

# Biomass and Quercetin Accumulation Predict Drought Sensitivity in a Novel White Clover Hybrid

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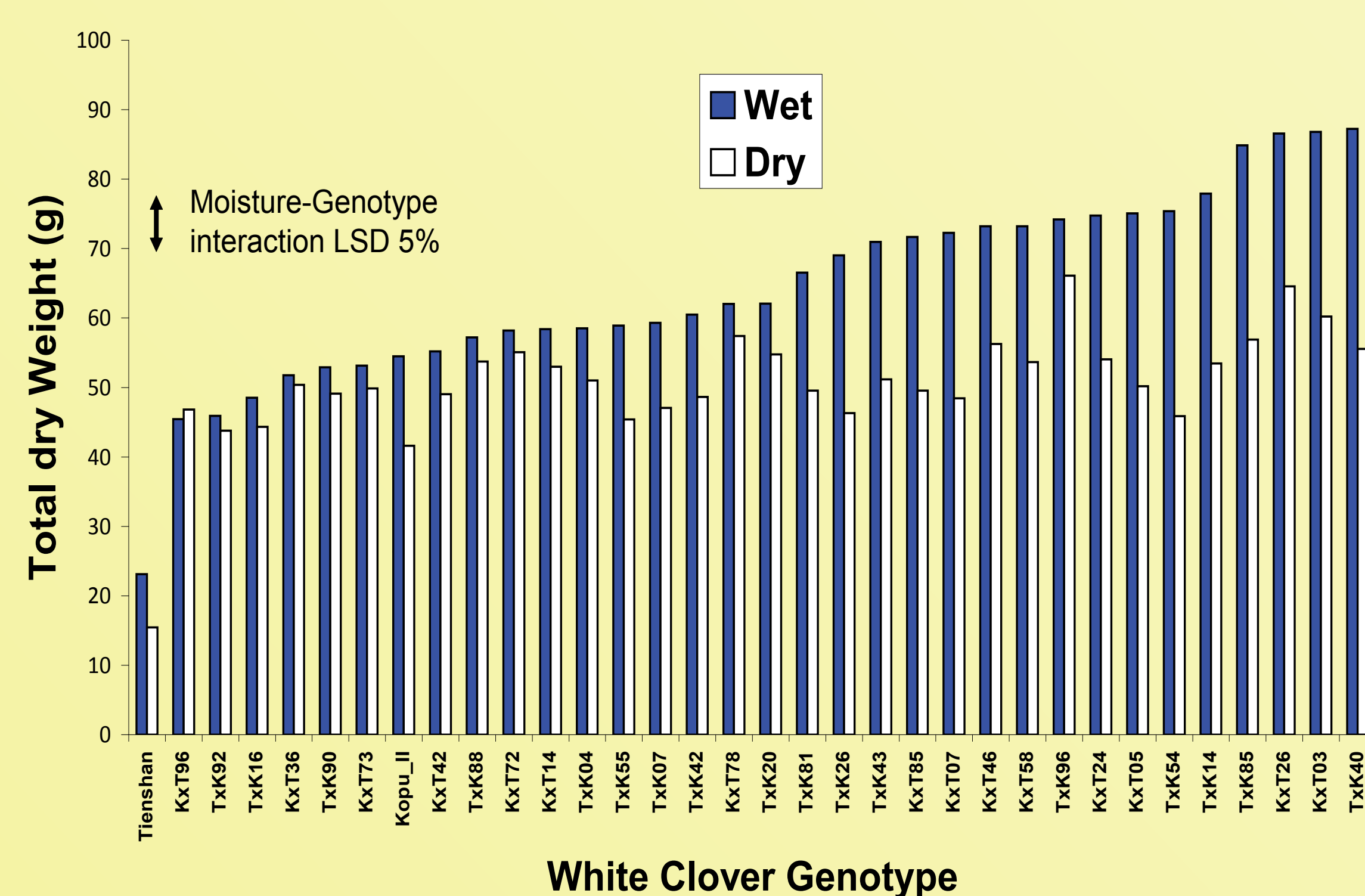
## Context

Previous research showed that levels of the flavonol quercetin (Q) were positively associated with UV stress resistance in populations of white clover (*Trifolium repens* L.), and inversely linked to dry matter (DM) production (Hofmann *et al.*, 2000). Q, and to a lesser degree its precursor kaempferol (K), have been implicated as antioxidants and energy dissipating compounds in plants exposed to stress, and could be useful markers for resistance to other stress factors. This study used a novel white clover hybrid of the productive cultivar Kopu II and of the stress-resistant population Tienshan to examine whether these relationships also hold under drought on a genotype level for germplasm development in future breeding trials.

