

Turfgrass Mastery

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Optimizing water efficiency on sand-capped fairways
Practical use of surfactants at Hirsala Golf

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FAIRWAY 5 • THE TRIAL SITE

The 12 strip plots lie on the open fairway in the centre, tee at the bottom of the picture, green at the top. Irrigation was turned off for the first part of the fairway.

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Fairway 5 – a sand-capped, mainly *Poa annua* fairway

2007

course opened; fairways built on a 20 cm 80/20 sand-peat cap

85 %

sand in the cap today (6.5 / 84.7 / 8.6 / 0.2 gravel-sand-silt-clay)

42 mm

thatch, 9.2 % OM in 0–3 cm; compact layer at 60 mm, soil OM 1.9 %

Poa

fairway 5 is mainly *Poa annua* – formerly heavily shaded and inherently a moist site

10 mm

robotic mowing, daily, Husqvarna Ceora • JD HD200
GPS sprayer for every application



Profile on fairway 5: sand cap with a thatch layer on top



John Deere HD200 GPS sprayer – plot-accurate surfactant applications

Starting point – September 2024



Water repellency, not water shortage

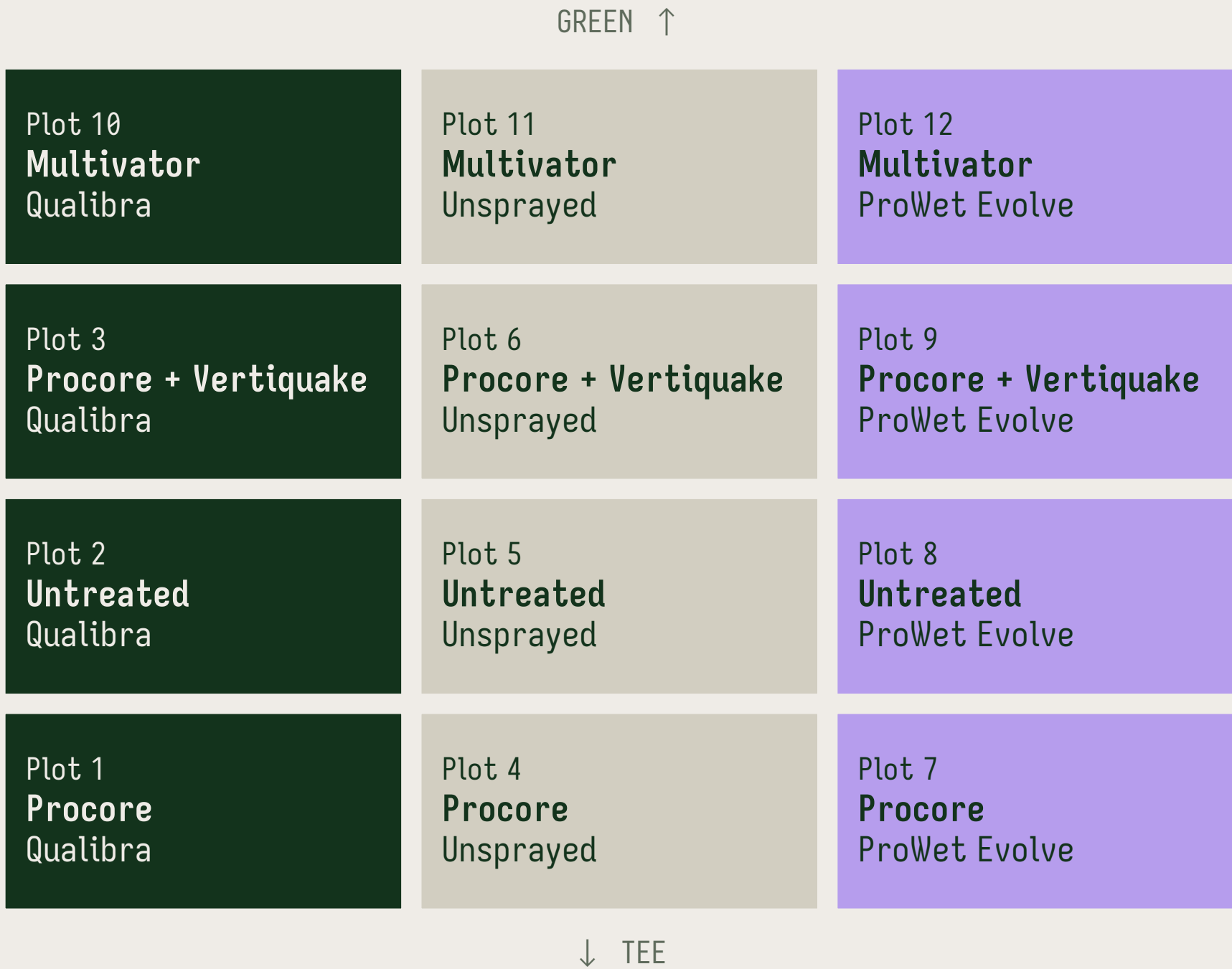
The localised dry spot patches are on the highest, best-drained part of the fairway. Irrigation water and rain run through or off the hydrophobic sand instead of wetting it.

The water-efficiency logic

An irrigation programme is always scheduled for the driest spot. If the dry spots can be made to accept water, the whole fairway needs less.

So the question for Hirsala was practical: can monthly surfactant applications, with or without mechanical work, keep a sand cap wettable through a Nordic summer?

