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RELATIONSHIP BETWEEN GRAIN YIELD AND SPECTRAL REFLECTANCE INDICES IN SPRING WHEAT AT VARIOUS GROWTH STAGES

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MATERIALS AND METHODS

Location of field trials

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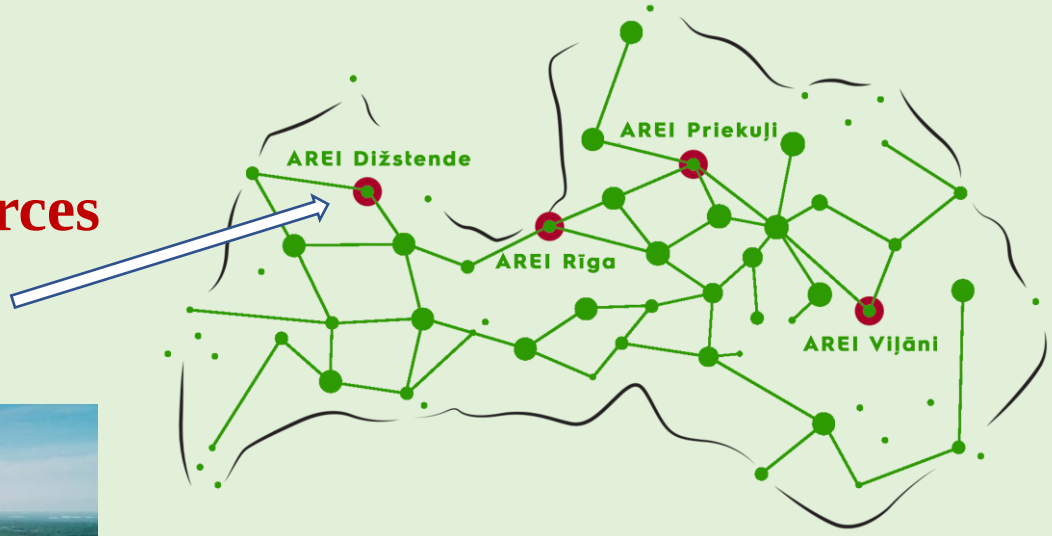


- Field trials was established from **2021 to 2022.**
- **300 spring wheat genotypes.**
- Plot size **5 m²** (2 replications).

Canopy spectral images were collected in **three growing stages stages - tillering begins (GS21), flowering halfway (GS65), early milk (GS73).**

The aim of this study was evaluate the relationships between grain yield and vegetation indices in spring wheat (*Triticum aestivum* L.) at various growth stages.

MATERIALS AND METHODS

Two digital **phenotyping platforms** were used to obtain wheat plant canopy spectral images:

Unmanned aerial vehicle

- Phantom 4 Pro,
- multi-spectral camera,
- 20 m height,

- *Normalized Difference Vegetation Index (NDVI).*

Ground-based vehicle

- Canon EOS 1300D
- RGB camera,
- 2 m height,

- *Green Area (GA), Greener Area (GGA), Crop Senescence Index (CSI), Early Vigor (EV).*

Statistical analyses (RStudio 4.2.2):

- *Analysis of variance (ANOVA),*
- *Pearson correlation.*
- *Principal components analysis.*

RESULTS AND CONCLUSION

- The mean grain yield per plot among the wheat genotypes ranged from 249.48 to 689.78 g m^{-2}, average grain yield was 503.73 g m^{-2}.
- Statistically significant variation between different genotypes was found for all calculated vegetation indices ($p<0.01$).

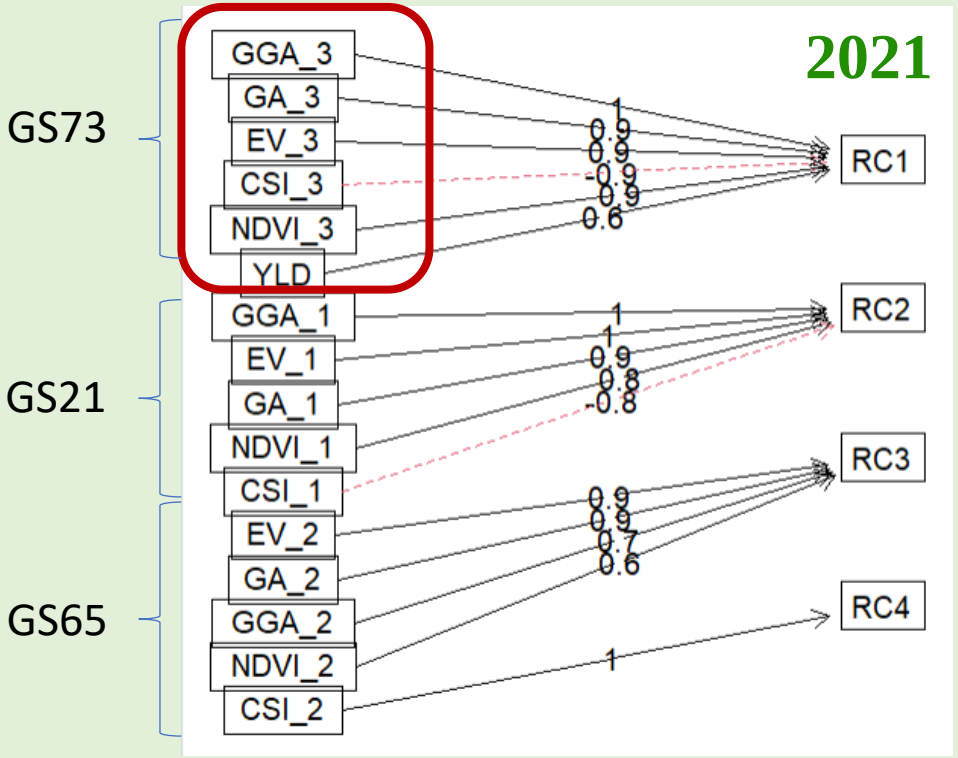
Correlation between grain yield and vegetation indices at different growth stages in wheat, 2021, 2022.

