



**Lincoln  
University**  
*Te Whare Wānaka o Aoraki*  
AOTEAROA • NEW ZEALAND



# Calculating “Hydrothermal time” to quantify seed germination of tall fescue (*Festuca arundinacea*)

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# Publication details



This presentation was made at the 78<sup>th</sup> annual New Zealand Grasslands Conference held at Caroline Bay Hall, Timaru 2-4 Nov 2016.

It is associated with the following publication:

Sharifiamina, S, Moot, D.J., Bloomberg, M. 2016. [Calculating "Hydrothermal time" to quantify seed germination of tall fescue](#). Journal of New Zealand Grasslands 78: 163-168.

**Note:** this presentation contains information on species other than the tall fescue reported in the associated paper

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# Germination is the initial step for successful establishment of grassland species

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- Rain-fed pastures in New Zealand are frequently sown in autumn when **soil temperature is higher** and **moisture is less** than spring
- May cause a failure in germination/emergence of drought sensitive species

**Water  
Availability**

**Temperature**



**Hydrothermal time**

## Objective

To define germination/emergence of seeds at different moisture and temperatures

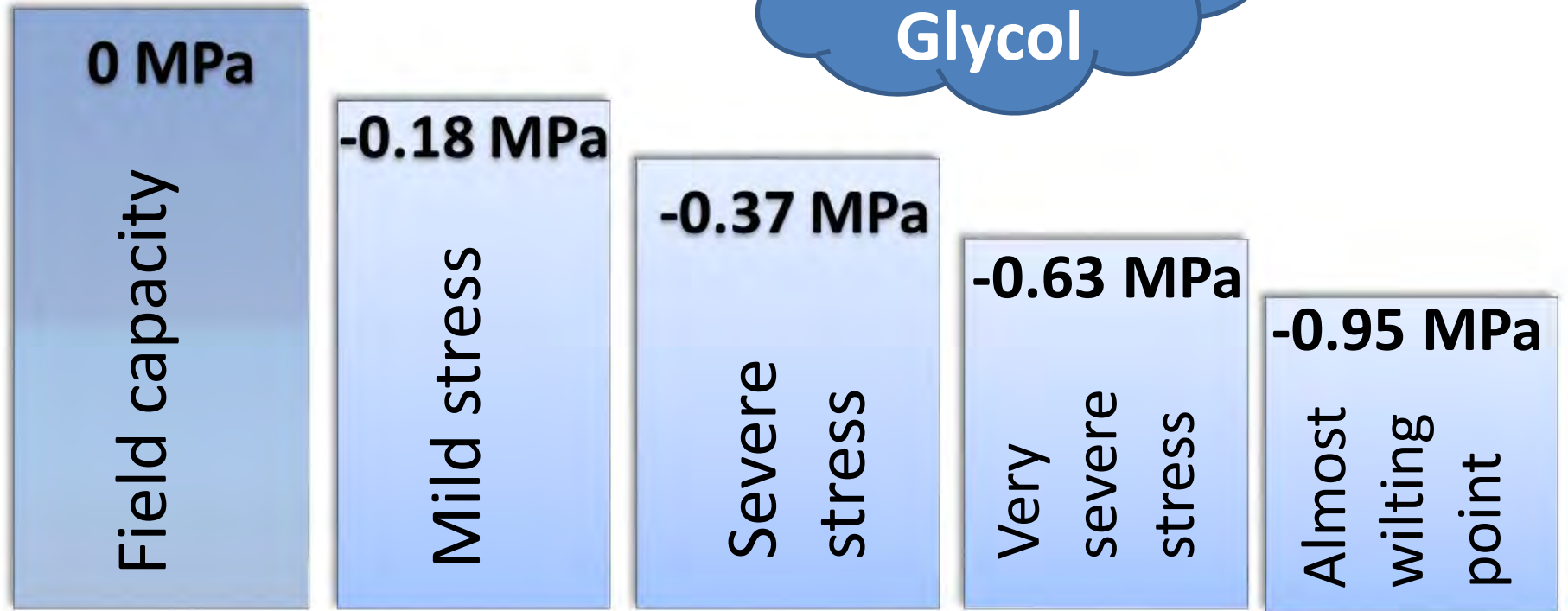
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# Treatments