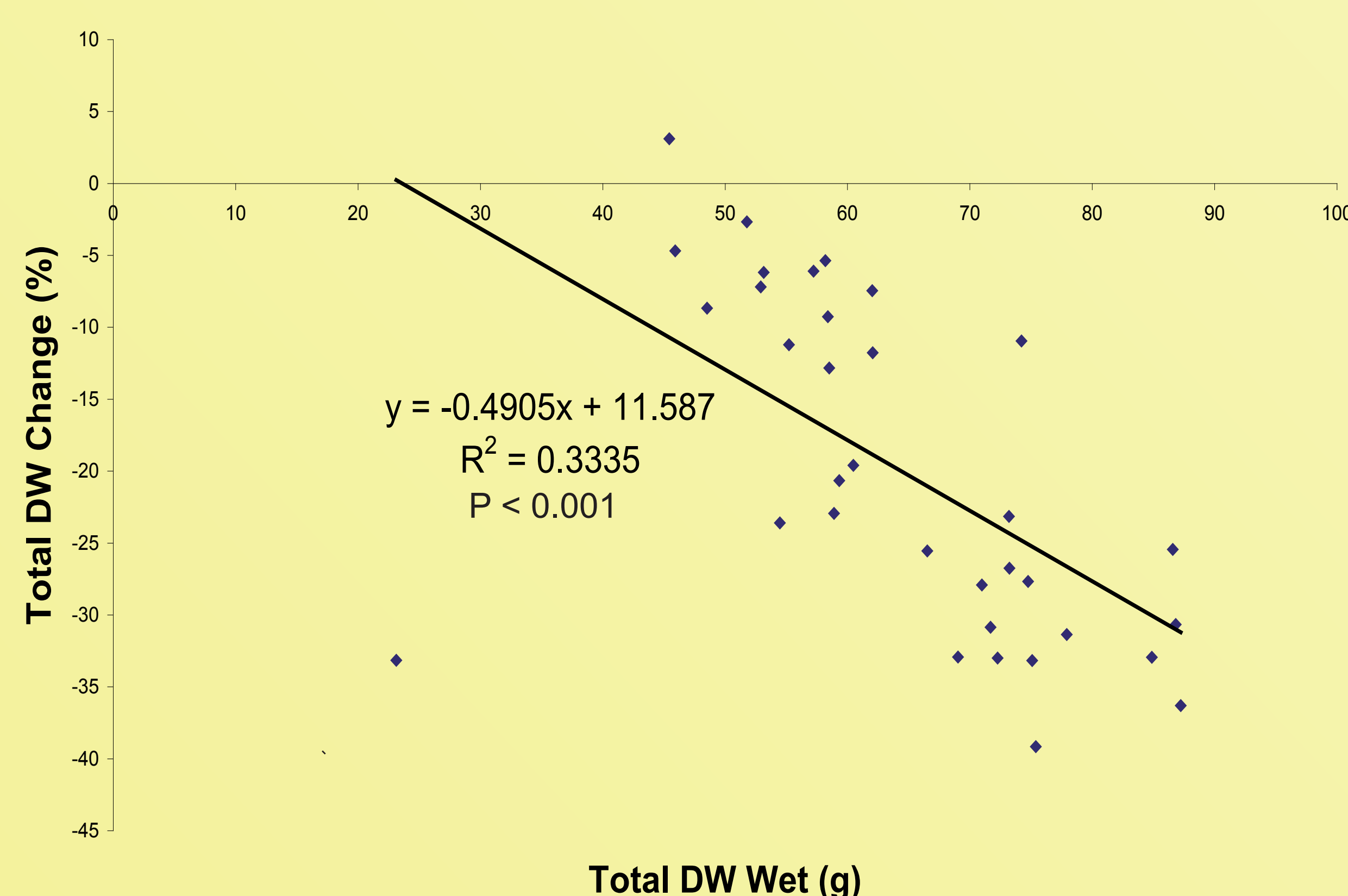
### 1. The drought trial with irrigation system and custom-built rain shelters:



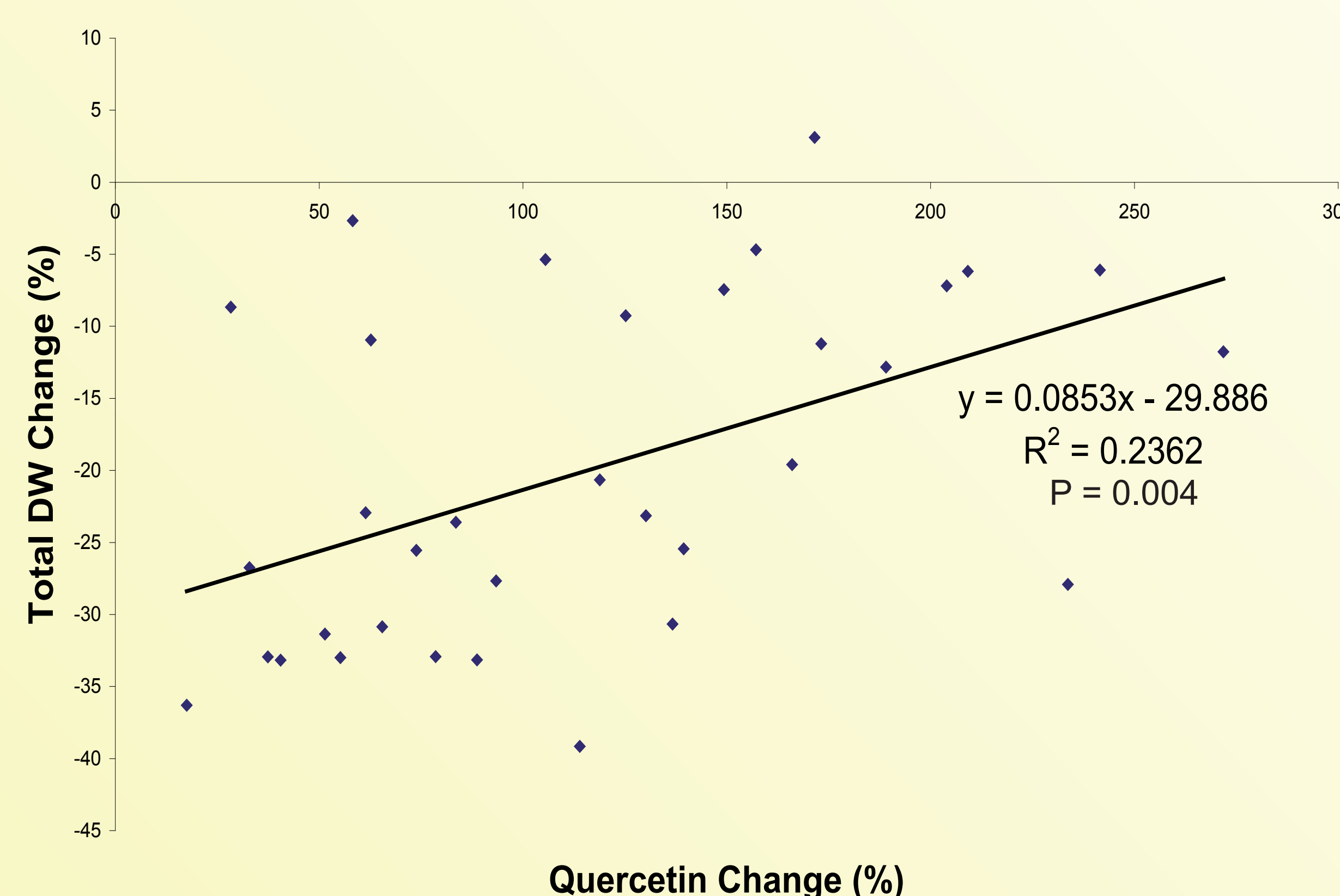
### 2. Drought sensitivity is expressed as drought-induced reduction in total dry weight:



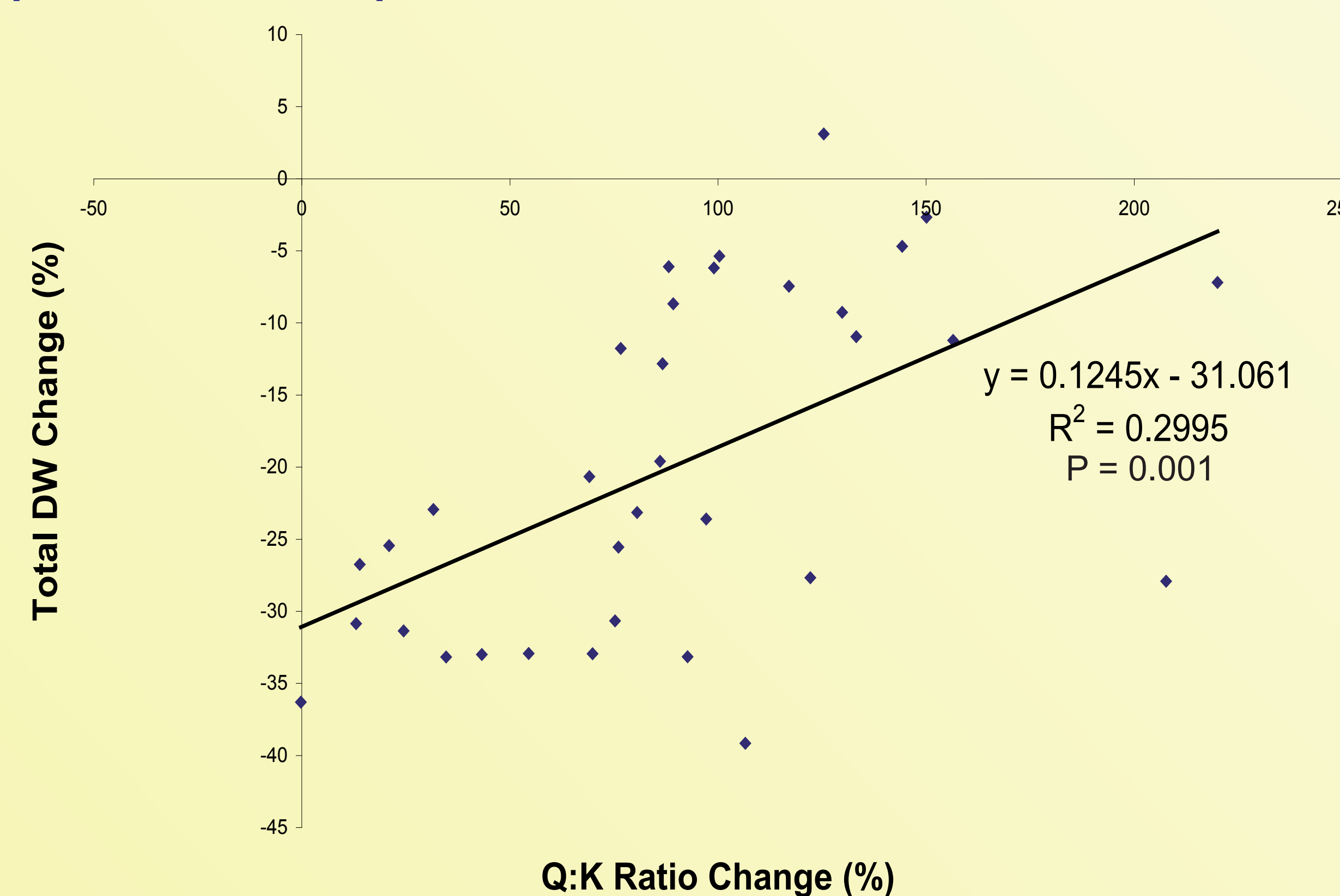
### 3. Drought sensitivity is related to plant productivity:



### 4. Drought resistance is related to drought-induced increase in quercetin levels:



### 5. Drought resistance is related to drought-induced increase in quercetin-to-kaempferol ratio levels:



## Summary

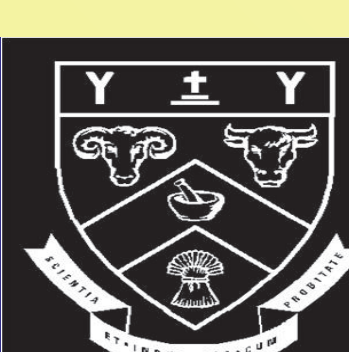
This study shows for the first time that drought resistance in a new white clover hybrid can be linked to drought-induced increases in quercetin levels, and quercetin-to-kaempferol ratio levels. Subsequent DNA-marker analysis studies will be used to identify quantitative trait loci (QTL) for improved drought resistance in white clover to combine high Q response with high herbage yield (Barrett *et al.*, 2004).

## References

Hofmann, R. W., E. E. Swinny, *et al.* (2000). Responses of nine *Trifolium repens* L. populations to ultraviolet-B radiation: Differential flavonol glycoside accumulation and biomass production. *Annals of Botany* **86**(3): 527-537.  
Barrett, B., Griffiths, A., Schreiber, M., Ellison, N., Mercer, C., Bouton, J., *et al.* (2004). A microsatellite map of white clover. *Theoretical and Applied Genetics*, **109**(3): 596-608.

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Te Whare Wānaka O Aoraki

