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Deep Inclusive Tillage Stripping (DITS) & BigDeep-Digger (BDD) to help sustain food growing soil in South-Western Australia

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(1)Retired Geraldton WA (2)Toowoomba QLD (3)Bordertown SA

An interactive decision support system, ‘BIG Deep-Digger’ to economically reduce subsoil constraints in Southwestern Australia.

V11 18/7/25

Blackwell P. S. (1), Hagan J. (2)

(1) DPIRD Geraldton (retired), (2) QDPI Toowoomba.

Repayment time for a 4,000ha farm and different costs of CTF including deep-ripping or other soil amelioration techniques for different % yield increases; including a line for each site.

Payback period for implementing CTF including amelioration cost

1

sis by James Hagan 2013

3%

Nabawa 4.9%

Binnu 8.6%

Buntine 9.6%

15%

Research Objectives

Ripping + Biochar + Cover Crop

Great news yesterday from Ekrem Ozlu, Nth Carolina SU,USA

Deep Inclus
treatment of co d
natural pr
So

Blacky

Geraldton (retired)

Deep Inclusive Tillage Stripping

More efficient deep tillage -

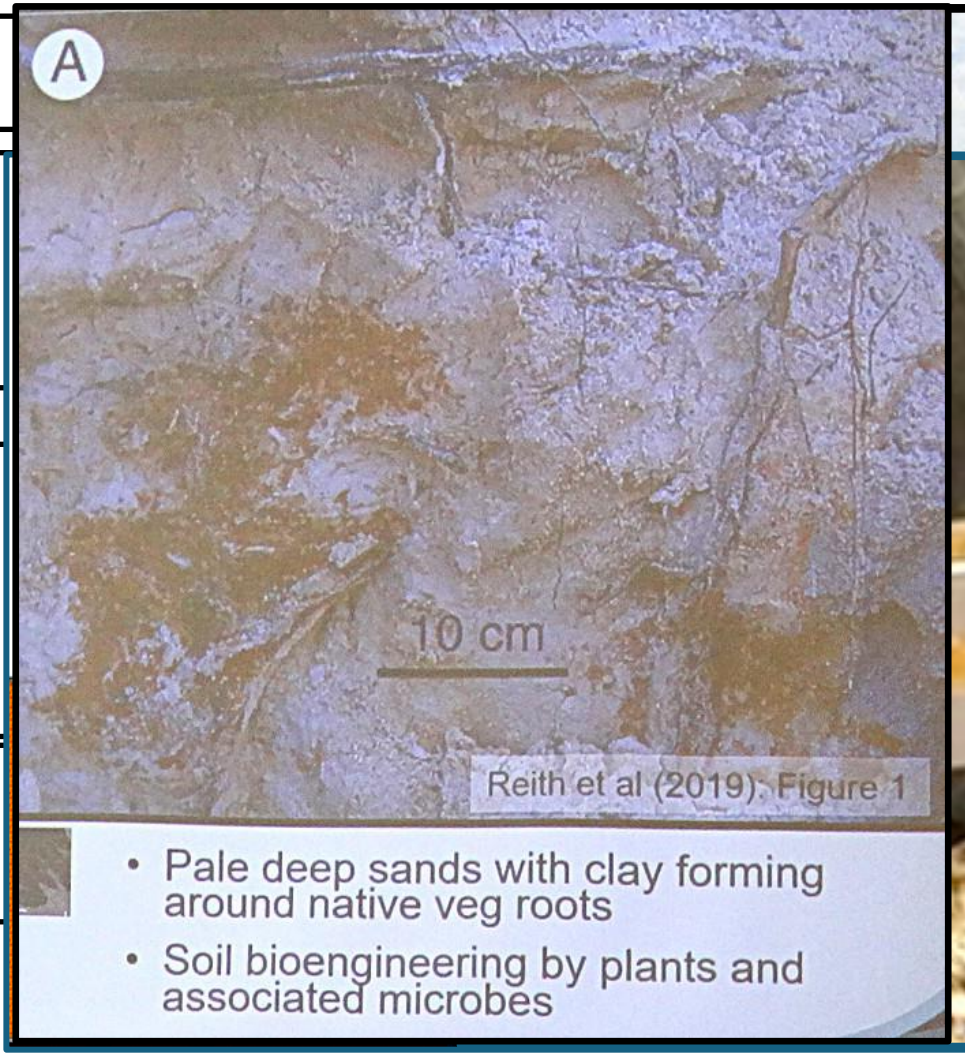
More ground cover retained –

Far less wind or water erosion ris

More natural engineering (just learned this on Monday from Karen Holmes)