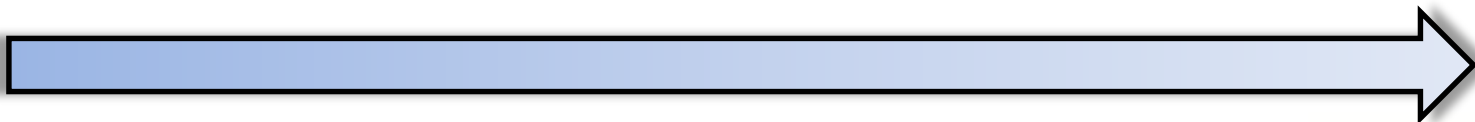
Water potential

$$\Psi = 0.130[\text{PEG}] 2T - 13.7[\text{PEG}]^2$$

Poly Ethylene Glycol



WET



DRY

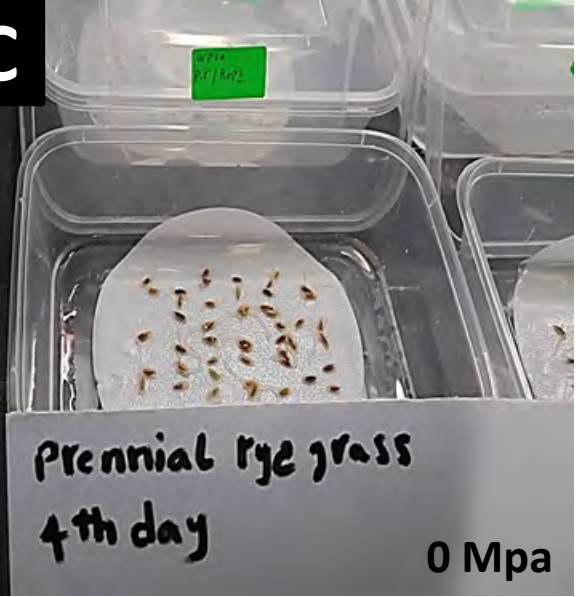
# Treatments

Temperatures:

- 5, 10, 15, 20, 25, 27.5, 30 and 35 °C

3 replicates

20 °C



Perennial ryegrass  
4th day

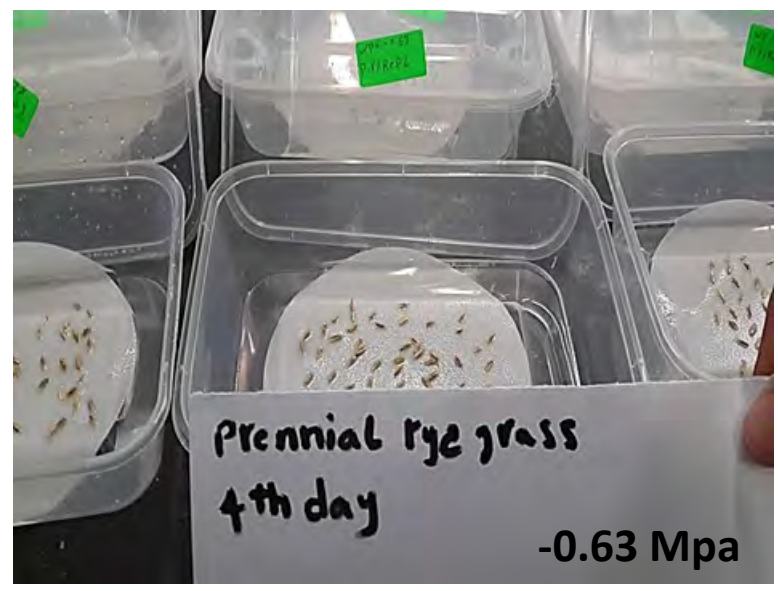
0 Mpa



-0.18 Mpa

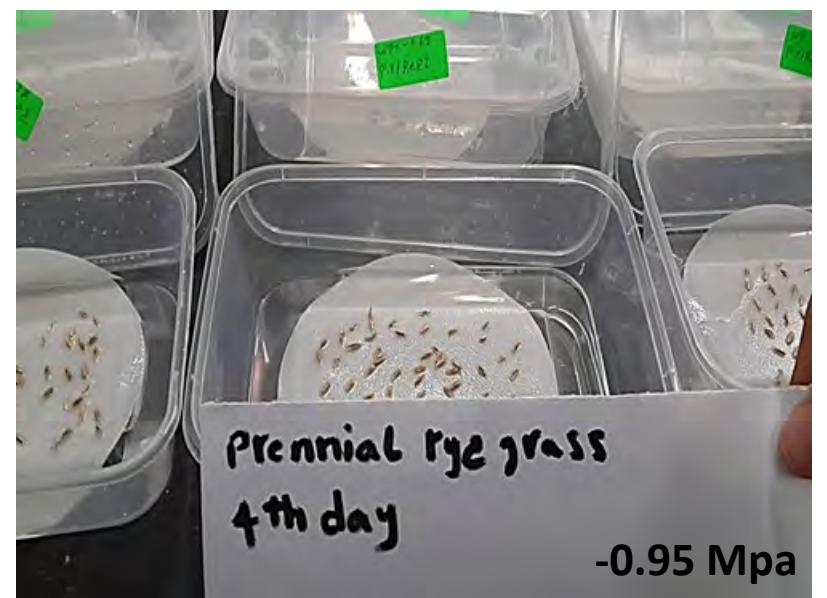


-0.37 Mpa



Perennial ryegrass  
