Yield response of selected taro (*Colocasia esculenta* L.) landraces from South Africa to irrigated and rainfed field conditions

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Introduction

- Taro as a neglected underutilised crop
- Food security
- South Africa's water situation
- Current status of taro production
  - A success story of commercialisation of a NUS
  - Coastal areas and hinterland of KwaZulu-Natal
  - Taro as a 'water loving' plant
  - Taro as an alternative to the Irish potato
- Limitations to taro expansion
  - Limited scientific information on local landraces
  - Drought tolerance – shaking off the 'water-loving' tag

Hypothesis

Local taro landraces may have evolved to acquire drought tolerance over years of farmer and natural selection, often under sub-optimum conditions

Specific objective

To identify and determine **drought tolerance mechanisms** in selected taro landraces collected from rural areas of KwaZulu-Natal, South Africa

Materials and Methods

- Three taro landraces were sourced from two locations in KwaZulu-Natal
  - Umbumbulu (dumbe-dumbe) – eddoe
  - Umbumbulu (dumbe-lomfula) – dasheen
  - KwaNgwanase (KW) – dasheen

KWANGWANASE

DUMBE LOMFULA

Dumbe-dumbe

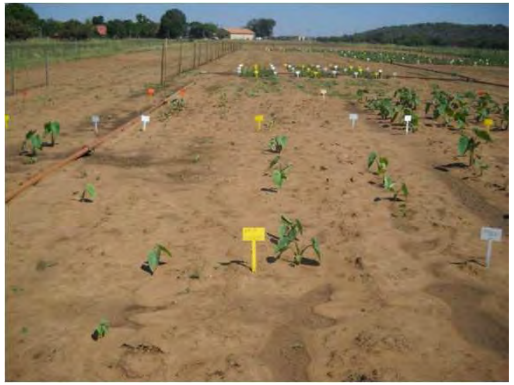
Experimental design

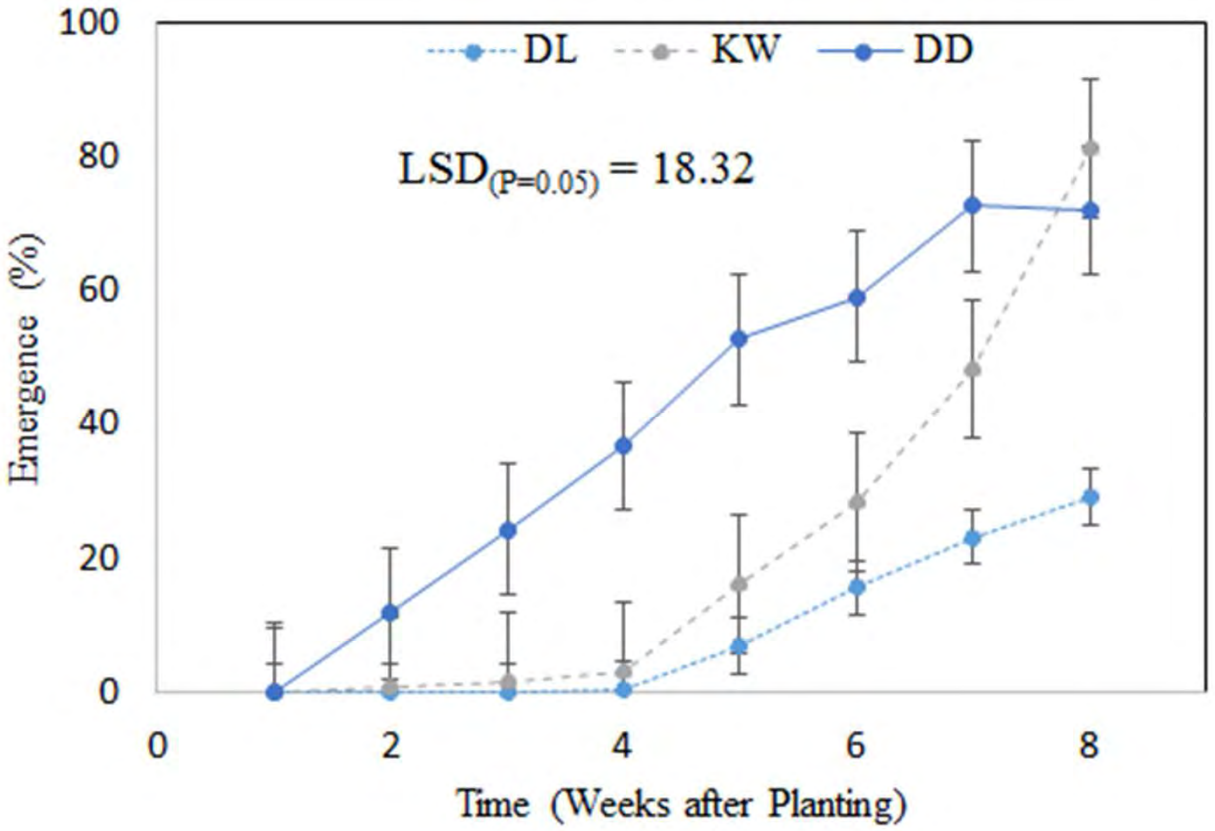
- Split-plot design
    - Irrigated vs. Rainfed
- RCBD, replicated three times
- Taro landraces as sub-plots
- Taro spacing = 1*0.5 m
- Irrigation scheduling based on supplying 100% ETo