between deep tillage zones -

By using either spaders, delvers or deep ripping with topsoil inclusion -



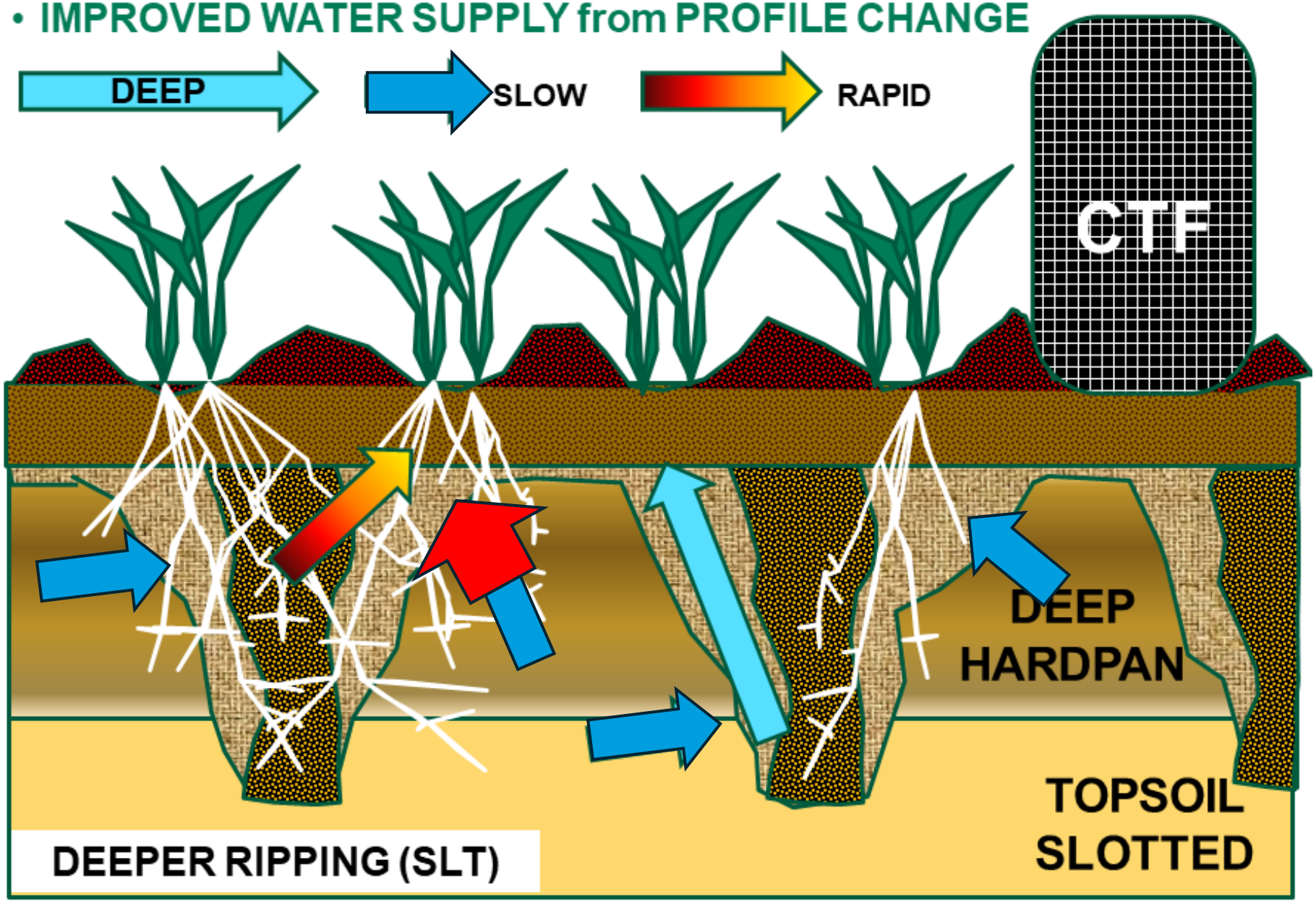
+tve Inclusion deep ripping by Univ. SA Ag. Eng. Group

A shallow strip tillage unit on V water erodible soils in Switzerland

Background music.....**THE STRIPPER!!!!!!**

REPEATED TOPSOIL INCLUSION

- **IMPROVED WATER SUPPLY from PROFILE CHANGE**



By deep ripping with inclusion plates in the same location each time & no cross or between ripping

Slow diffusion of trapped moisture from unripped ridges hostile to roots due to (hardness/acidity)

Such water supply can help grain fill on a dry seasonal finish.

Stored N & K may also help earlier growth.

These benefits may be most evident in sands with moderate clay or silt.

Brad Smith of Nola Downs, Eradu
Sharing his soil knowledge with
Mrs Bindi Isbister (DPIRD & Agrarian Management- Geraldton)

