Rhodes Grass: a New Forage Crop for the Low Desert

Oli Bachie

UCCE Agronomy Advisor, Imperial, Riverside and San Diego Counties

Director, UCCE Imperial County

- ✓ Backgrounds
- ✓ Research @ DREC
- ✓ Yield & nutrition
- ✓ Other desirable features
- ✓ Summary

The 7th Annual New Technologies Workshop for Field Crops.
Wednesday, June 3rd, 2020 . The UA CE (via zoom)

THE RHODES GRASS & AGRONOMIC FEATURES

- Is *Chloris gayana* Kunth, *C. abyssinica (synonym)*
- Is a C4 perennial grass native to Africa, but, widespread in tropical & subtropical countries.
- Very closely related to Bermuda grass (*C. dactylon*)

Morphology

- RG stems are tender, very leafy & spreads through stolons (Stoloniferous) & highly productive nature

- RG is valued for its (1) ability to set seed, (2) relative ease of establishment & ability to cover ground, (3) tolerance for drought, light frost, & soil salinity

Keftasa 2006.

- In the Arabian Peninsula, RG varieties produced significantly higher dry mass than alfalfa cultivars

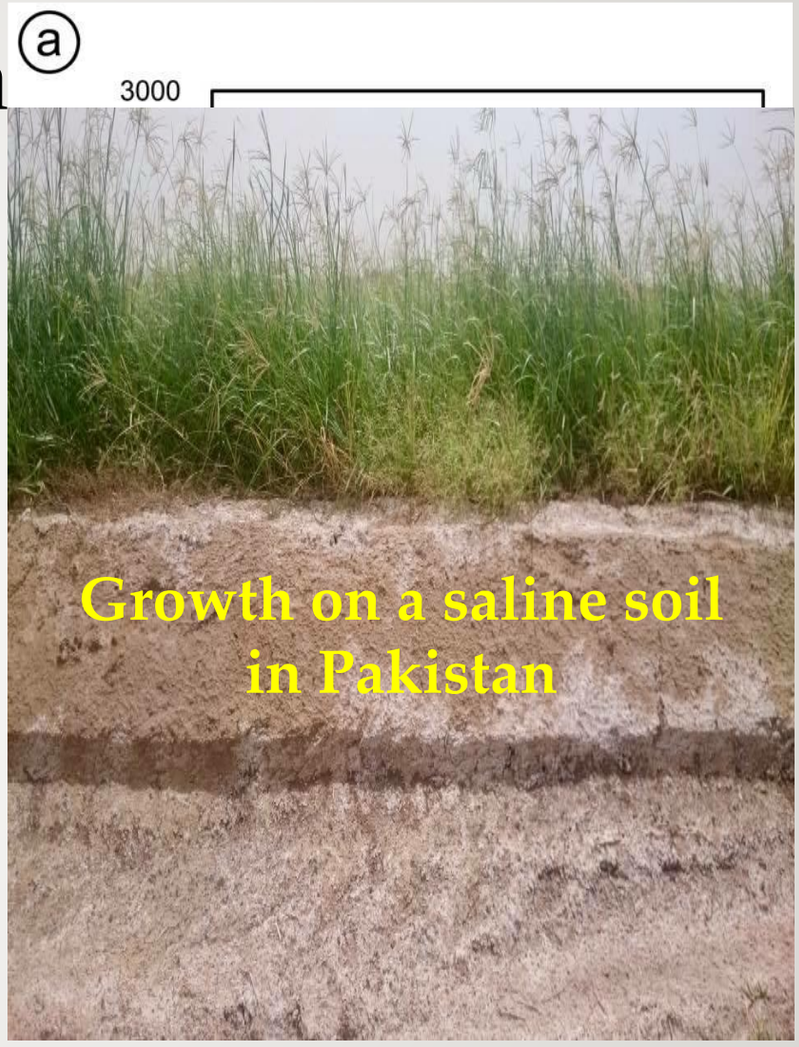
Nadaf et al., 2014

Salt tolerance of RG

- Possession of salt glands is th mechanism by which RG tolerates salinity problems *(can secrete both Na+ & K+) through its leaves*

Kobayashi et al., 2007

- the ability to secrete Na+ is greater than that of K+ secretion



THE RESEARCH @ DREC

- Probably the first of its kind in CA on RG

- We tested 2 varieties;
  - ✓ *Gulfcut (GF)* & *Recliner (RL)*
  - ✓ Selected Seeds of Australia states that the previous RG were wild selections & inconsistent in feed bunks.