Trial design on fairway 5 – 12 strip plots, 10 × 25 m



Factor 1 – mechanical (autumn 2024 & 2025)

Untreated • Procore hollow-tine 2–3 cm • Procore + Vertiquake 20 cm • Multivator (Hirsala extra)

Factor 2 – soil surfactant (2025 & 2026)

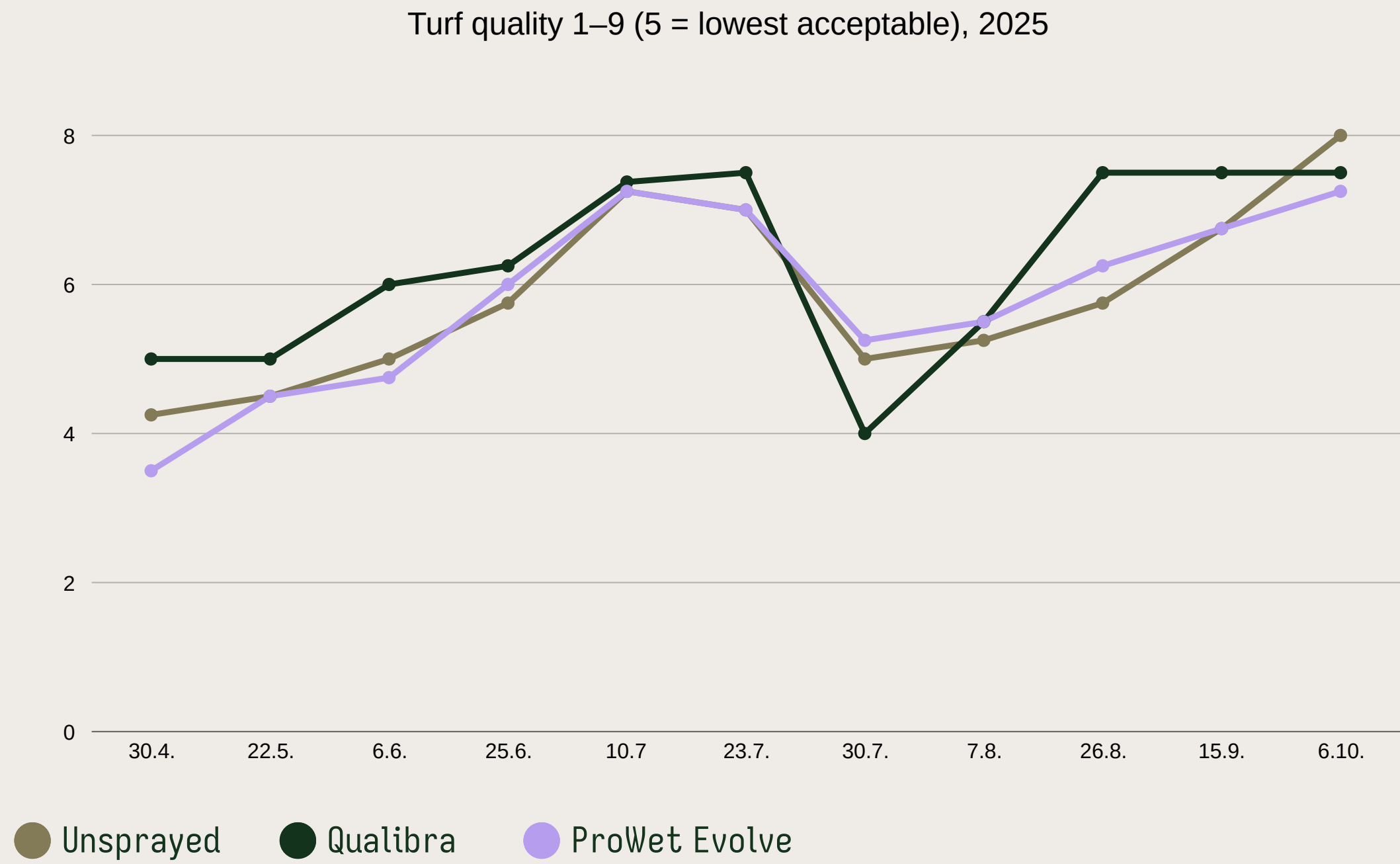
Unsprayed • Qualibra 20 L/ha • ProWet Evolve 12.5 L/ha – monthly, 750 L/ha water, JD HD200 GPS boom sprayer

Measured in fixed 2 × 2 m subplots

Every 2 weeks: soil water (TDR, 7.5 cm, 5 readings), turf quality & colour 1–9, drone image from a fixed position. Rain gauge on site. Penetrometer spring & autumn.

Same protocol at Romerike (NO), Jammerbugt (DK) and St. Dionys (DE). Strip-plot demo – large plots, no replicates, so read the trends, not p-values.

2025: a 12-week spray gap met a July heat wave



16 June 2025 – uniform



31 July 2025 – after the heat

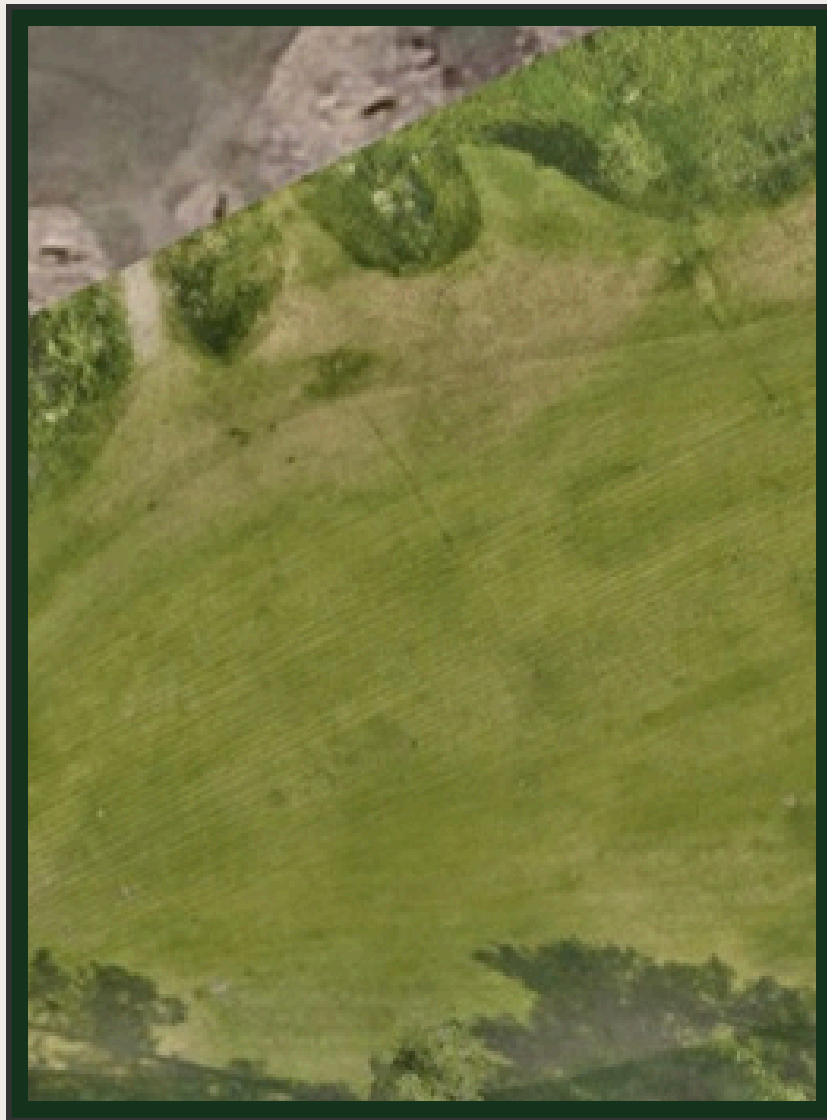
Applications: 16 Apr • 21 May • 4 Jun • 26 Aug