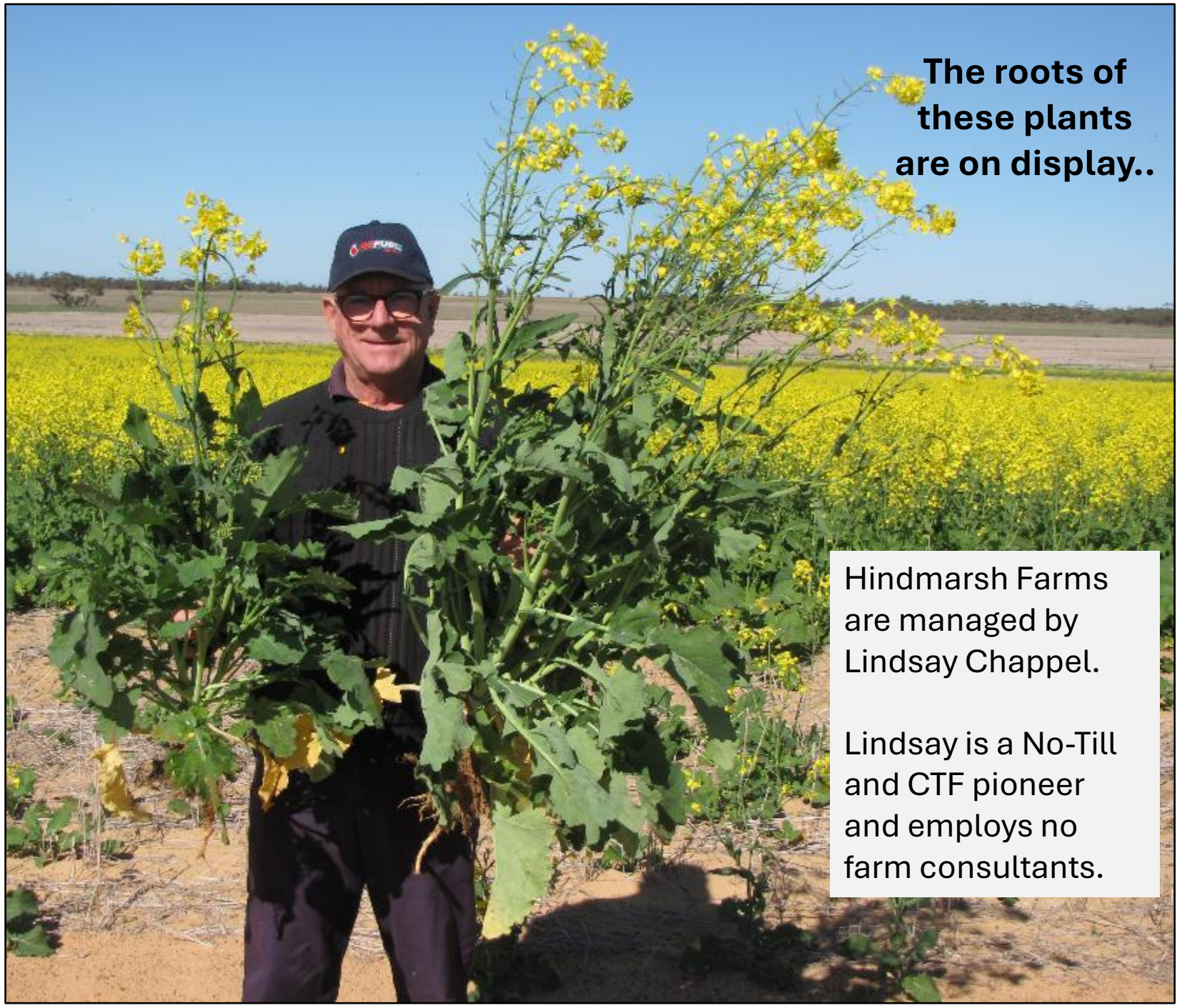
A Farm with many seasons of repeated topsoil inclusion in the same zone after top-dressing limesand.

Dennis Simkin (retired from farming at Binnu)
Showing how deep he used to rip.

The first time Dennis did deep ripping ~ 1975, he was very happy with the result, even with a dry finish the season.

The second time he deep ripped (cross ripping to break out the residual ridges) and another dry finish grain size was very poor, and grain quality compromised his yield…

Ask an early deep ripping pioneer…



9.35am Thursday 17th July **Hindmarsh Farm**, Sandhill paddock, No-Till since 1992, Zero-till & CTF since 2002, never deep ripped.

(29°25'27.70"S 116° 6'10.05"E)

Crop sown 11th April 2025, after a dry summer and no significant rain pre seeding, 170mm post.