- Response variables
  - Emergence
  - Stomatal conductance
  - Plant height
  - Leaf number
  - Leaf area index (LAI)
  - After harvest;
    - Biomass
    - Harvest Index (HI)
    - Corm number per plant
    - Yield

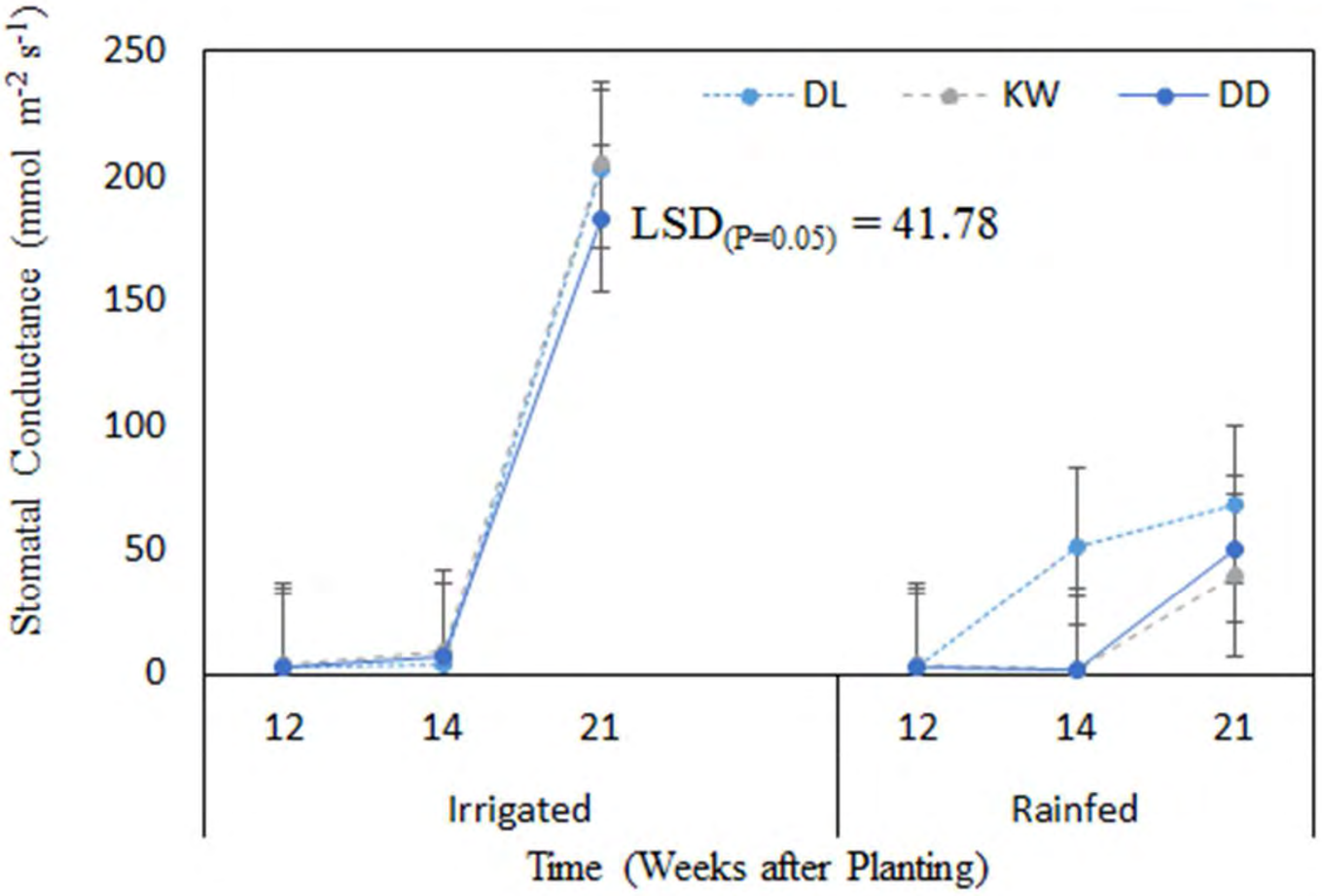
Results & Discussions

Emergence

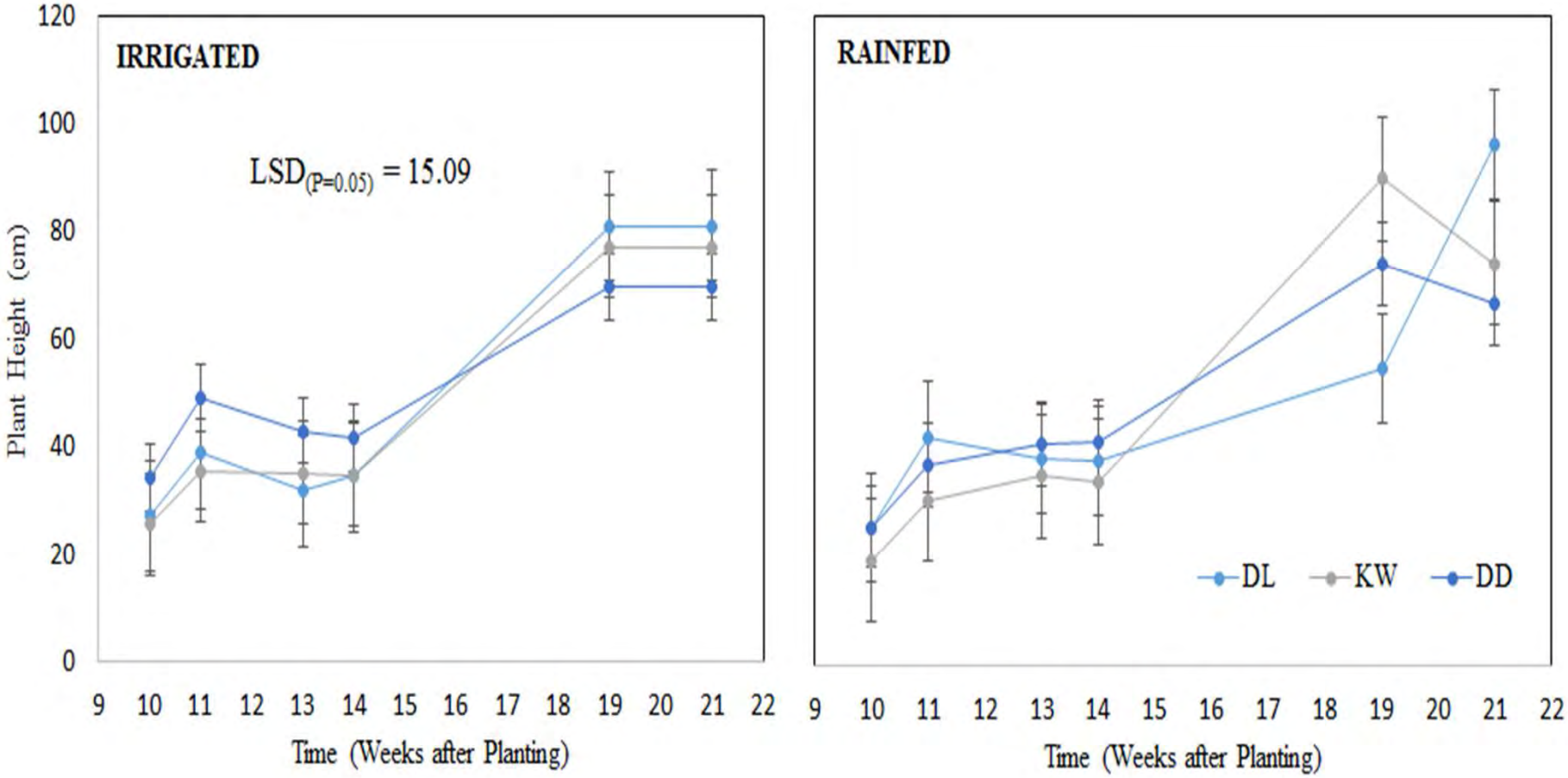




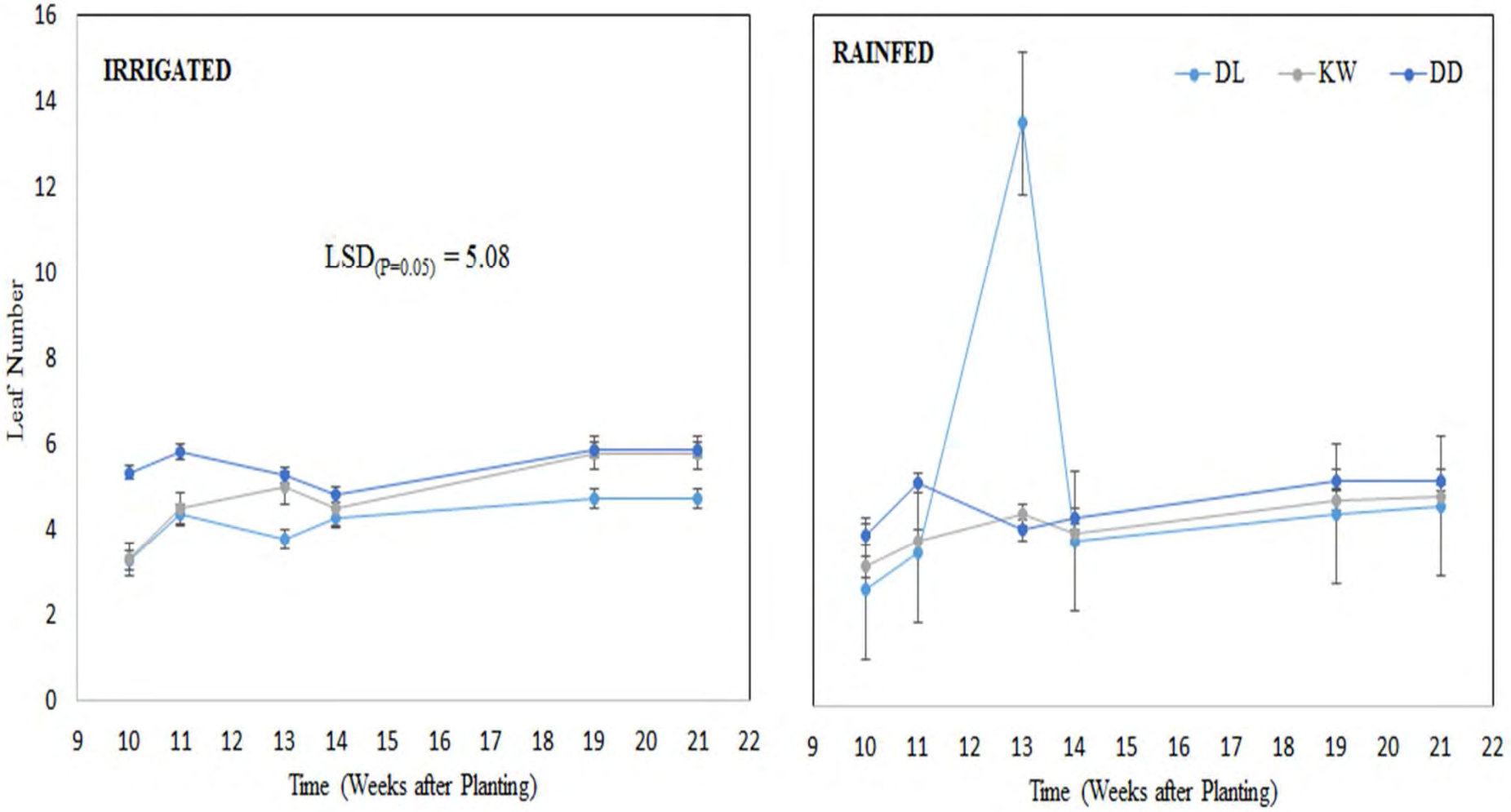
Stomatal conductance