Nothing between 4 June and 26 August. Two weeks above 30 °C in mid-July; soil water 6–9 vol-% on 30 July, quality collapsed on every plot – three plots scored 0.

Recovery after rain was fastest on Qualibra plots. Mechanical treatments alone did little.

Lesson: a surfactant is preventive.

2025: the pattern appears in the first summer



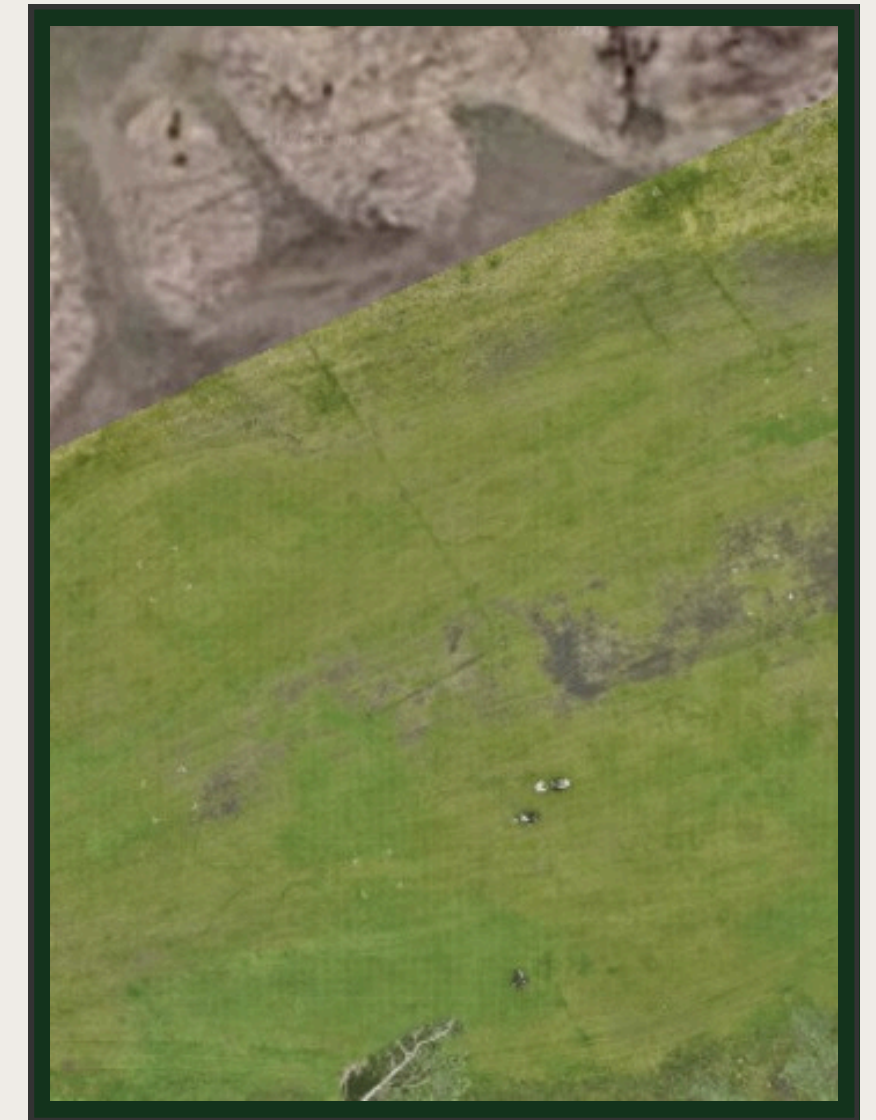
16 June 2025



13 July 2025



31 July 2025



24 August 2025

Uniform in mid-June after three applications. By 13 July – five weeks after the last spray, in the heat – dry patches open along the unsprayed centre strip; by 31 July they cover it. On 24 August the treated columns have closed up again, the centre has not. Columns tee → green: Qualibra • Unsprayed • ProWet Evolve.

How we applied the surfactants in 2026

01

Start early

First application 23 April – frost at night, no growth yet. The sand must be wettable before the first dry spell, not after it.

02

Monthly

One application every month through September. Booked in the spray calendar.

03

Water it in

750 L/ha carrier with the JD HD200 GPS sprayer, boom matching the 10 m plot width. Timed ahead of forecast rain; otherwise an irrigation cycle the same night.

04

Other practises as usual

Robotic mowing 10 mm daily, ~45 kg N/ha organic-based, no overseeding, no herbicides. The surfactant is the only variable across the columns.