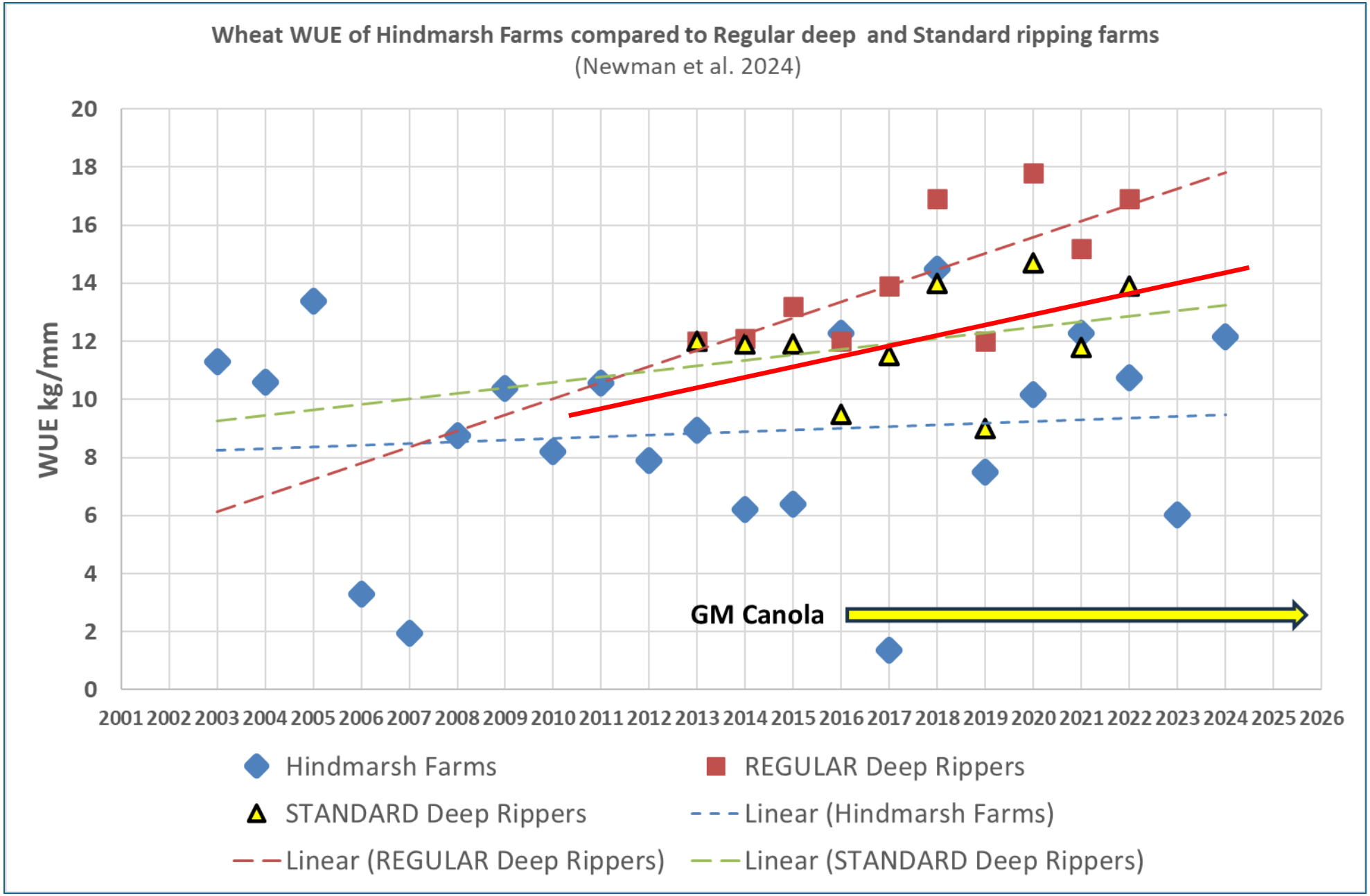
Lindsay holds 2 plants of different germination times from between the tramlines.

The taproots of these and four other plants had found suitable pathways into the deeper subsoil of this Sandy loam soil.