  - ✓ The varieties were latter hybridized & optimized as fine stemmed leafy plant of aggressive stoloniferous growth habits, salt tolerance & high dry matter yields.

Objectives of the trial

- Evaluate adaptability under the dry hot irrigated conditions of the low desert, &
- test forage yield and nutrition value of the two varieties

Plot layouts & Planting

- Plots laid out in RCBD with 4 replications
- 18 lbs of seeds/ ac (broadcasting)
- sprinkler irrigation, then shifted to flood irrigation

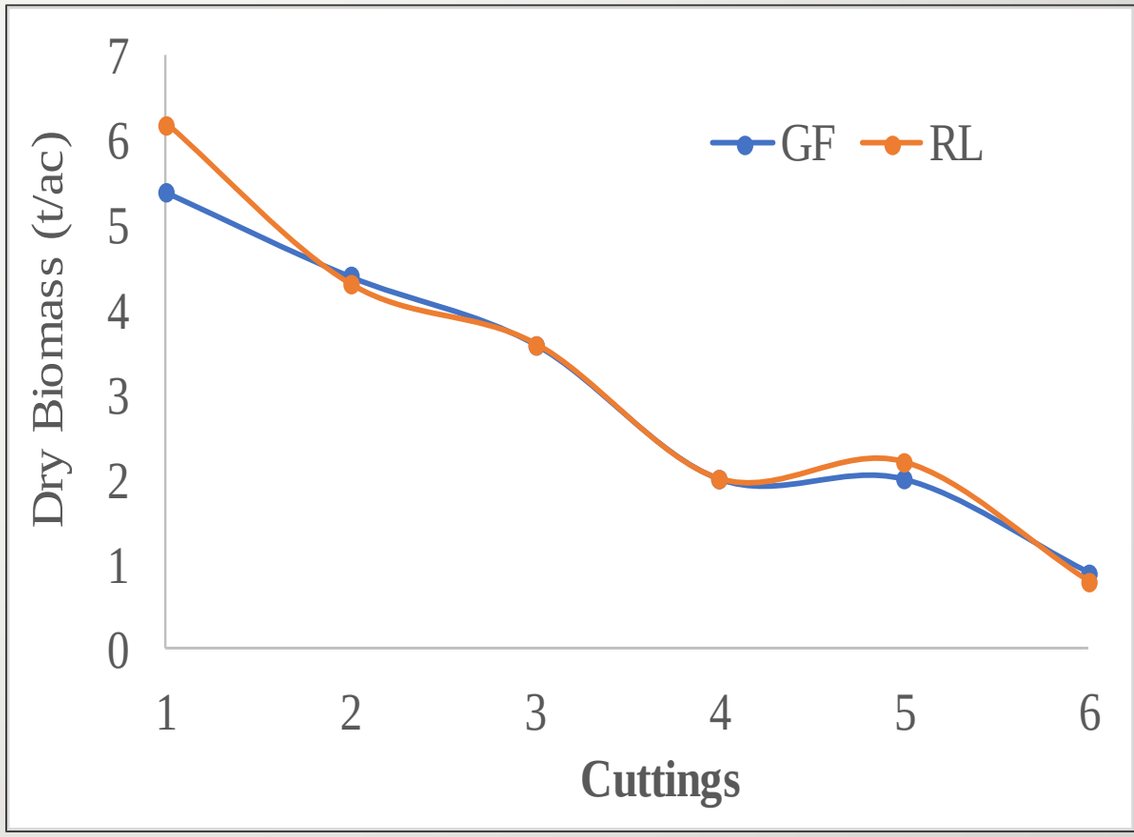
- **Fertilization;**
  - ✓ 120 lb/ac N (pre-plant) & 50 lbs/ac N (subsequent cuttings)
  - ✓ Pre-plant PK at 40-50 kg/ac

