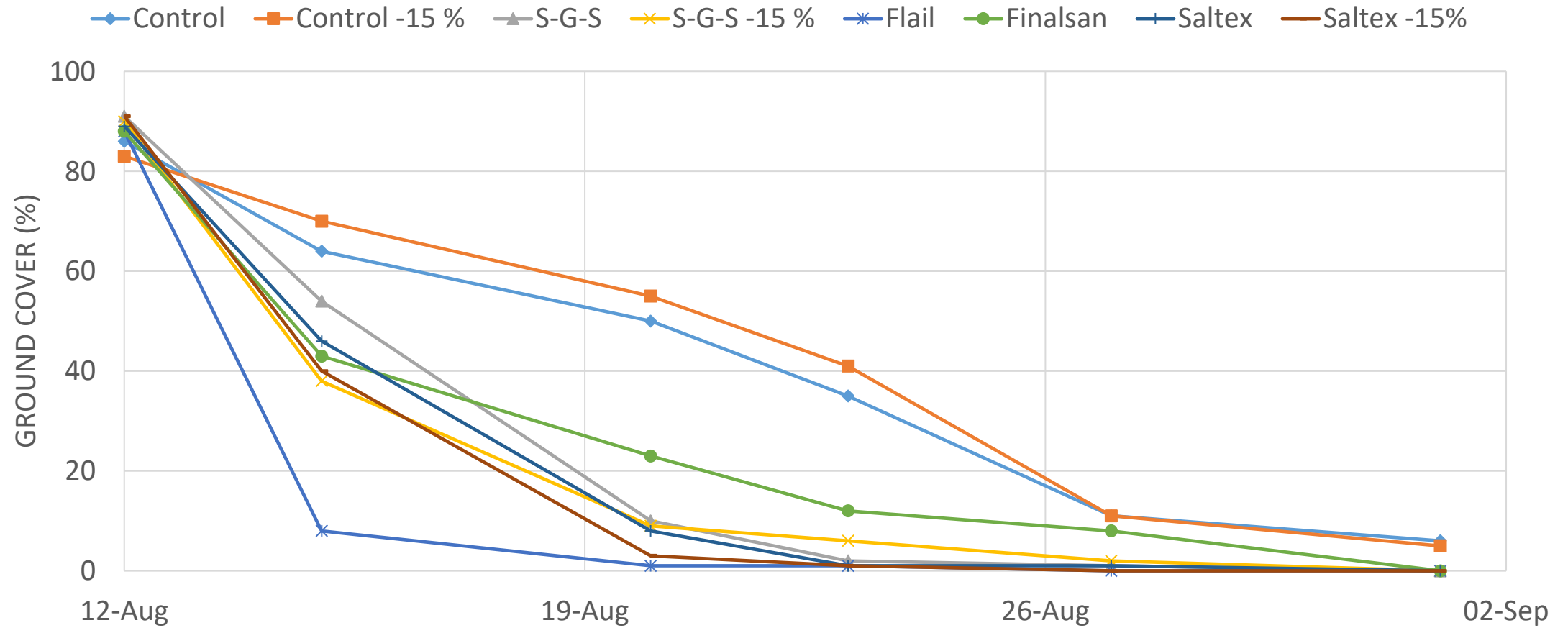
Post-flail



Ground cover timecourse: East



Ground cover timecourse: North



Ground cover and stem desiccation T1 + 2 weeks: East (typical of North also)