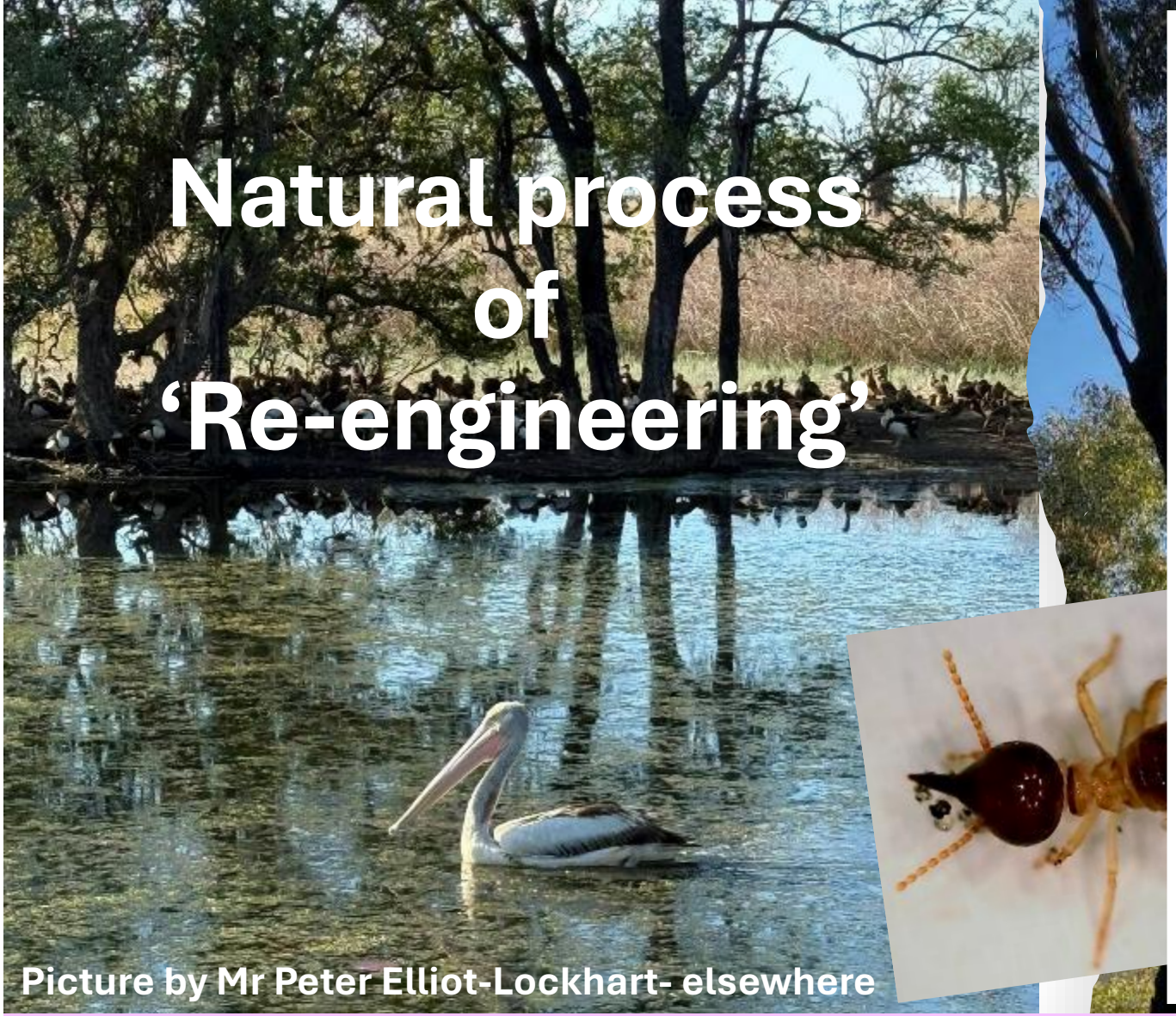
Calculated annual WUE of a zero till CTF grain only farm (Hindmarsh) compared to that of groups of deep tillage farms analysed by Newman et al. (2024).

2006, 2007, 2017 and 2023 were droughts at Hindmarsh Farm; 2023 also had much heat stress at flowering.