- **Harvested/cut** when crop develops 5 -10% flower heads

First year biomass (t/ac) – 6 cuttings

Variety	*5-May*	*21-Jun*	*28-Jul*	*29-Aug*	*10-Oct*	*12-Dec*	*Total*
GF	5.4a	4.5a	3.6a	2.0a	2.0a	0.9a	18.4
RL	6.2a	4.26a	3.61a	2.0a	2.0a	0.8b	19.1
Pr>F	*0.34*	*0.73*	*0.94*	*0.95*	*0.46*	*0.05*	

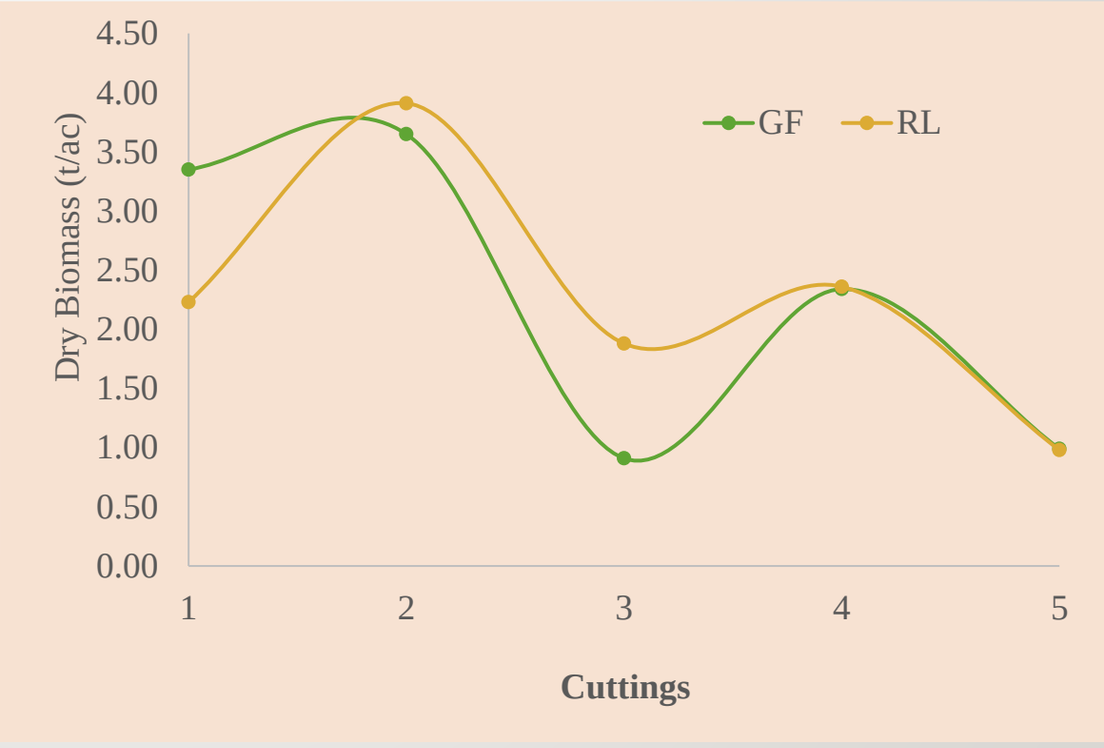
- no significant differences between the varieties in hay production at any of the cuttings
- Biomass yield declined throughout the cutting cycles
- Annual yield ranged from 18 to 19 t/ac (see table)