4th day

-0.63 Mpa

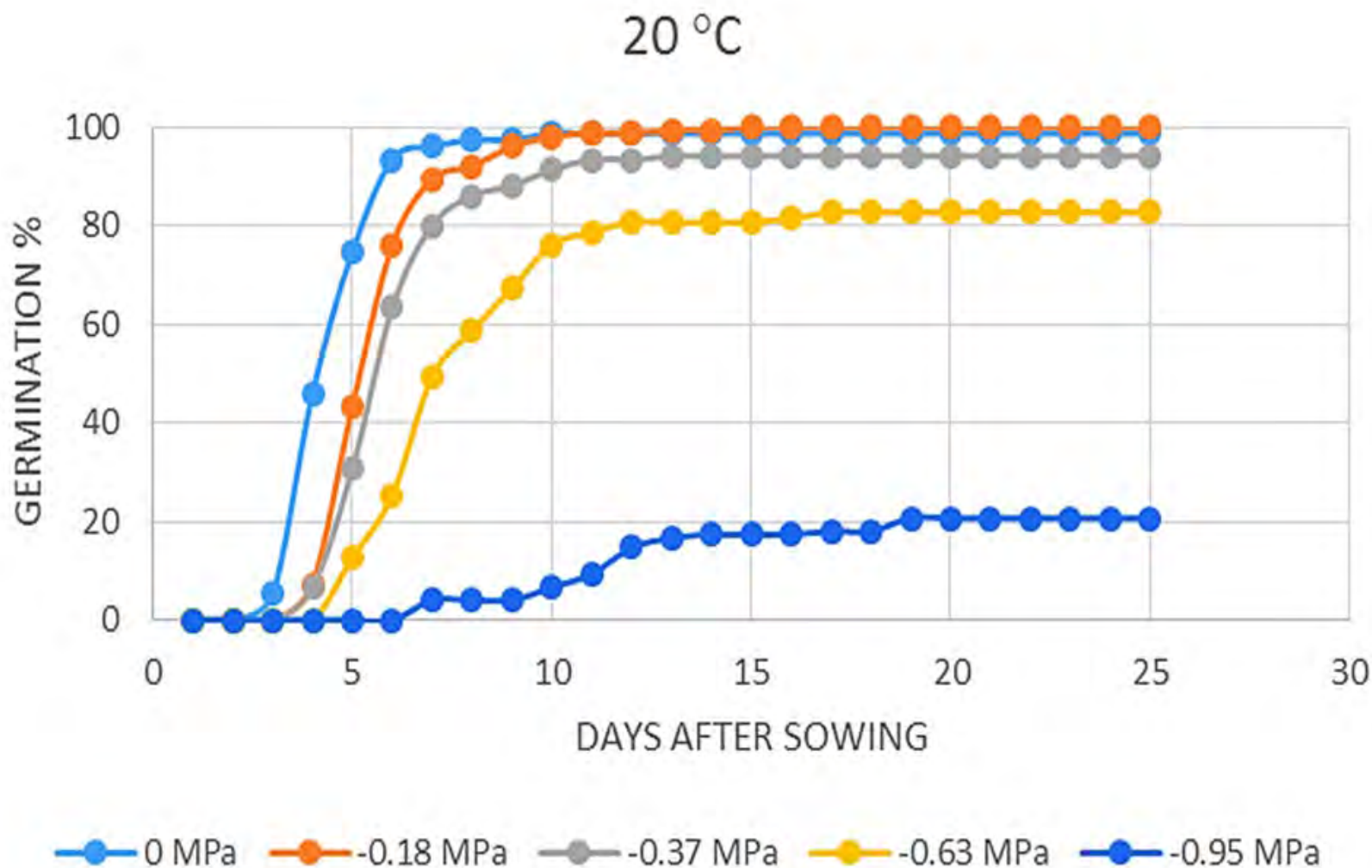


Perennial ryegrass  
4th day

-0.95 Mpa

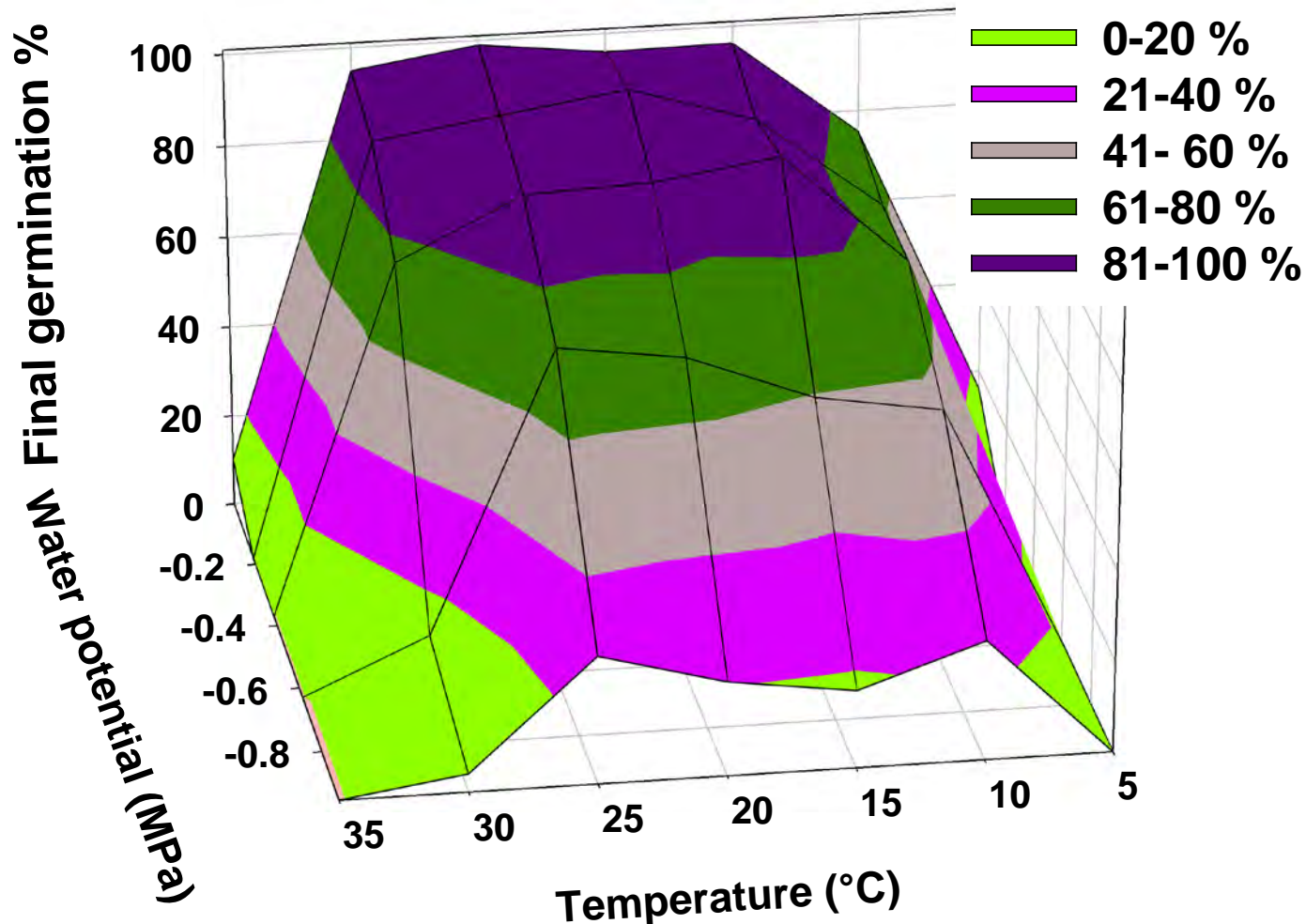
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# Tall fescue