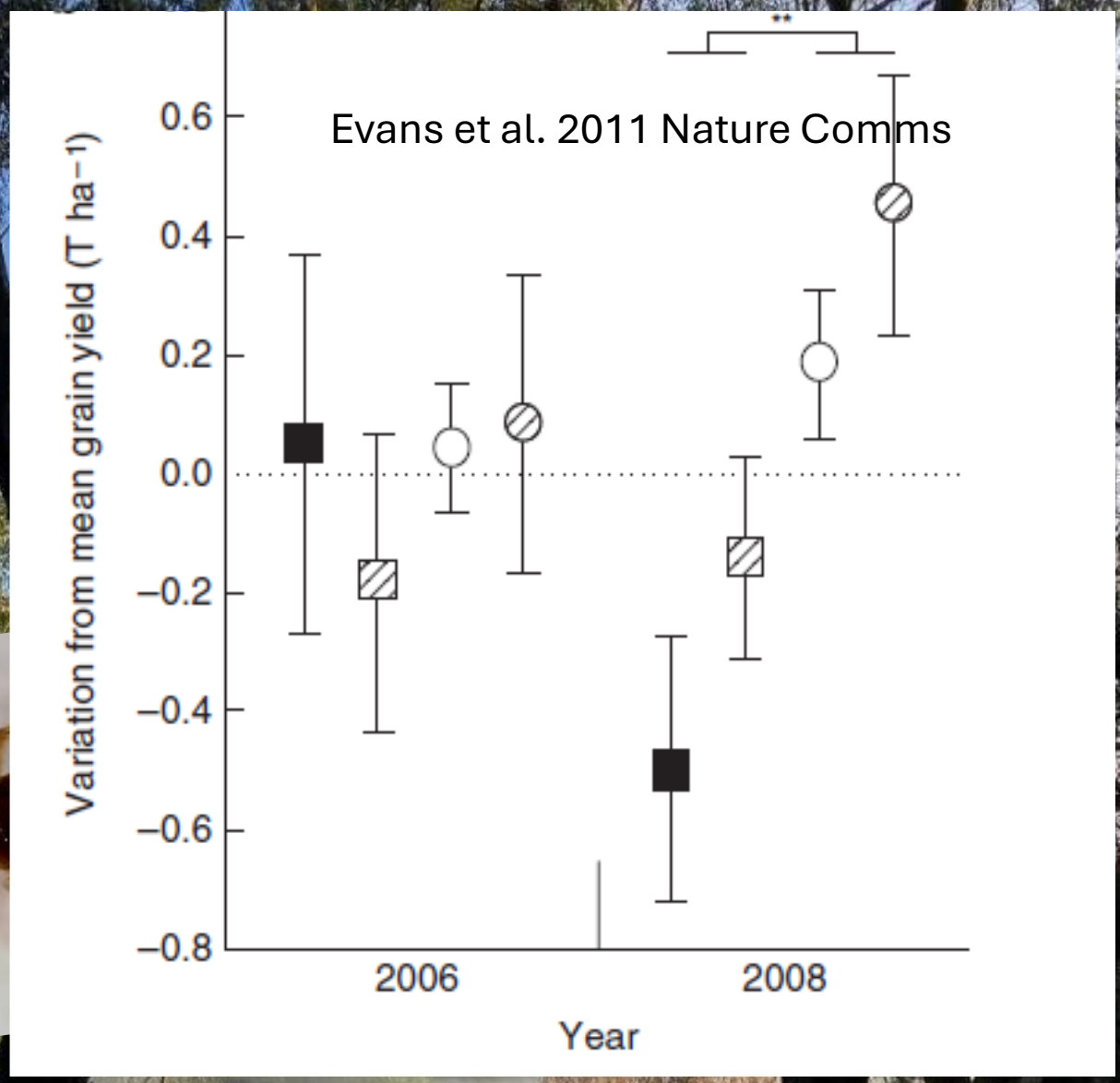
ESTIMATED DITS response for Hindmarsh



Natural process of ‘Re-engineering’



Picture by Mr Peter Elliot-Lockhart- elsewhere

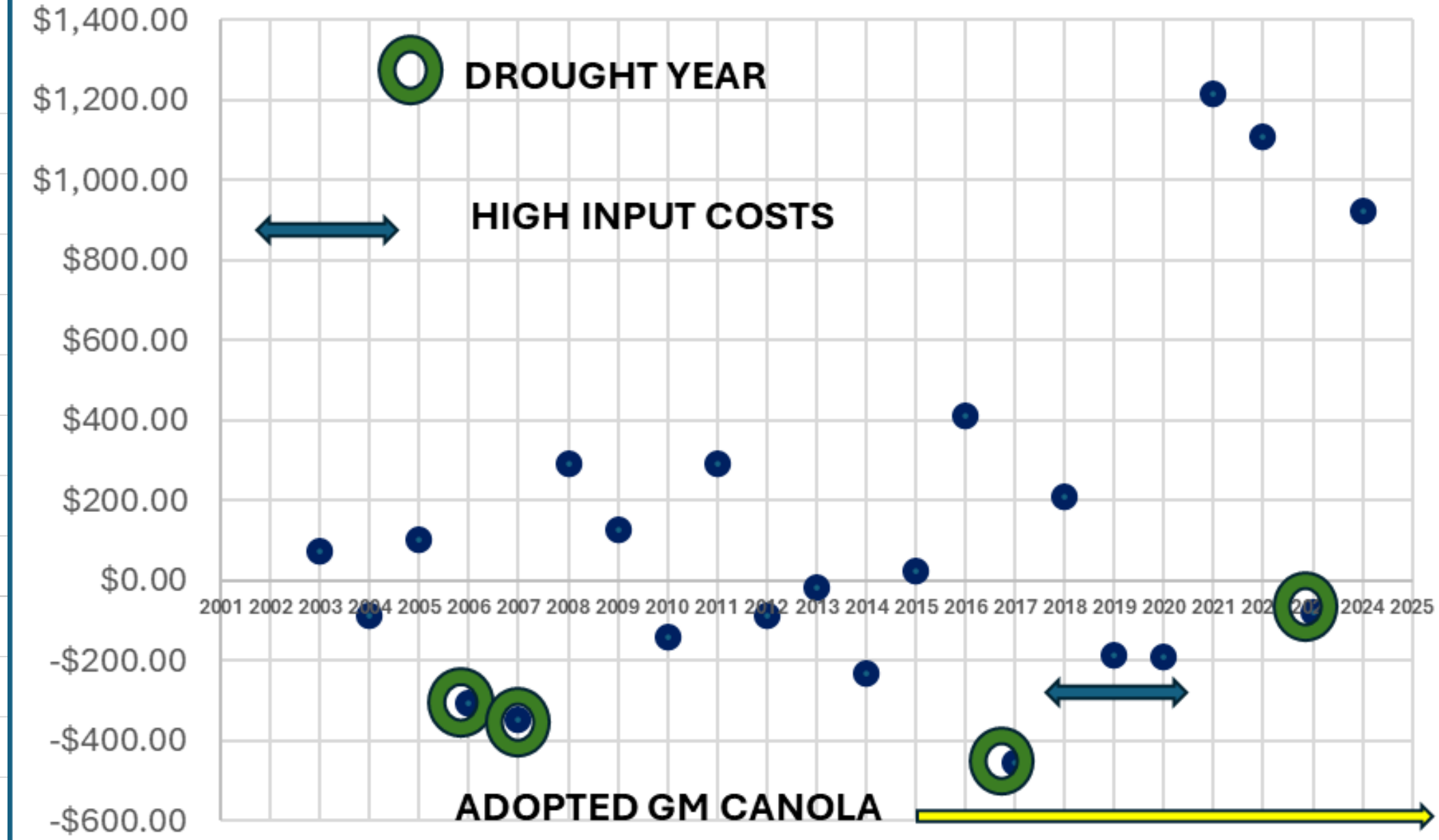


Wheat yield with termites excluded (squares) or termites present (circles). No-Till (solid colour) or shallow tilled (hatched). Means +/- st. dev. Average yield increase of 36% due to deep rainfall infiltration through their tunnels and N fixing bacteria in their gut.