Control



Spotlight-
Gozai-
Spotlight



Finalsan



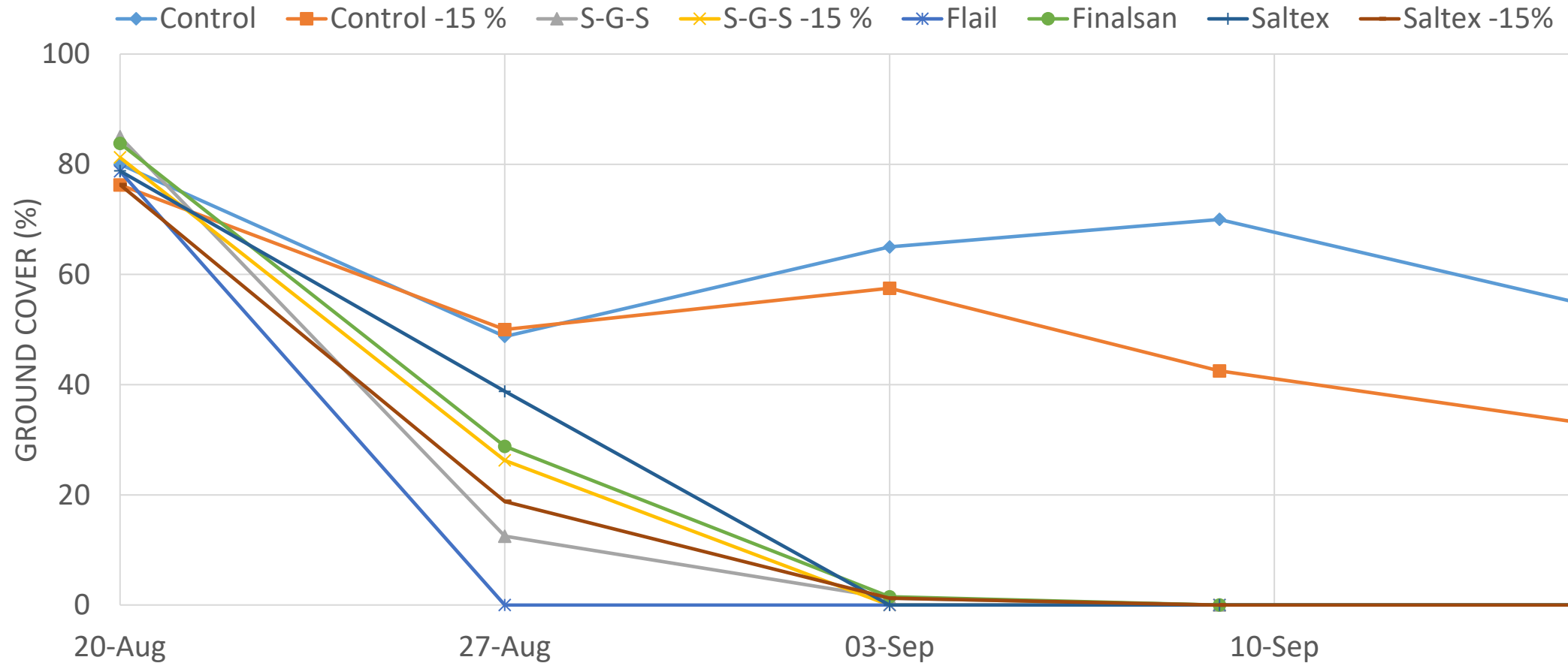
Saltex



SPot West



Ground cover timecourse: West



Ground cover and stem desiccation T1 + 2 weeks:

West

Control



Spotlight-
Gozai-
Spotlight



Finalsan



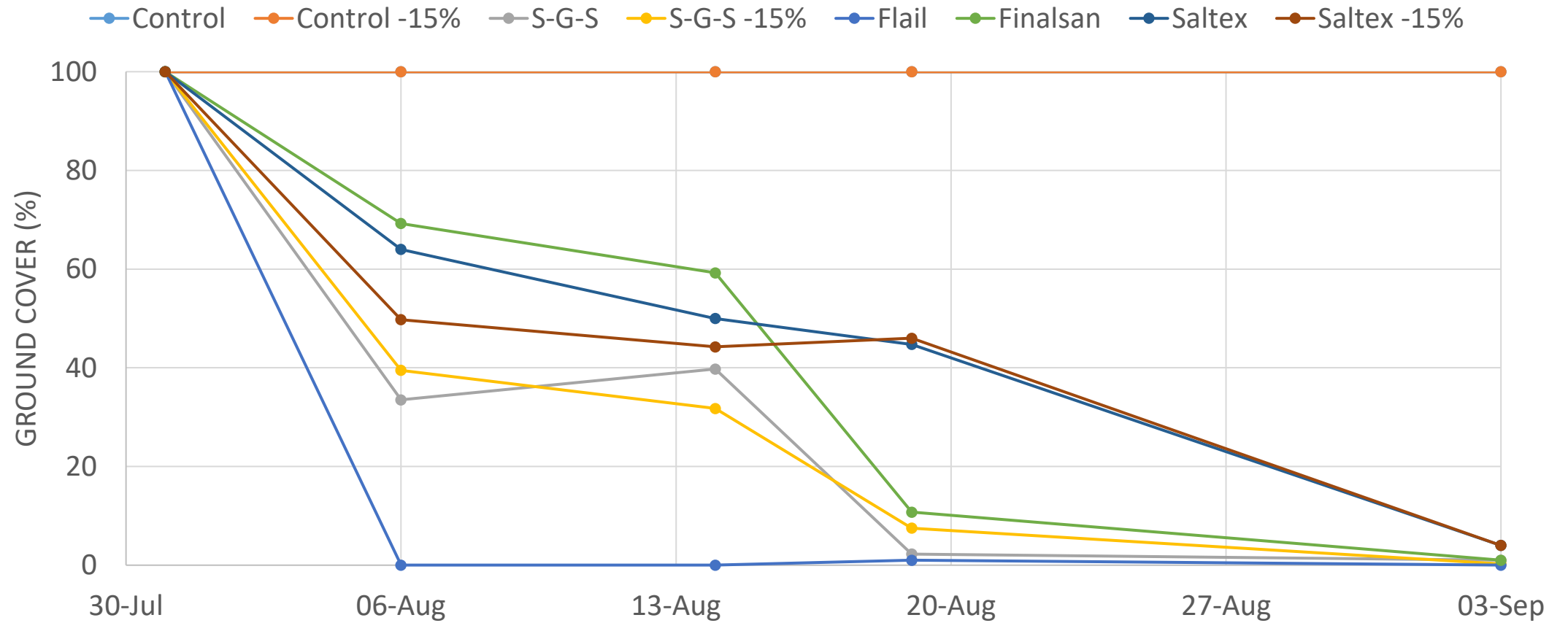
Saltex



SPot Scotland



Ground cover timecourse



Ground cover and stem desiccation T1 + 2 weeks

Control



Finalsan



Spotlight-
Gozai-
Spotlight



Saltex



Stem desiccation at T4 (3 weeks) and T5 (4 weeks): East

No.	Treatment	N rate	T4 Green (%)	Bleached (%)	Brittle (%)	T5 Green (%)	Bleached (%)	Brittle (%)
1	Control	RB209	42	22	37	24	15	62
2	Control	RB209-15 %	28	17	55	23	20	57
3	Spotlight-Gozai-Spotlight	RB209	0	4	96	0	0	100
4	Spotlight-Gozai-Spotlight	RB209-15 %	0	13	87	0	0	100
5	Flail RB209	RB209	0	0	100	4	0	96
6	Finalsan	RB209	2	14	84	5	7	89
7	Saltex	RB209	0	15	85	0	7	93
8	Saltex	RB209-15 %	0	14	86	0	5	95
S.E.	(21 D.F.)		4.7	2.9	5.9	2.7	3.5	4.6