05

Measurements

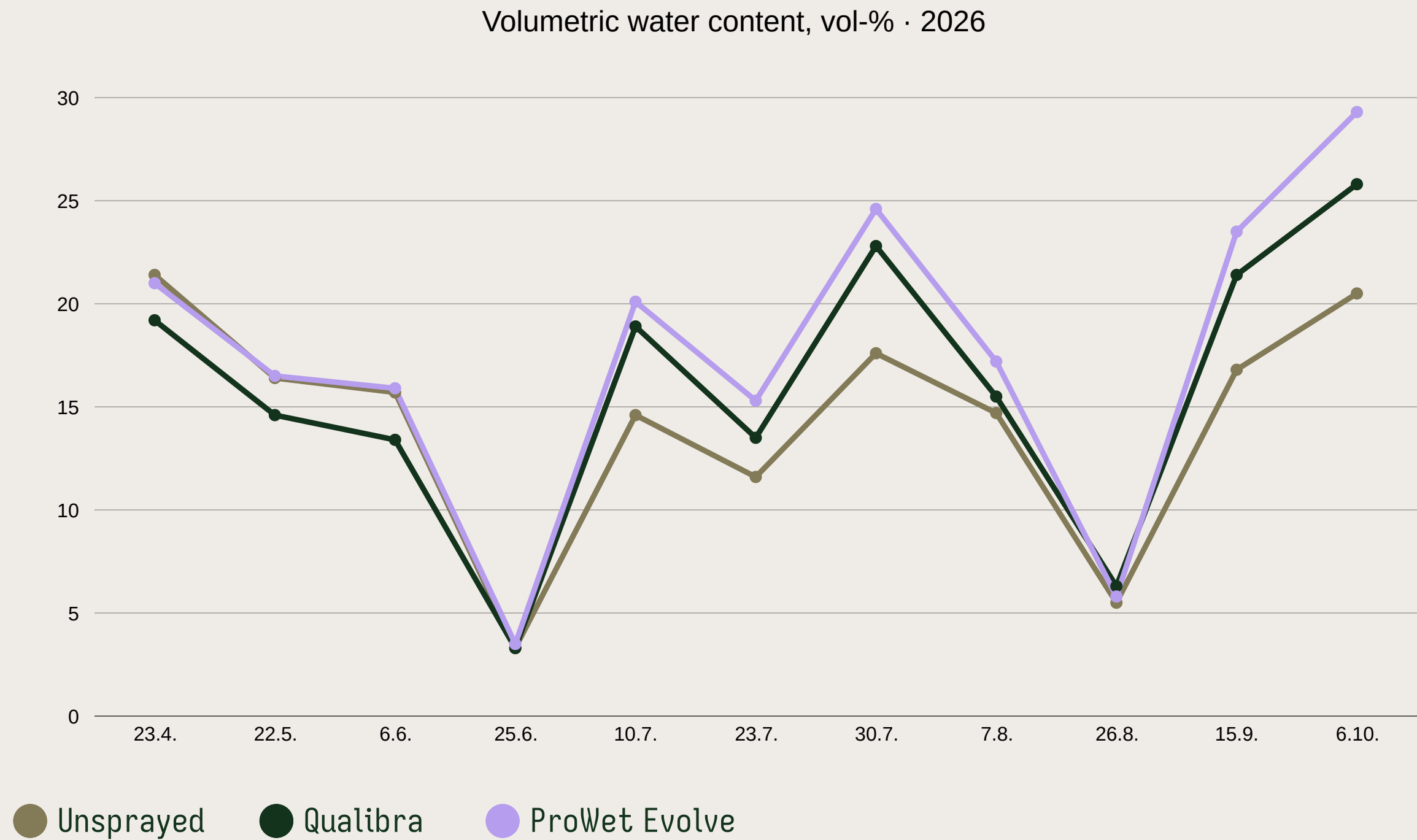
TDR 5 readings per subplot, quality & colour 1–9, drone from the same point, rain gauge on site – every two weeks, by our own crew.

06

Season in mm

Apr 10 • May 18 • Jun 32 • Jul 118 • Aug 63 • Sep 36 (to 19 Sept). A dry spring and early summer, followed by wet July continuing wet to early Autumn.

Same amount of rainfall, soil receptive in the treated sand



3 %

4 June – every plot bone dry after 60 mm of rain and high ET in ten weeks. Treated turf went dormant too; the unsprayed strip even dried a touch more slowly in May.