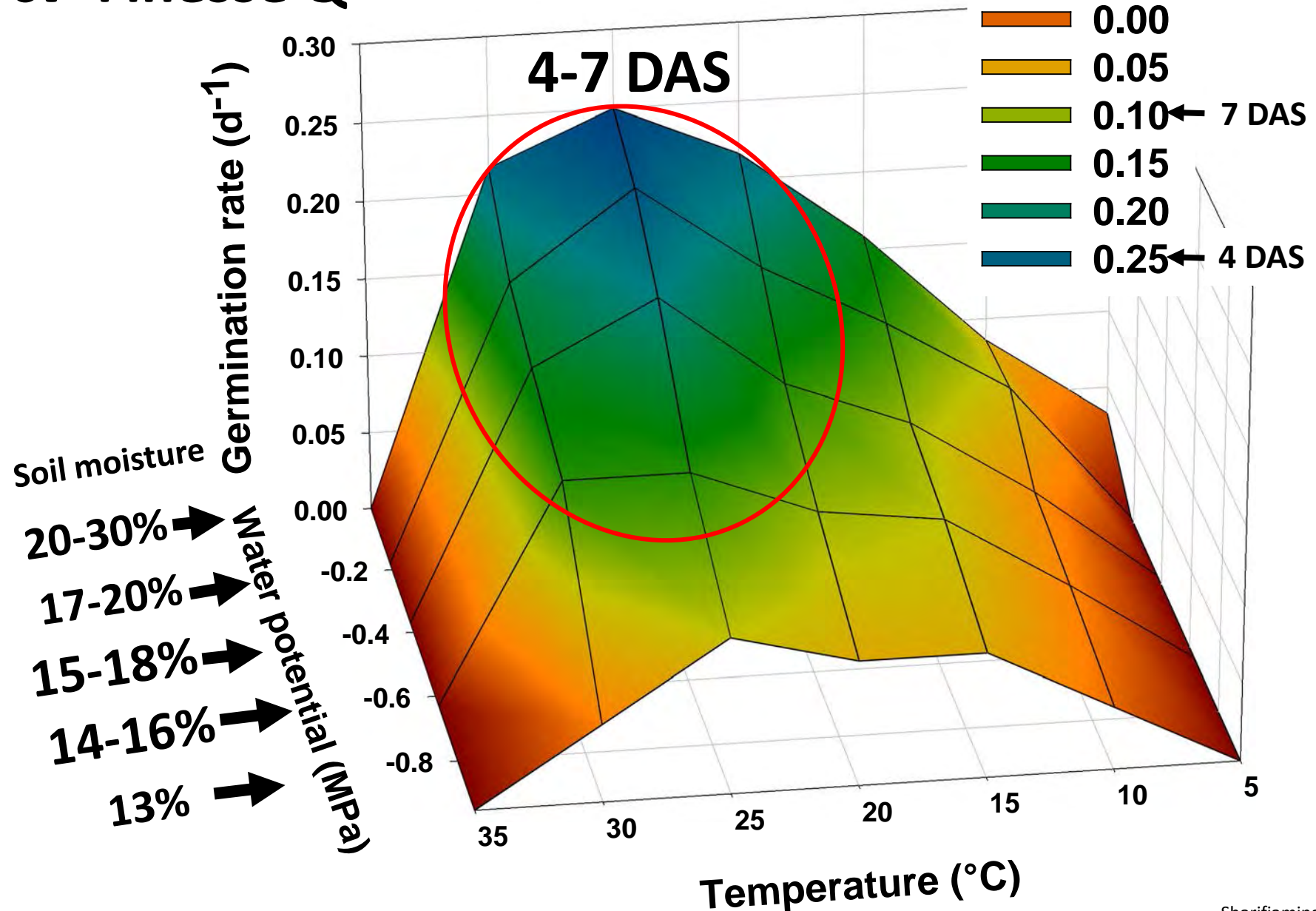




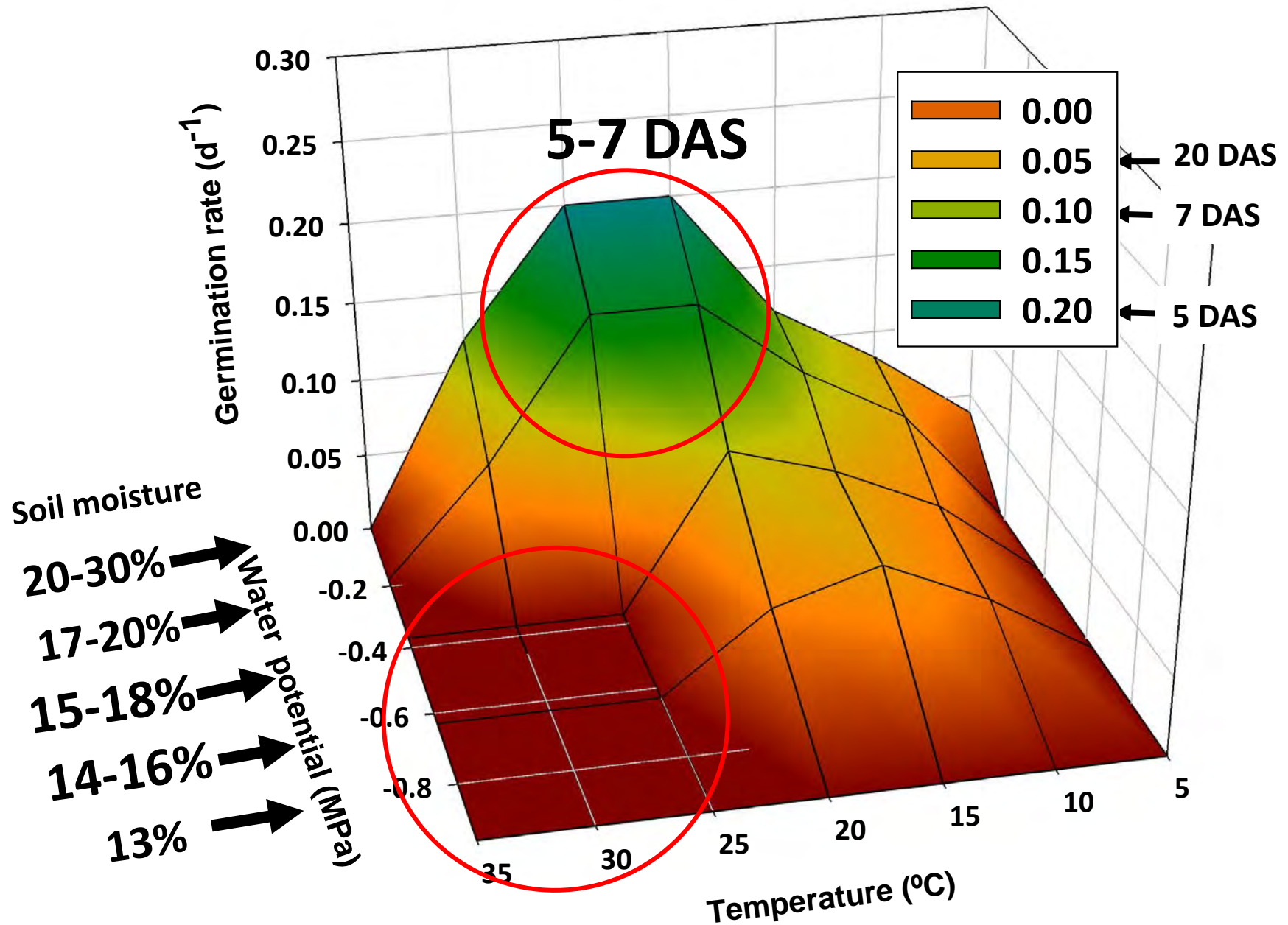
# Final germination% for tall fescue cv 'Finesse Q'