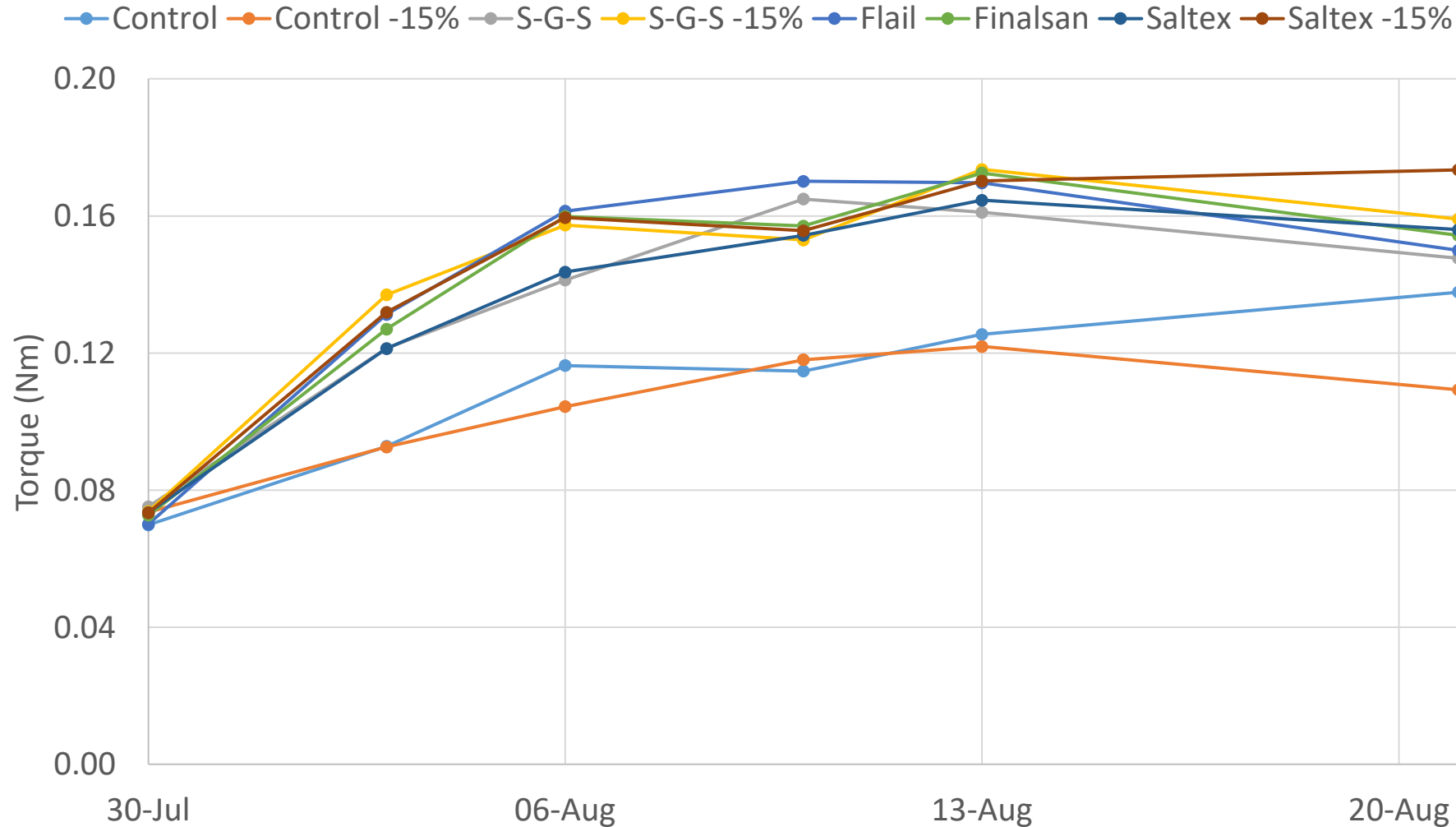
Stem desiccation at T4 (3 weeks) and T5 (4 weeks): Scotland

No.	Treatment	N rate	T4 Green (%)	Bleached (%)	Brittle (%)	T5 Green (%)	Bleached (%)	Brittle (%)
1	Control	RB209	100	0	0	100	0	0
2	Control	RB209-15 %	100	0	0	75	25	0
3	Spotlight-Gozai-Spotlight	RB209	0	100	0	0	100	0
4	Spotlight-Gozai-Spotlight	RB209-15 %	0	100	0	0	100	0
5	Flail RB209	RB209	0	100	0	0	0	100
6	Finalsan	RB209	23	78	0	0	100	0
7	Saltex	RB209	0	100	0	0	100	0
8	Saltex	RB209-15 %	25	75	0	0	100	0
S.E.	(21 D.F.)		11.0	11.0	0.0	8.8	8.8	0.0