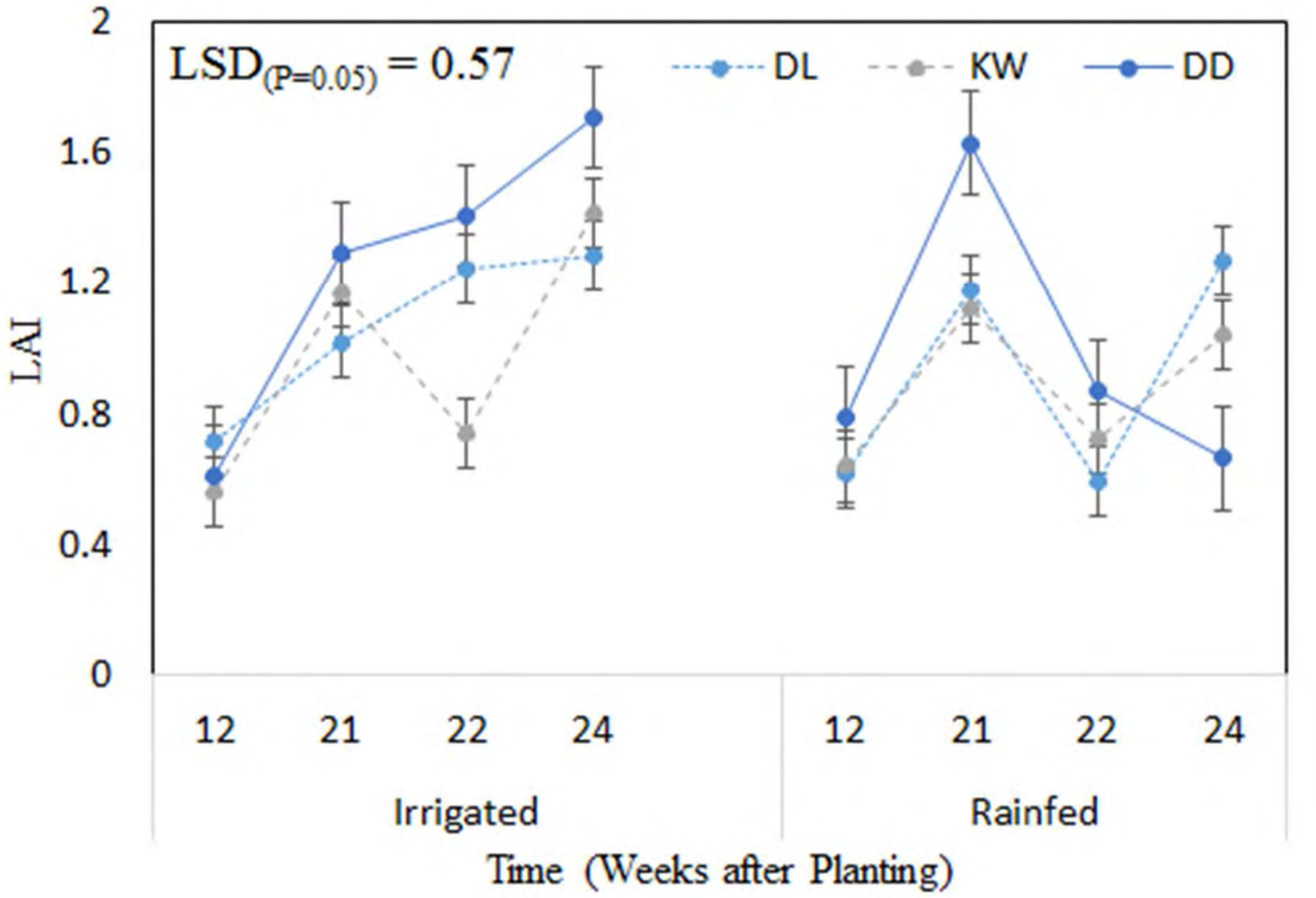
Plant height



Leaf number


IRRIGATED
RAINFED
DL
KW
DD
LSD(P=0.05) = 5.08
Leaf Number
Time (Weeks after Planting)
Time (Weeks after Planting)

Leaf Area Index (LAI)



Yield and yield components

Water Regime	Landrace	Biomass plant^{-1} (kg)	Harvest Index (%)	Corm number plant^{-1}	Yield (t ha^{-1})
Irrigated	**Dumbe-dumbe**	**1.58a**	**72.28a**	**22.39a**	**22.77a**