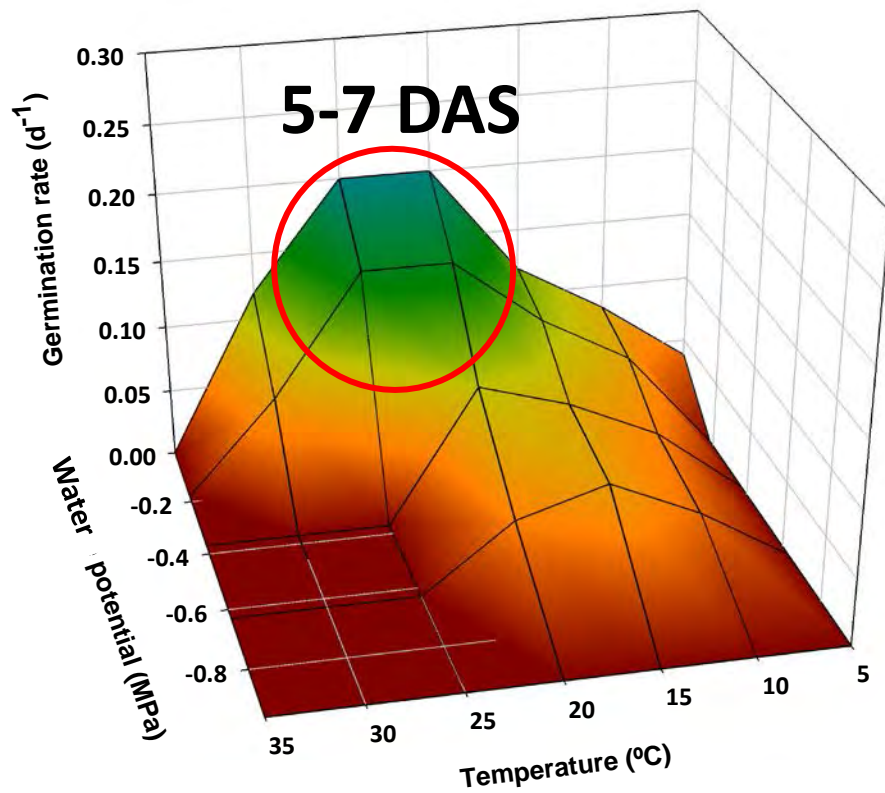


# Germination rate (50%) for tall fescue cv 'Finesse Q'

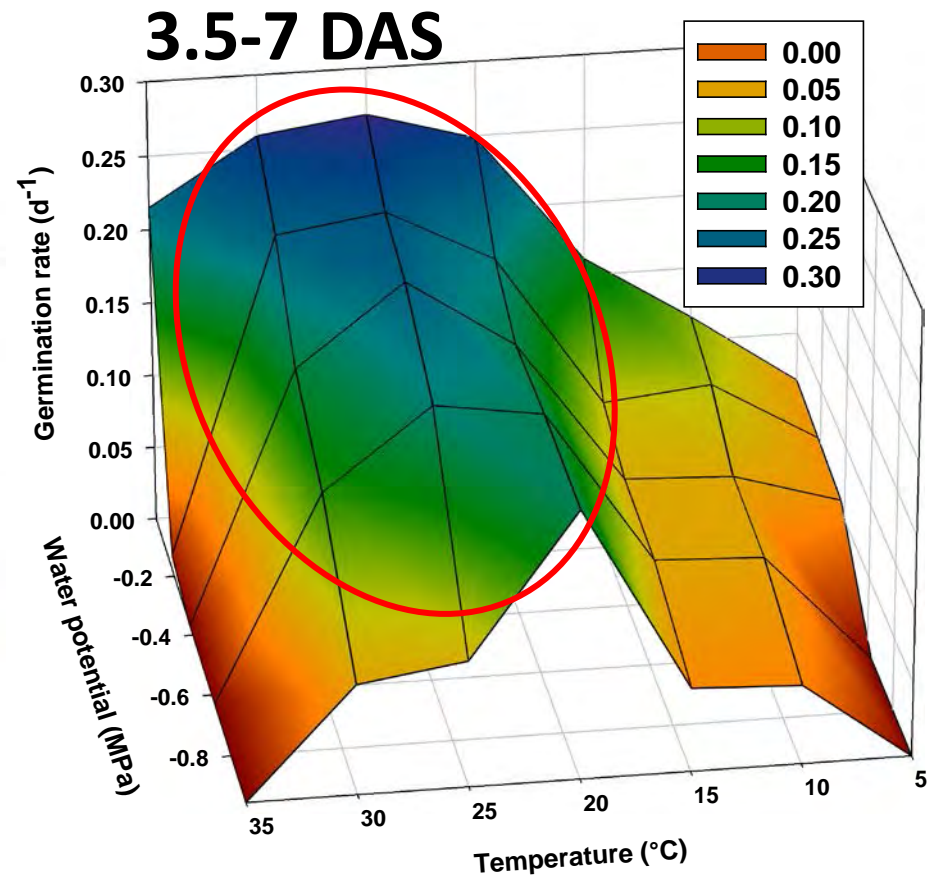


# Germination rate (50%) for Cocksfoot ('SFR36-009')





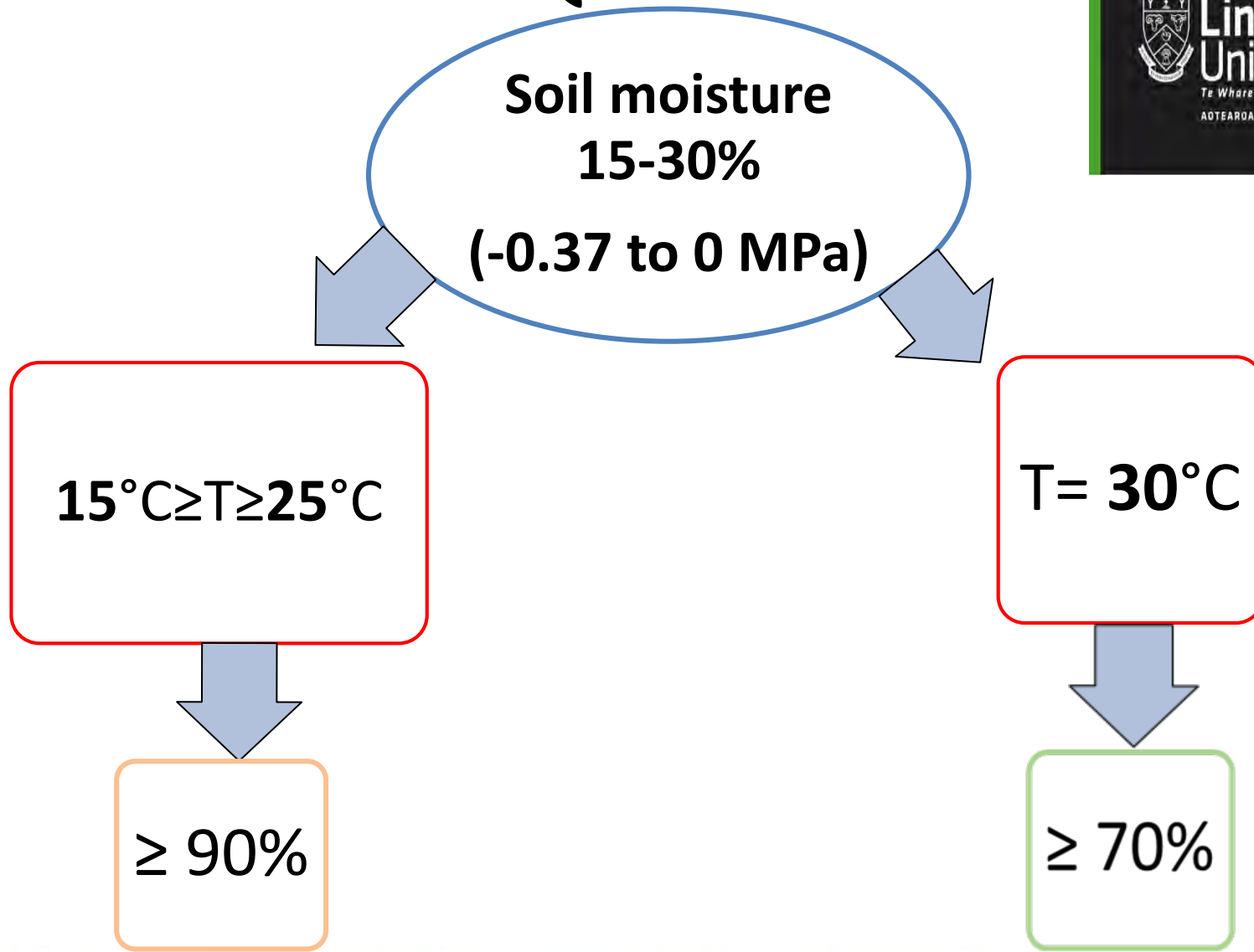
**Cocksfoot (SFR36-009)**



**Perennial ryegrass ('Stellar' AR1)**

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# Tall fescue 'Finesse Q'



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# Tall fescue 'Finesse Q'

**Soil moisture of 14%  
(-0.63 MPa)**



**T= 30°C**



**12% of germination**

# Acknowledgments:



- **Seed Force Ltd.**
- **Callaghan Innovation**

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