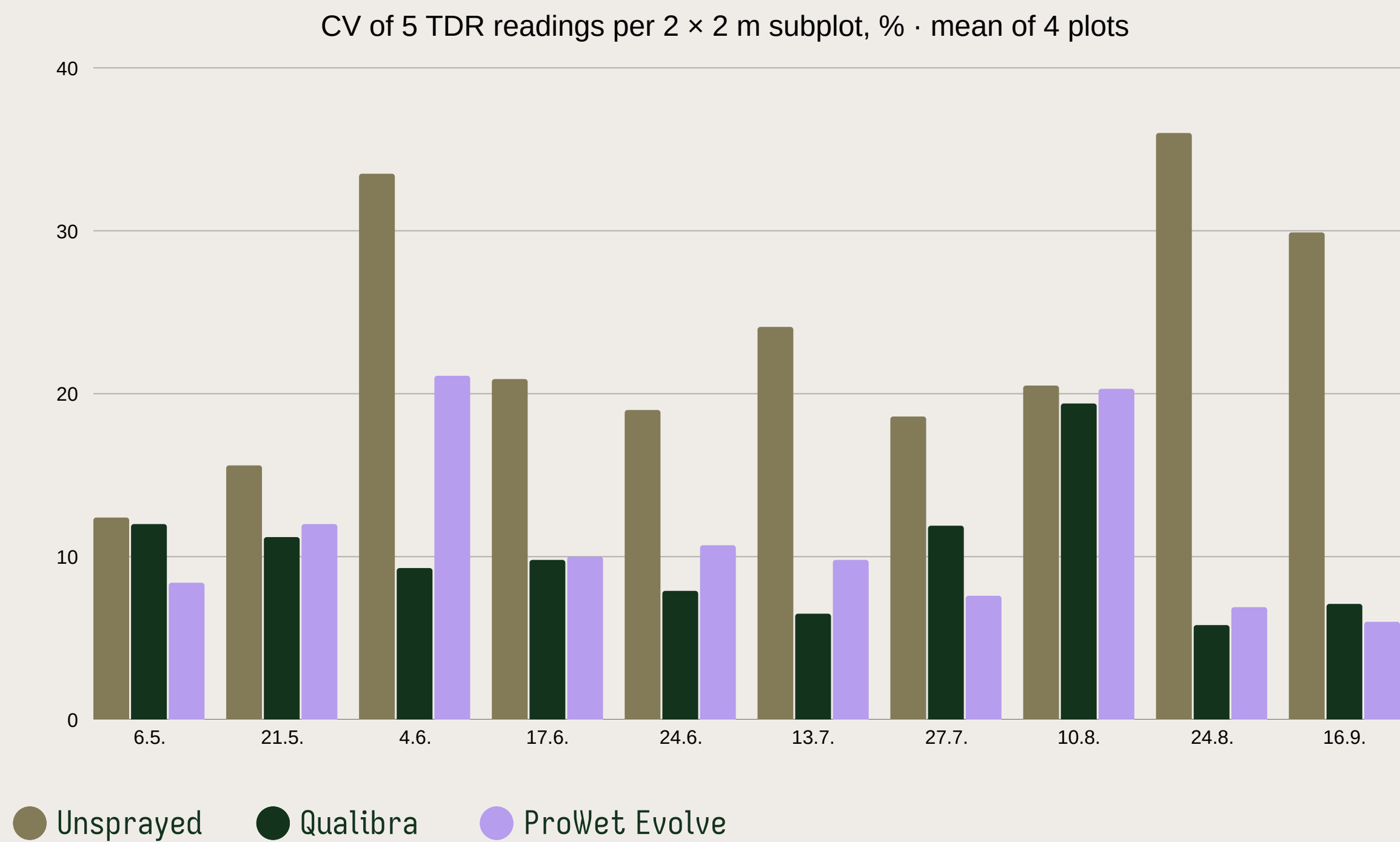
+4–7

vol-% more water in treated plots at every wet reading from 17 June on (13 July: 17.6 → 22.8 / 24.6). Treated turf came back to full green cover after each rain; the centre did not.

29 %

ProWet Evolve on 16 Sept vs 20.5 % unsprayed – the treated cap accepts autumn rain, the untreated cap still sheds it.

Surfactants halve the moisture variation inside a plot



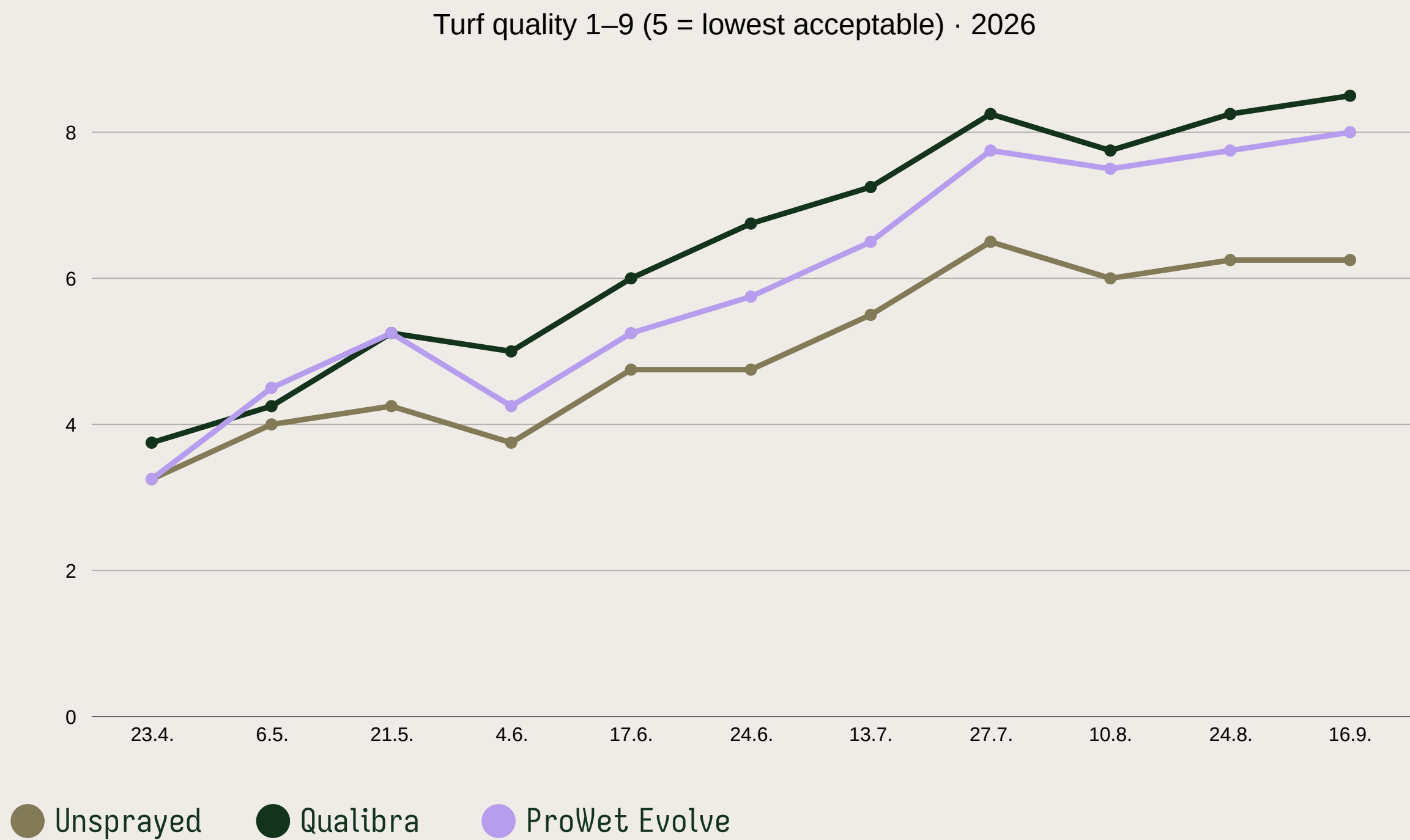
23 % season-mean CV, unsprayed

10 % Qualibra

11 % ProWet Evolve

Why this matters more than the mean: irrigation run time is normally set by the driest spot in the zone. Cut the spread and you can run for the average – the unsprayed strip ranged 4–38 vol-% on 16 Sept, the treated strips 18–38.