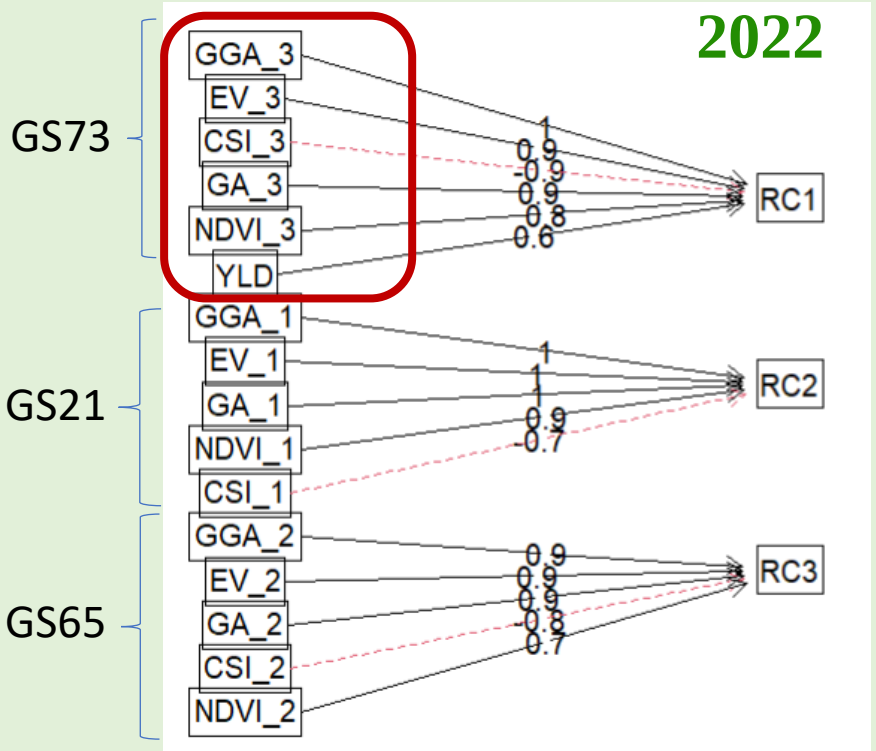
Growth stages	Zadok's stage	GA		GGA		CSI		EV		NDVI	
		2021	2022	2021	2022	2021	2022	2021	2022	2021	2022
Tillering begins	GS21	0.09 *	-0.04 ns	0.11 **	0.01 ns	-0.09 *	-0.17 ***	0.09 *	-0.03 ns	0.17 ***	0.00 ns
Flowering halfway	GS65	**0.35 *** **	**0.36 *** **	**0.29 *** **	**0.33 *** **	-0.05 ns	-0.24 ***	**0.30 *** **	**0.36 *** **	**0.33 *** **	**0.40 *** **
Early milk	GS73	**0.41 *** **	**0.52 *** **	**0.43 *** **	**0.49 *** **	-0.40 ***	-0.44 ***	**0.41 *** **	**0.52 *** **	**0.55 *** **	**0.64 *** **

RESULTS AND CONCLUSION

Principal components analysis (PCA)

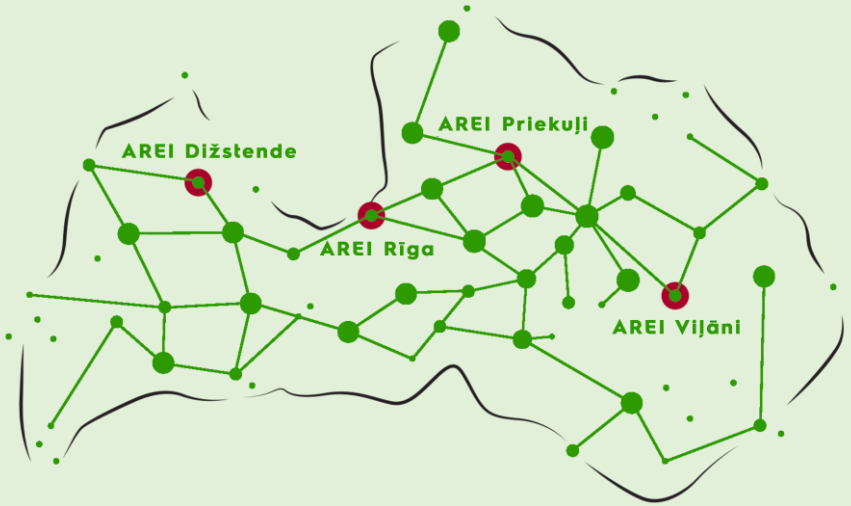
- The first three components accounted for 77% in 2021 and 83% in 2022 of the total variation.





- The first principal component (RC1), which accounted for 31% of the variation in both research years, was strongly associated with GY and all VIs obtained in GS73.

THANK YOU FOR YOUR ATTENTION!



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