

# Teff: Tiny Seeded Multi-Purpose Alternative Crop

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## THE CROP

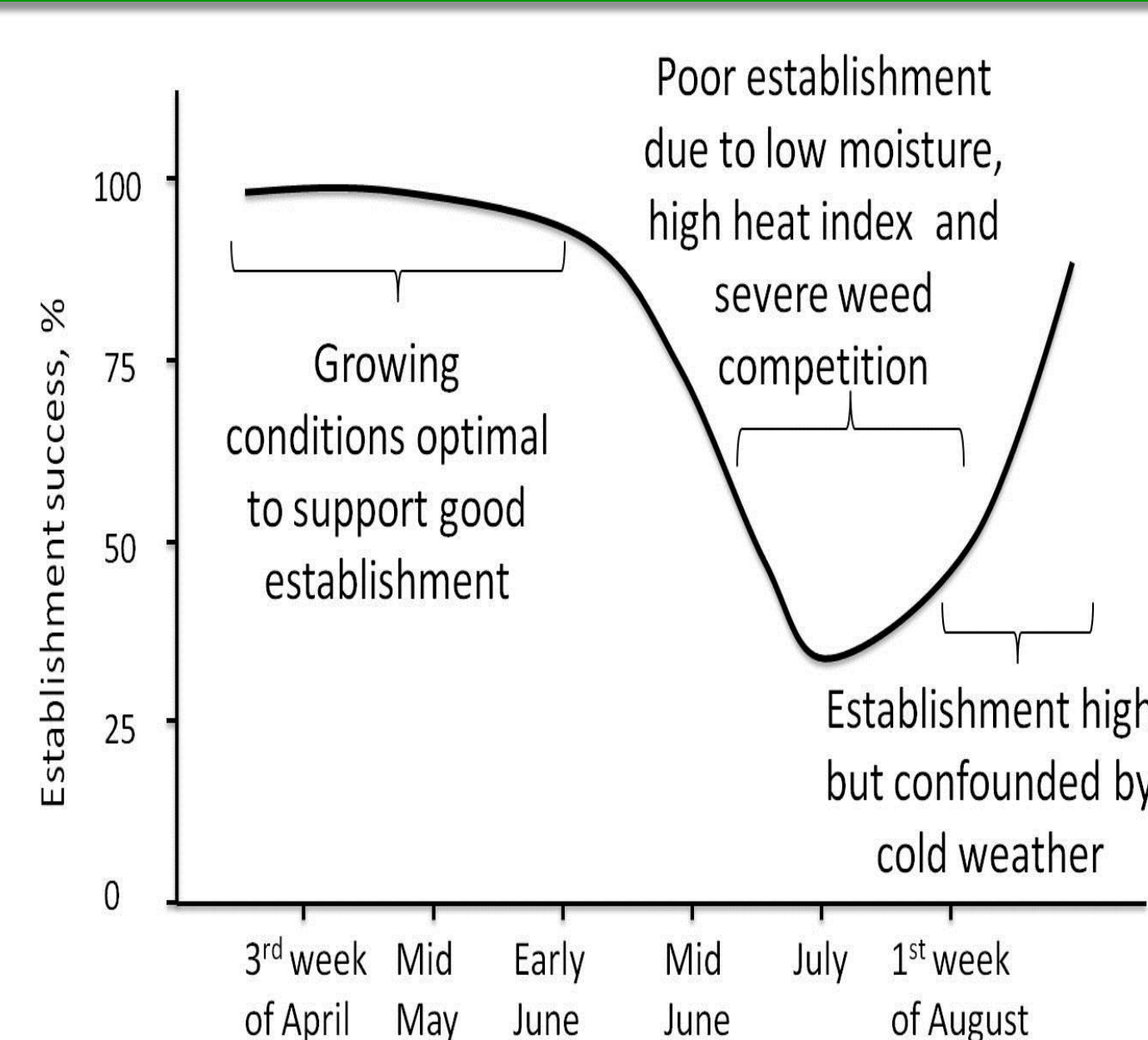
- Teff [*Eragrostis tef* (Zucc.) Trotter] is originated from Ethiopia.
- One of the crops that have captured attention of producers, health food industry and business entrepreneurs in the U.S. due to its multiple uses.
- The grain of teff contains high level of several minerals and essential amino acids- all in excellent balance. It is low in gluten-good for people with gluten intolerance.
- Forage/hay is among the best quality grasses.
- We report results of a project that evaluated the establishment, grain and forage yields, and grain quality of teff in North Central Oklahoma.