Acceptable turf recovery faster, better quality all season



16 Sept 2026 by plot

	Qualibra	Unspr.	ProWet
Procore	9	7	9
Untreated	8	6	8
Proc.+Vertiq.	8	7	8
Multivator	9	5	7

Unsprayed strip reached 5 only on 13 July; Qualibra on 21 May.

Light hollow-tine coring + surfactant was the best combination (9/9). Deep aeration and the Multivator added nothing on this profile – and Multivator + unsprayed was the worst plot on the fairway.

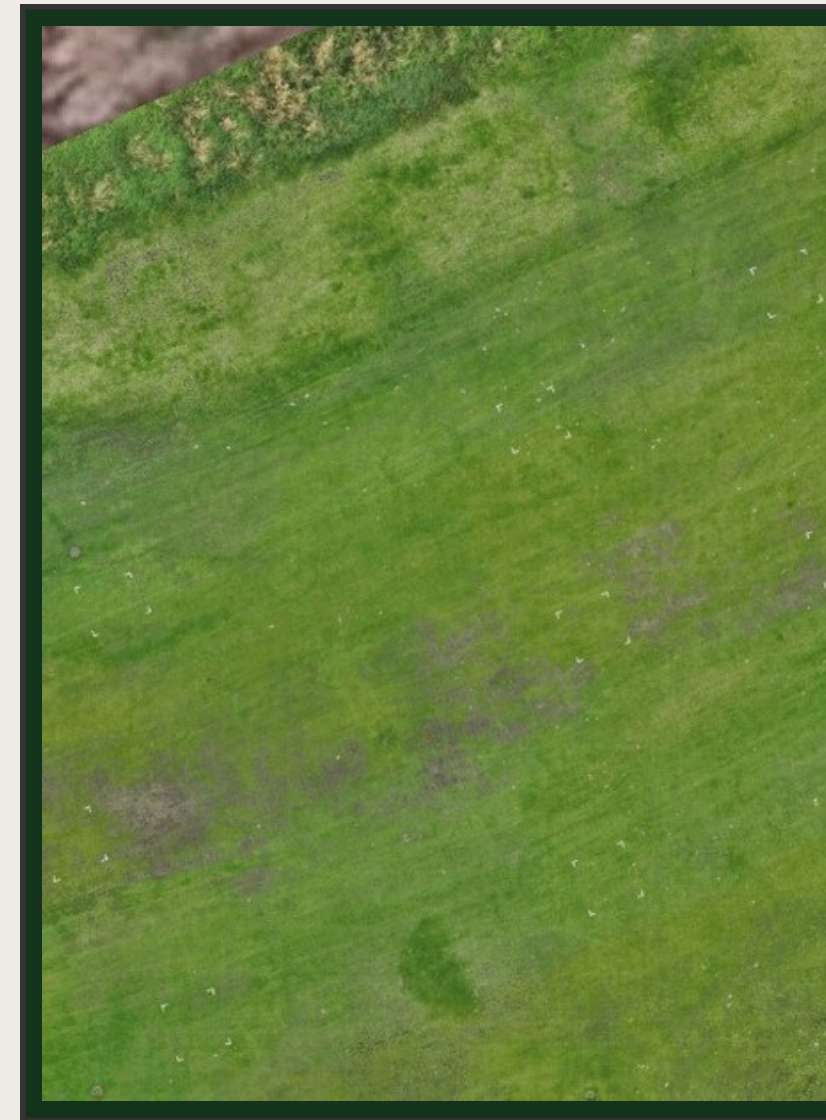
The unsprayed strip runs through the middle