Second year biomass (t/ac) – 5 cuttings

Variety	24-May	12-Jul	31-Aug	1-Nov	12-Dec	Total
GF	3.4a	3.7a	0.9b	2.3a	1.0a	11.2
RL	2.2a	3.9a	1.9a	2.4a	1.0a	11.4
Pr>F	*0.43*	*0.66*	*0.01*	*0.94*	*0.96*	

- ✓Slightly variable biomass yielding patters for the 2nd year trial
- ✓Similar trend of yield decline over cutting cycles
- ✓no significant differences between the varieties in biomass production
- ✓Total annual yield was ~ 11t/ac (5 cuttings)



Graphical representation (dry biomass production)

Forage Crop hay yield comparison

Crop	2016 yield (t/ac)
Alfalfa hay	7.19
Bermuda grass hay	7.89
Klein grass hay	10.0
Sudan grass hay	5.66
Rhodes grass	**11-19**

Source: 2016 IV Ag Crops & LS Report

Nutritional values from three samplings

Variety	CP%	AFD	dNDF	Ash	dNDF48	dNDF30	TDN
			First cutting				
RL	14.1[a]	37.5[a]	65.4[a]	9.9[a]	38.1[a]	23.5[a]	59.8[a]
GF	14.2[a]	37.8[a]	65.0[a]	9.7[a]	37.5[a]	22.4[a]	59.5[a]
Pr>F	*0.94*	*0.62*	*0.74*	*0.63*	*0.57*	*0.24*	*0.64*
			Second cutting				
RL	12.2[a]	39.73[a]	67.2[a]	10.1[a]	40.8[a]	28.7[a]	63.2[a]
GF	12.1[a]	41.2[a]	68.8[a]	10.0[a]	41.6[a]	28.9[a]	61.8[a]
Pr>F	*0.94*	*0.41*	*0.4*	*0.74*	*0.25*	*0.71*	*0.26*
			Third cutting				
RL	12.4[a]	38.9[a]	69.4[a]	10.1[a]	40.0[a]	28.9[a]	59.2[a]
GF	13.4[a]	38.4[a]	67.5[a]	10.1[a]	40.2[a]	29.5[a]	62.1[a]
Pr>F	*0.24*	*0.69*	*0.32*	*0.93*	*0.68*	*0.62*	*0.16*