Gro

oils

Hindmarsh Farm's gross margins ($/ha) from 2001 to 2024



800
700
600
500
400
300
200
100
0
-100
-200
-300

2012

2023

Why so pr

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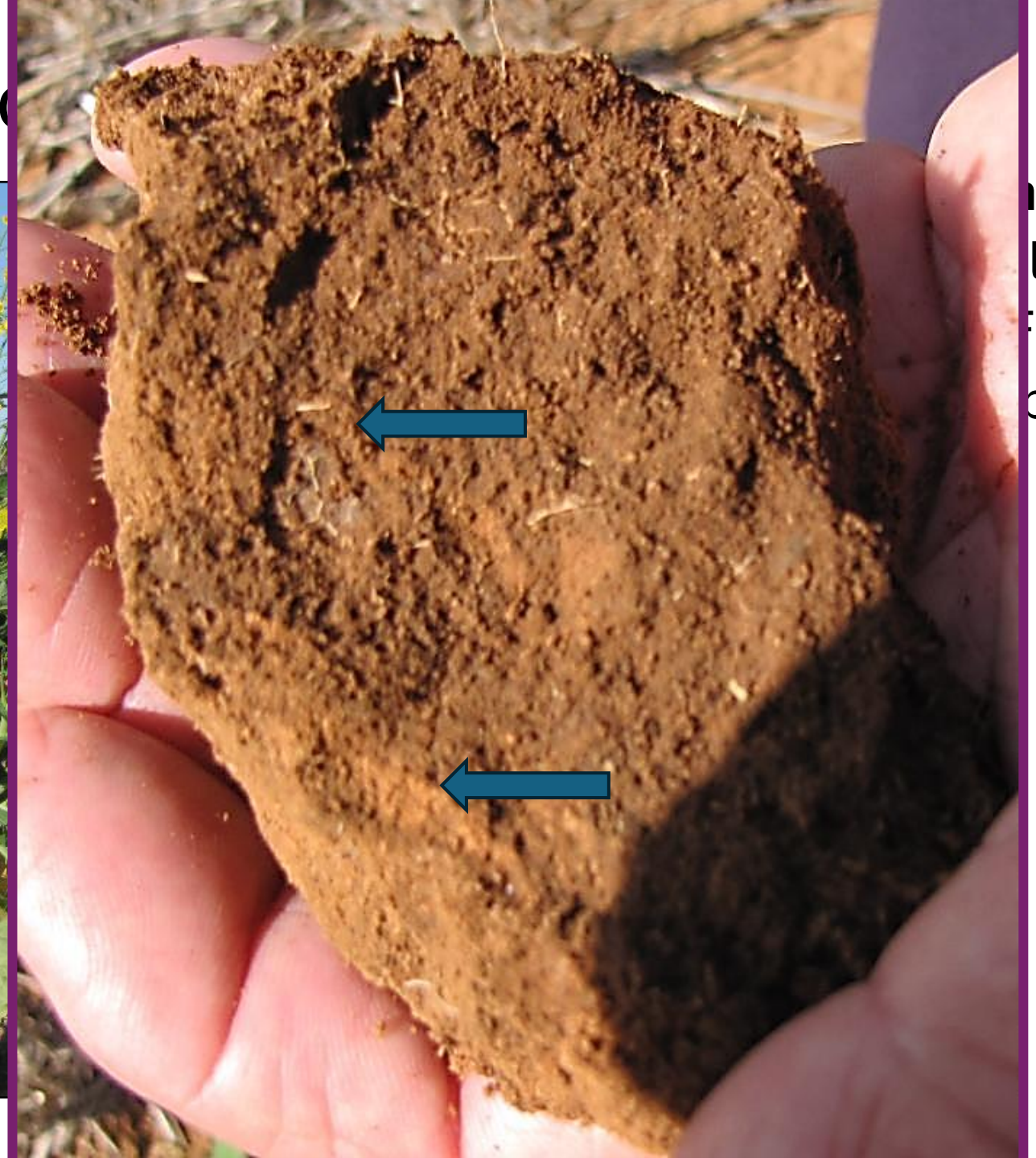
since 2002,
o ripped.



The tap roots have penetrated the pan

POTENTIAL in Landscapes

Higher sandplain- Decompaction, moisture conservation, profile mixing.

Coastal sandplains- Clay delving, drainage, adding fertility to deep siliceous sands.

Midslopes of ancient drainage systems- Overland and interflow interception to lessen valley floor salinisation. Inducing v slow flow and max. subsoil adsorption; slopes of 0.5-1%

Gent angled double disc openers….