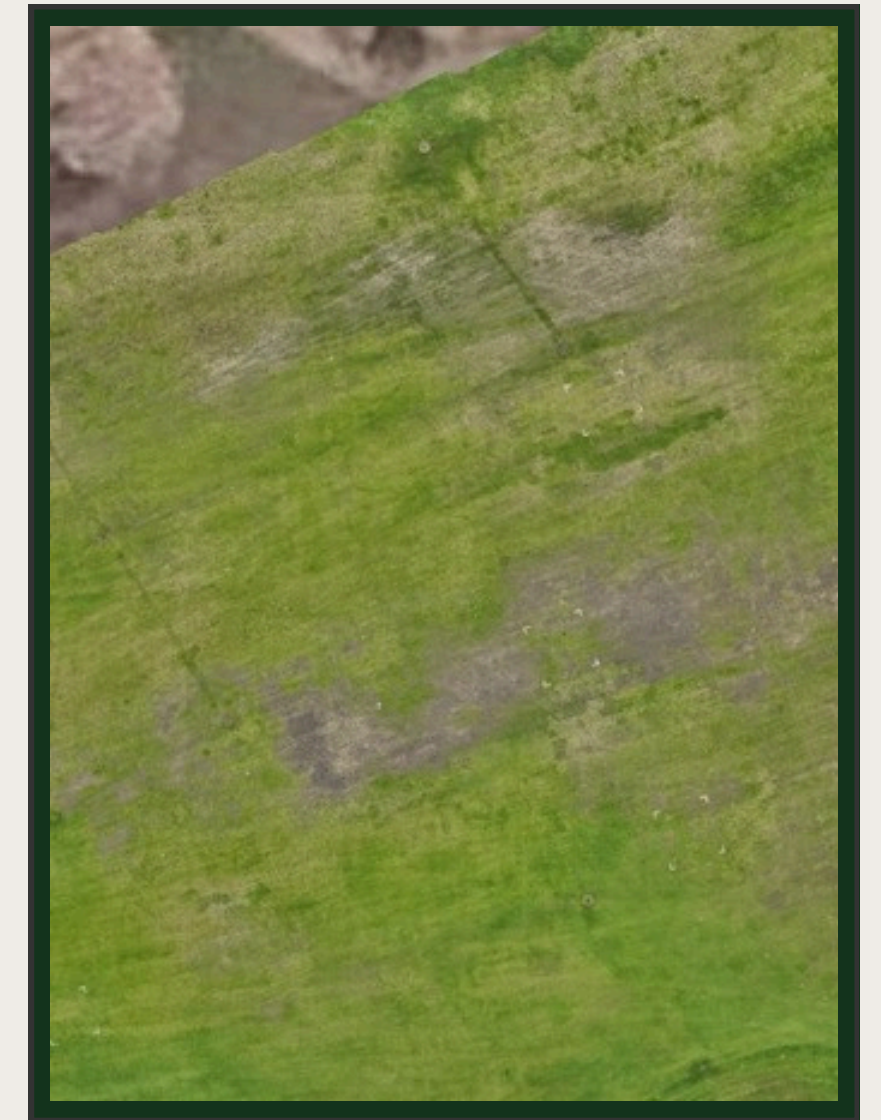
25 June



13 July



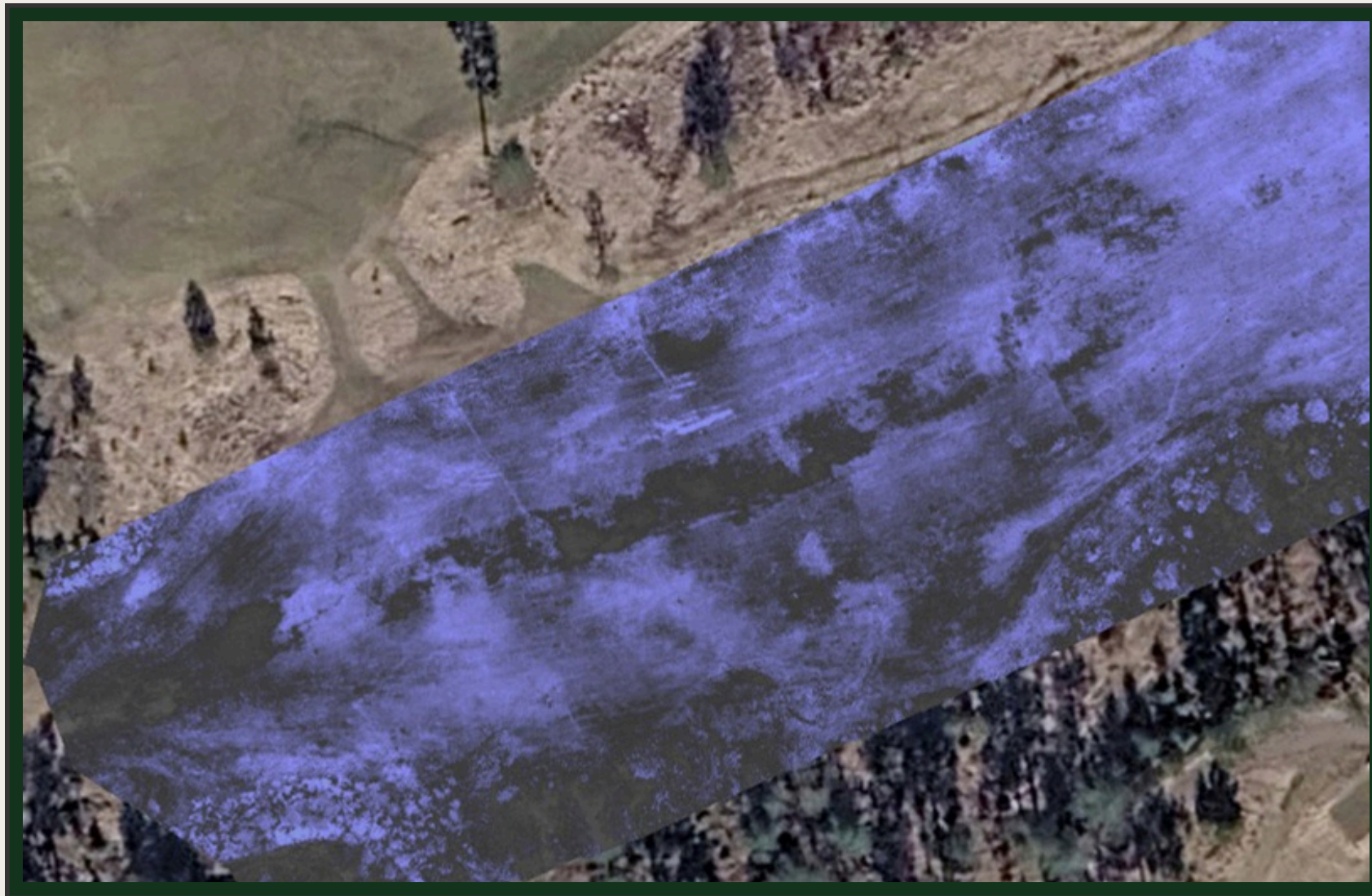
28 July



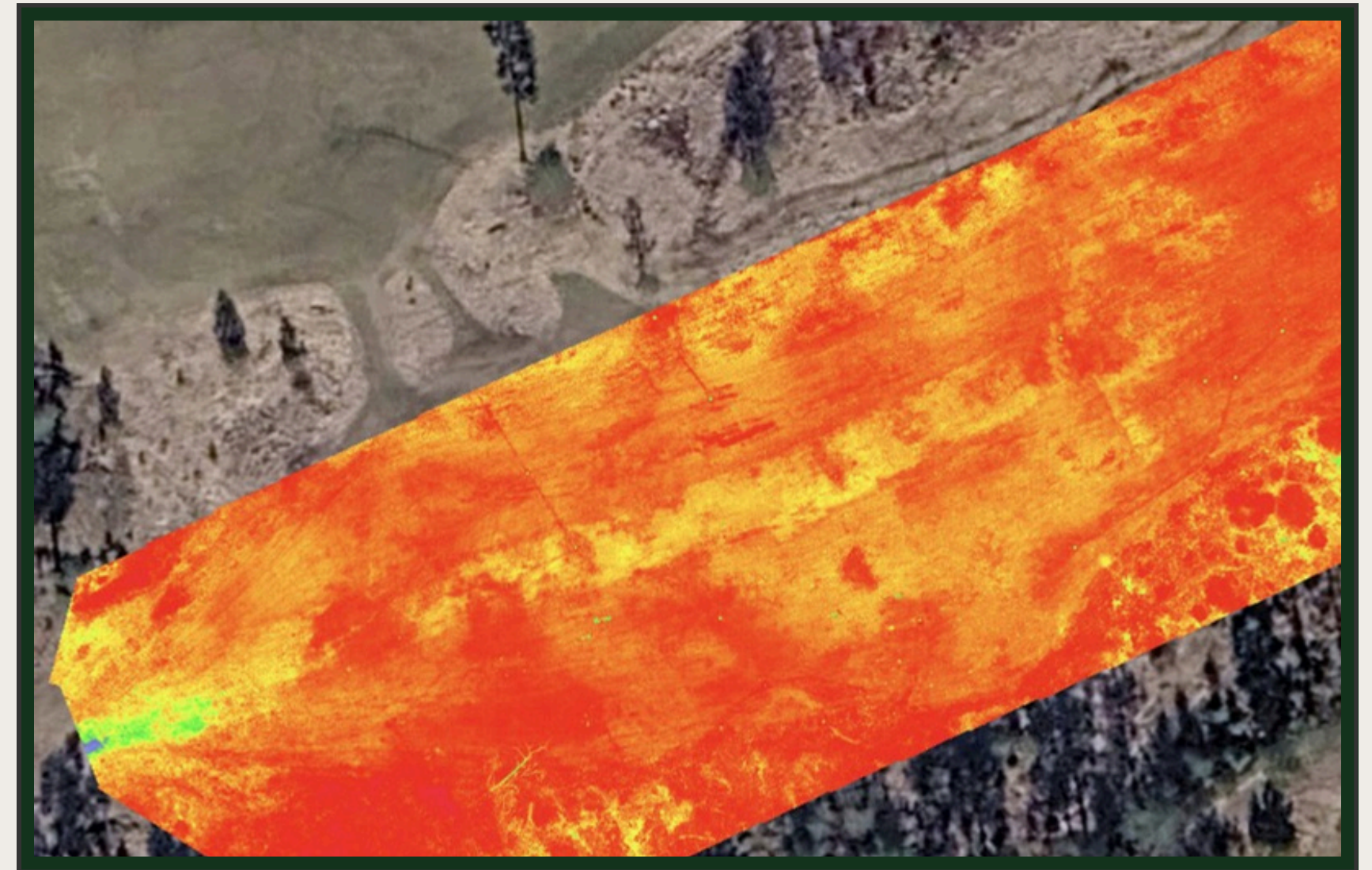
10 August

Columns run tee → green, left to right: Qualibra • Unsprayed • ProWet Evolve. Rows are the mechanical treatments. Dry patches (grey-brown mottling) appear first and persist longest in the unsprayed centre strip; after the July rain the treated columns close up, the centre does not.

The index maps proves application efficiency



OSAVI, 24 Aug 2026 – dark = low canopy vigour



NDVI, 24 Aug 2026 – yellow = weakest canopy

After two seasons of monthly applications, both OSAVI and NDVI draw the plot map by themselves: the unsprayed centre strip is the continuous band of low vigour running the full length of the fairway, and the mechanical rows are barely visible across it.

Same fairway, same irrigation, same rain – the only difference across the three columns is whether the sand cap was kept wettable.



18 SEPTEMBER 2026 • END OF SEASON TWO
• FROM THE TEE

Rain only does not cure hydrophobic sand in our conditions

217 mm

of rain from July to mid-September – well above evapotranspiration for those months. Both surfactant columns went dormant in the dry spells and returned to full green cover after each rainy period. The unsprayed centre took extensive damage and never recovered. The sand under it is still water-repellent in mid-September – and will stay so until autumn cultivation and next surfactant applications.

Wettability is something you maintain, not something the weather gives back.

Practical takeaways

1

Work preventatively