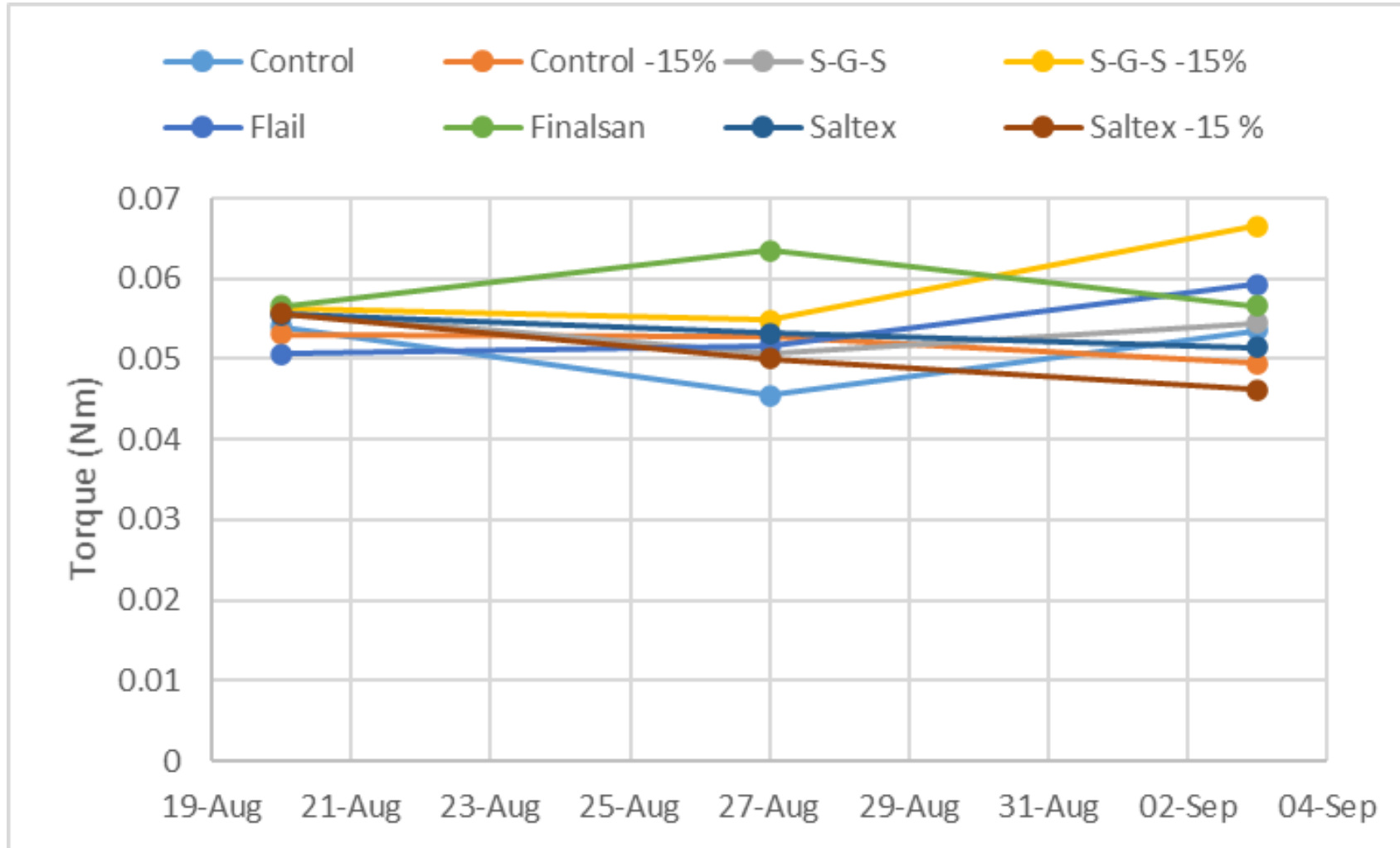
Using a torque screwdriver to assess skinset in the field