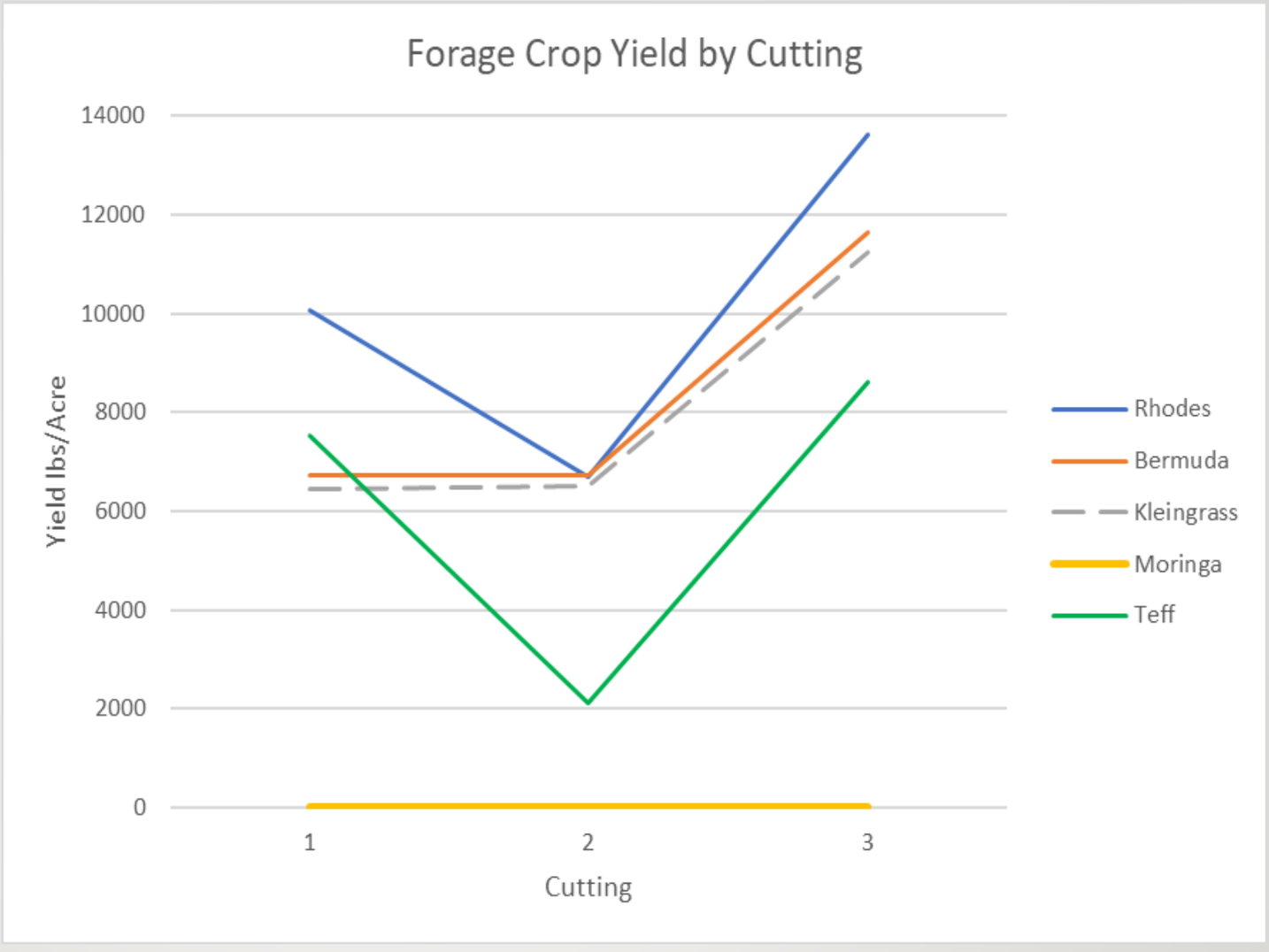
Means in each column followed by the same letter under each cutting is not significantly different from each other.

Forage nutrient component comparisons

Crop	CP	TDN	ADF	NDF
Alfalfa	17-29	50-56	26-35	40-50
Bermuda grass	8-12	43	32-43	70-78
Sorghum / Sudan grass	8-15	-	29-40	55-65
Corn Silage	6-9	70	28-43	51-68
Wheat straw	4	-	54	85
Rhodes grass	**12-14**	**59-63**	**37-41**	**65-69**

Source: Compared to nutrition information ,Putnam (ag practices for forage quality)

ONGOING TRIAL



Other desirable Characteristics

- Tolerates mechanical damages
- Crop after recovery from damage (bottom)

Suitability for Pasture (not tested here)

- Suitable for rainfed & irrigated systems
- Highly desirable for direct pasturing, palatable
- Suitable for all animals
  (Dairy, Beef, Horses, Goats & Sheep)

Pest Management

- No incidences of insect pest or pathogens detected at our research field
- Weeds were not a problem.
  - ✓ It was strong competent crop
  - ✓ But, may need BL weed control at establishment

Summary (strengths)

- Easy to establish, high salt & stress tolerant
- Rare pests or diseases

- Well adapts to the low desert conditions & produces high biomass of good nutritive quality
- RG can be an alternative forage crop for the low desert & even beyond

- Is already adopted by some growers for commercial production and export

- Future work will focus on resource use & estimation of production costs & prepare RH production guideline

Acknowledgments

This research at DREC was conducted with funding support provided by "Selected Seeds" of Australia. I also thank the support provided by DREC and UCCE Imperial County staff for field maintenance and data collection

Contact: **obachie@ucanr.edu**

More information IN Proceedings, 2019 Western Alfalfa & Forage Symposium. Pages 123-131