FINAL MESSAGES

- **1. TRY STRIP DEEP INCLUSIVE TILLAGE SYSTEMS…(DITS)!!**

- **2.One farming strategy cannot fit all- there is a diversity of management attitudes as well as agroecological diversity; the least divisive advice is still “Horses for Courses” (Harcourt 2023) !**

- **3. ALWAYS DIG DEEPER……(Than AI can)** ☺

THANKYOU FOR LISTENING & ANY QUESTIONS?

(IF TIME ALLOWS)

PROTOTYPE VARIABLE DISC 1998
Either one double or 2 single discs

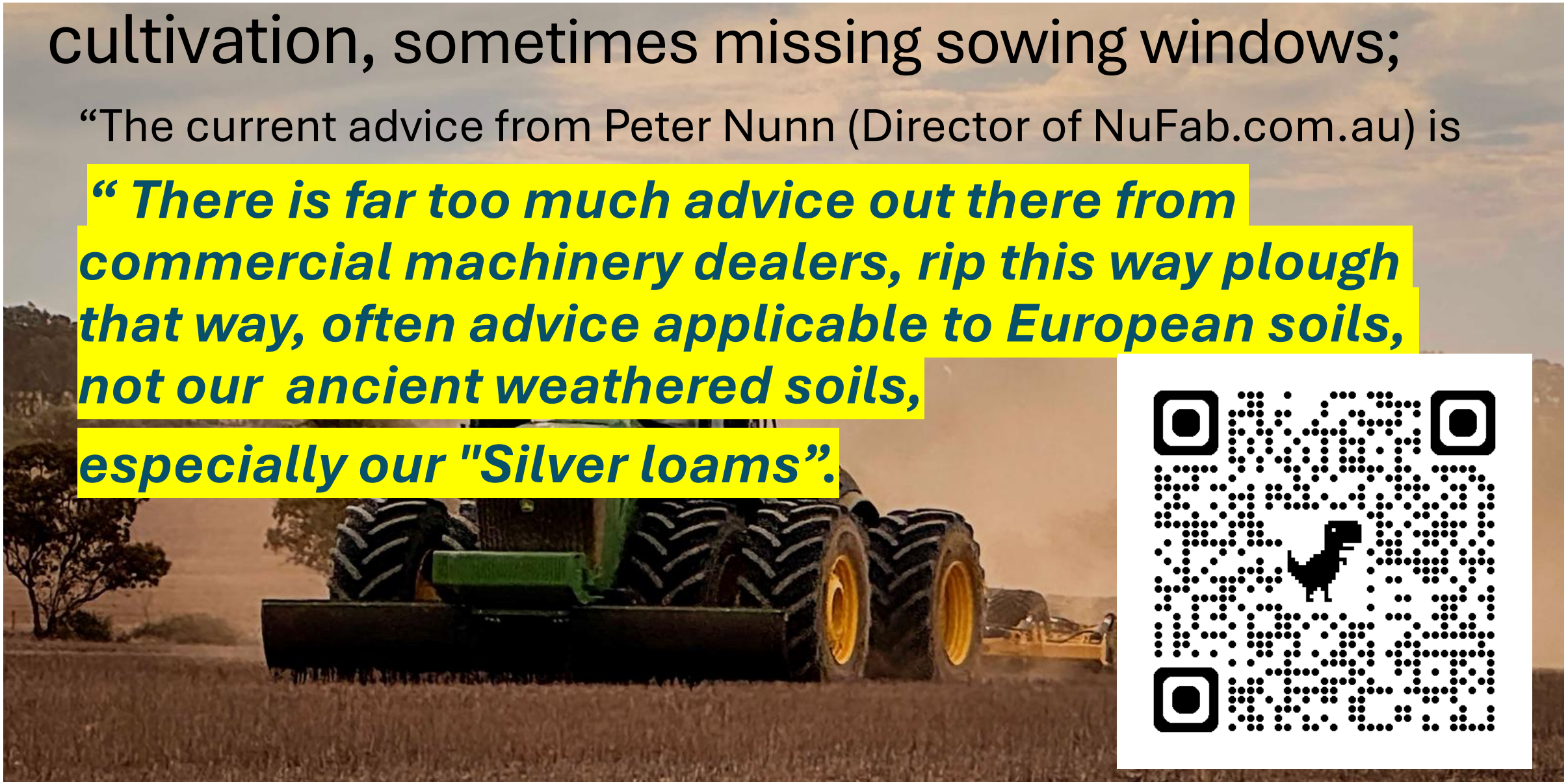
From 1984 to 1989 with CSRO Div. Soils I learned some basic concepts for managing Australian soils....

Research
Airseder
March
1998

BUT WESTERN AUSTRALIAN FARMERS AND FARM WORKERS TAUGHT ME REALITY.....!!!!!!!! ☺

Far too much routine full breakout tillage going on.....

Farms can lose precious time on too much cultivation, sometimes missing sowing windows;



"The current advice from Peter Nunn (Director of NuFab.com.au) is

" There is far too much advice out there from commercial machinery dealers, rip this way plough that way, often advice applicable to European soils, not our ancient weathered soils, especially our "Silver loams".