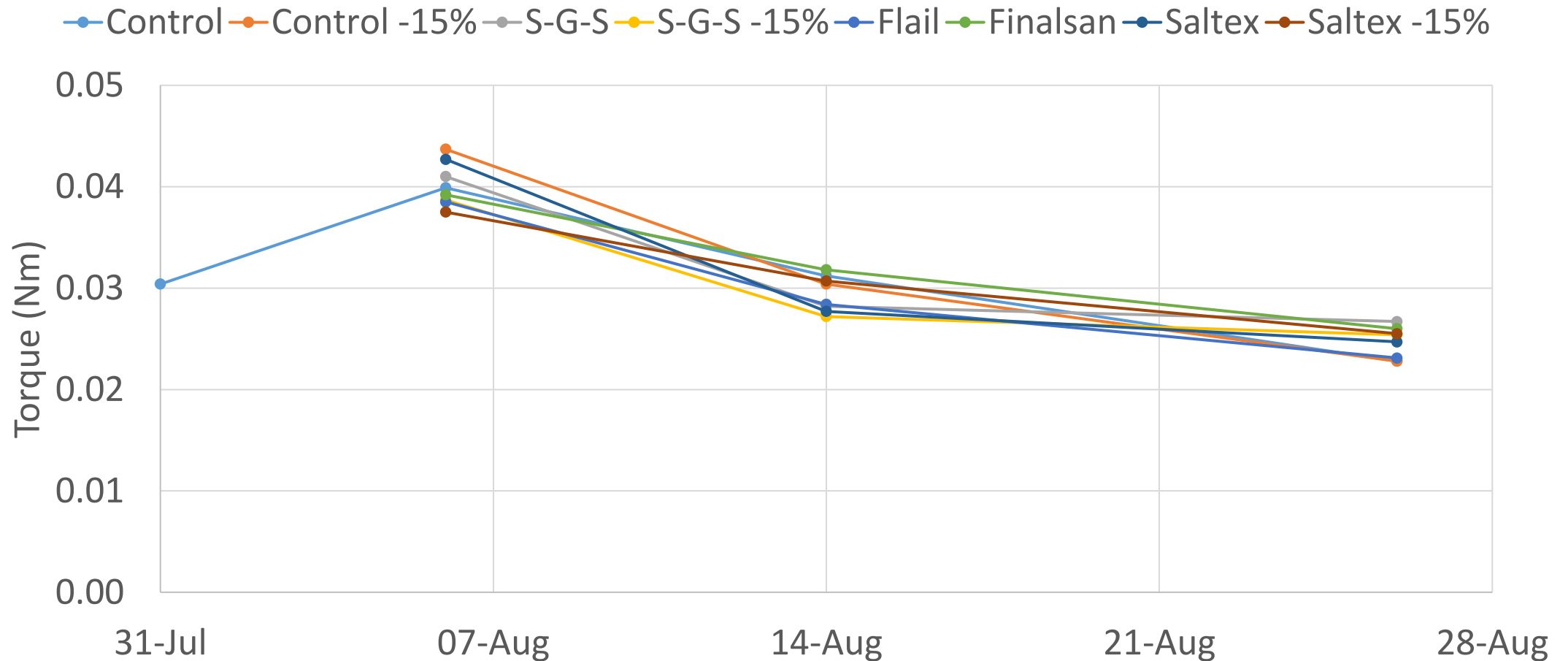
Timecourse of torque screwdriver skinset: East



Timecourse of torque screwdriver skinset: West



Timecourse of torque screwdriver skinset: Scotland



T4 and T5
skinning
barrel:
pretty
aggressive!





Skinset at T4 (3 weeks) and T5 (4 weeks): East

No.	Treatment	N rate	T4 SA skinned (%)	T5 SA skinned (%)
1	Control	RB209	1.74	0.45
2	Control	RB209-15 %	1.55	0.46
3	Spotlight-Gozai-Spotlight	RB209	0.34	0.24
4	Spotlight-Gozai-Spotlight	RB209-15 %	0.30	0.16
5	Flail RB209	RB209	0.29	0.22
6	Finalsan	RB209	0.40	0.23
7	Saltex	RB209	0.48	0.21
8	Saltex	RB209-15 %	0.47	0.16
S.E.	(21 D.F.)		0.164	0.066
<15 % SA is skinset for mechanical harvesting				

SPot North skinset at T4 (3 weeks): 2020 vs 2019

No.	Treatment	2020 SA skinned (%)	2019 SA skinned (%)
1	Control	6.9	0.9
3	Spotlight-Gozai-Spotlight	4.0	1.1
5	Flail RB209	4.3	0.9
6	Finalsan	4.6	1.8
7	Saltex	3.7	0.9
S.E.	(21 D.F.)	1.07	0.37

<15 % SA is skinset for mechanical harvesting

Skinset at T4 (3 weeks) and T5 (4 weeks): West

No.	Treatment	N rate	T4 SA skinned (%)	T5 SA skinned (%)
1	Control	RB209	9.0	40.4
2	Control	RB209-15 %	13.8	33.8
3	Spotlight-Gozai-Spotlight	RB209	31.2	35.4
4	Spotlight-Gozai-Spotlight	RB209-15 %	16.1	38.1
5	Flail RB209	RB209	12.1	40.1
6	Finalsan	RB209	20.6	41.0
7	Saltex	RB209	10.1	45.0
8	Saltex	RB209-15 %	14.8	33.3
S.E.	(21 D.F.)		7.42	5.79

<15 % SA is skinset for mechanical harvesting

Skinset at T4 (3 weeks) and T5 (**5 weeks**): Scotland

No.	Treatment	N rate	T4 SA skinned (%)	T5 SA skinned (%)
1	Control	RB209	66.6	52.1
2	Control	RB209-15 %	58.1	47.7
3	Spotlight-Gozai-Spotlight	RB209	39.8	13.5
4	Spotlight-Gozai-Spotlight	RB209-15 %	35.5	14.3
5	Flail RB209	RB209	34.0	12.7
6	Finalsan	RB209	48.4	21.8
7	Saltex	RB209	36.6	14.4
8	Saltex	RB209-15 %	34.9	14.1
S.E.	(21 D.F.)		3.52	2.57