	KwaNgwanase	1.19ab	46.31a	7.39b	10.65a
Mean		1.39^{a}	59.30^{a}	14.89^{a}	16.70^{a}
Rainfed	**Dumbe-dumbe**	**1.45a**	**61.37a**	**19.83a**	**19.25a**
	KwaNgwanase	0.98b	53.64a	4.61b	11.54a
Mean		1.21^{a}	57.50^{a}	12.22^{a}	15.40^{a}
LSD $_{(P=0.05)}$ (Water Regime*Landrace)		0.31	25.82	6.84	8.90
CV%		14.60	15.60	14.90	18.00
S.E.D.		0.13	10.55	2.80	3.64

Conclusions

- The Dumbe-dumbe landrace showed drought avoidance mechanisms under rainfed conditions
- The Dumbe-dumbe landrace may be suitable for cultivation under rainfed conditions in areas other than the coastal areas where it is currently cultivated
- Slow emergence of taro landraces remains an issue to be dealt with in future research
- Breeding for drought tolerant taro varieties with good stand establishment should be prioritised in NRIs
- The successful commercialisation of taro production should be used as a model for similar NUS
- Nutritional water productivity of taro should be studied
- Taro as future crop?
  - Drought tolerant
  - Water-logging tolerant

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Thank You!!!

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