First application in April, when the sand is still wet. You are protecting wettability, not restoring it.

2

Keep up the frequency of applications

The 2025 collapse came from a June–August gap. Stick to the plan; July and August are the months that count.

3

Water it in

750 L/ha carrier and rain or an irrigation cycle behind it. A surfactant left on the thatch does nothing.

4

Pair with light coring/OM management

Procore hollow tines 2–3 cm plus surfactant gave the best turf response. Deep aeration gave no extra benefit on our profile in this trial.

5

Manage to uniformity

Track the spread of TDR readings, not just the mean. When the CV falls from ~23 % to ~10 %, the driest spot is closer to the average – and the irrigation programme can follow the average.

6

Both products gave us effect

Qualibra and ProWet Evolve both gave excellent results in our hands – dormancy in drought, full recovery after rain. Consistency of application mattered more than the choice of product. There was difference in surface WVC between products and it depends on your current situation to determine correct product to use.

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Thank you

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FAIR WATER II is a STERF-funded project led by NIBIO. Thanks to Trygve S. Aamlid and the NIBIO team for the protocol and data handling, to the Hirsala greenkeeping crew Samuli Salmenautio (2026) and Bianca Mignon Pronk (2025) for the applications and every two-week measurement round, and to partner courses Romerike, Jammerbugt and St. Dionys.

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