<15 % SA is skinset for mechanical harvesting

Final yield: Scotland

No.	Treatment	N rate	No. of tubers 25-55 mm (t/ha)	Seed yield (t/ha)	Yield >55 mm (t/ha)	Total no. tubers (000/ha)	Total yield (t/ha)
1	Control	RB209	132	12.2	33.4	344	45.6
2	Control	RB209-15 %	166	16.9	32.1	335	49.1
3	Spotlight-Gozai-Spotlight	RB209	283	27.9	13.4	375	41.4
4	Spotlight-Gozai-Spotlight	RB209-15 %	272	25.1	15.5	381	40.8
5	Flail RB209	RB209	302	27.9	10.3	376	38.2
6	Finalsan	RB209	226	22.8	17.8	331	40.7
7	Saltex	RB209	267	22.6	14.8	365	37.4
8	Saltex	RB209-15 %	322	30.7	12.1	409	42.9
S.E.	(21 D.F.)		20.3	2.52	1.63	20.2	2.63

Summary: weather conditions at application 2020

	T1a				T2a			
Site	Date Time	Temperature (C)	Cloud cover (%)	RH	Date Time	Temperature (C)	Cloud cover (%)	RH
East	30-Aug 11:00	22	10	Average	06-Aug 11:15	23	50	Average
North	12-Aug 14:15	30	15	Dry	20-Aug 15:15	22	65	Dry
West	20-Aug 12:30	23	50	Average	26-Aug 11:30	22	40	Average
Scotland	31-Jul 14:00	18	50	Average	06-Aug 10:15	19	20	Average

Warm to hot weather at most T1 and T2 applications: Scotland cooler, but not cold

Summary 2020: skinset at 3 weeks

No.	Treatment	N rate	East	North	West	Scotland	Mean
1	Control	RB209	1.7	6.9	9.0	66.6	21.1
2	Control	RB209-15 %	1.6	6.8	13.8	58.1	20.1
3	Spotlight-Gozai-Spotlight	RB209	0.3	4.0	31.2	39.8	18.8
4	Spotlight-Gozai-Spotlight	RB209-15 %	0.3	5.2	16.1	35.5	14.3
5	Flail RB209	RB209	0.3	4.3	12.1	34.0	12.7
6	Finalsan	RB209	0.4	4.6	20.6	48.4	18.5
7	Saltex	RB209	0.5	3.7	10.1	36.6	12.7
8	Saltex	RB209-15 %	0.5	5.1	14.8	34.9	13.8

<15 % SA is skinset for mechanical harvesting

Summary 2020: skinset at 3 weeks (N effect)

N rate	Mean
RB209	17.5
RB209-15 %	16.1

No overall effect of reduced N on skinset

Conclusions and recommendations: 2019 & 2020

- Many crops achieved rapid skinset: exceptions Scotland 2019/20 and West 2020
- Crops showing signs of active senescence responded rapidly to desiccation
- Spotlight/Gozai only 1-2 days slower in skinset than Reglone, flail or Saltex
- Saltex skinset as rapid as flail, even at 50 % rate
- Whilst Finalsan was slowest to kill leaves, skinset was similar to Spotlight/Gozai
- No effect of 15 % lower N on skinset
- Aim for early- to mid-morning application of PPO desiccants. Water rates?
- Skinset is faster in dry soils: aim to stop irrigating 7 days prior to desiccation
- SPot West 2020: no effect of any treatment on skinset and worsened T4 to T5?
- Torque screwdriver was not suitable for detecting changes in skinset
- Little evidence that 'passive bulking' differs across chemical treatments
- Defoliation method has little effect on internal defects or diseases
- [Important to kill all leaves and prevent regrowth for blight or virus infection]

Planning for 2021 Discussion?



SPot Farm Results 19 January, 2021

Desiccation: how effective are diquat alternatives for potato crops?

Mark Stalham (Coordinator)

With contributions from staff at NIAB CUF, Richard Austin Agriculture Ltd, Scottish Agronomy & Crop and Environment Research Centre