## METHODS BRIEFLY

- 4-10 varieties were evaluated at 5 site-years.
- Design: RCBD with 2-blocks and sub-sampling.
- Measurements include emergence, stand assessment, plant height, panicle length, # of nodes, internode length, forage and grain yields, lodging, and grain mineral contents. Forage and grain yield, and grain quality are presented here.
- Mineral composition and protein content of teff grain for washed and unwashed samples were performed by Soil, Water and forage analytical lab (SWFAL) following established procedures.
- All data were subjected to statistical analysis in SAS.

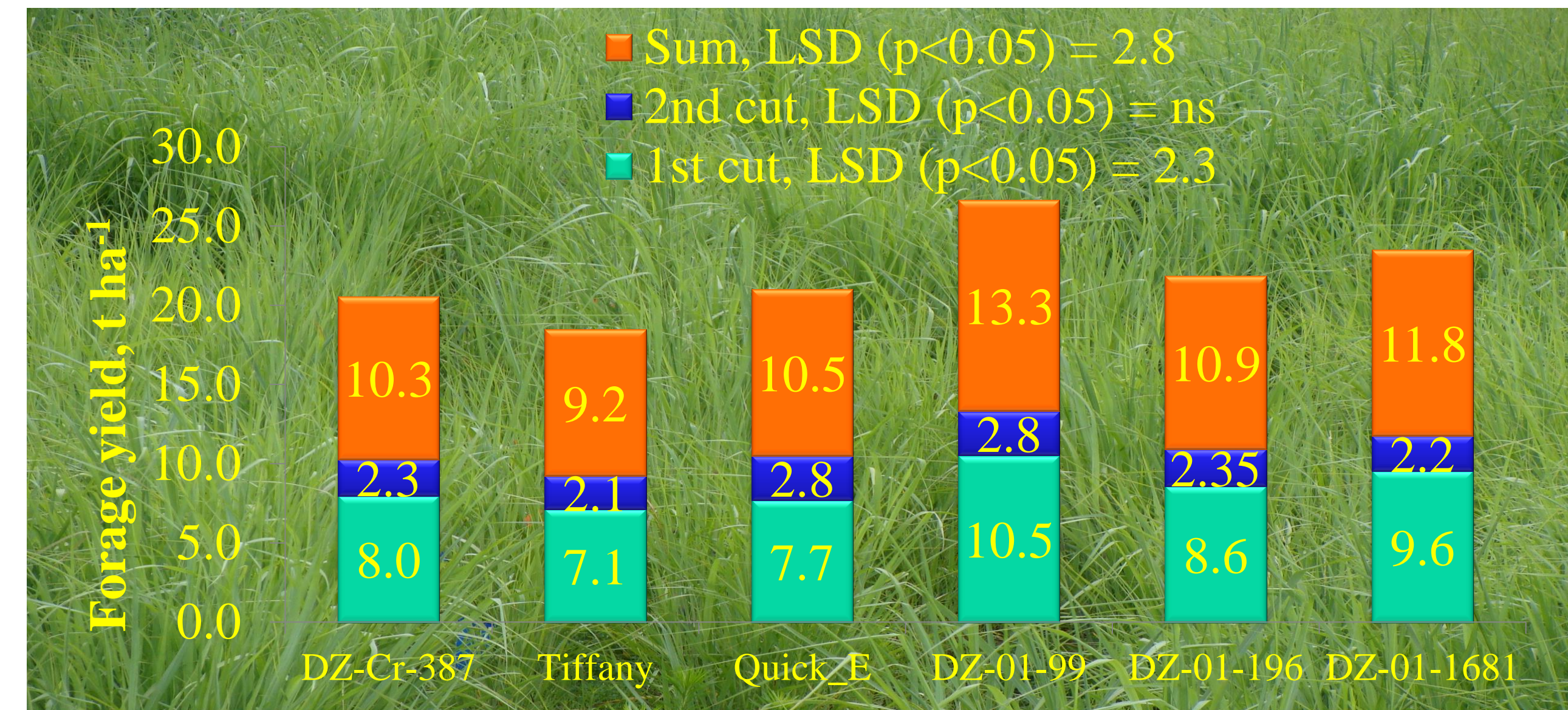
## TEFF FIELD ESTABLISHMENT

- Temperature of <50- limits growth; > 96- leaf burn and; > 100 & no moisture- halt growth and may cause shoot death.
- Moisture: 28% (v/v)- OK; <15 v/v- no growth.



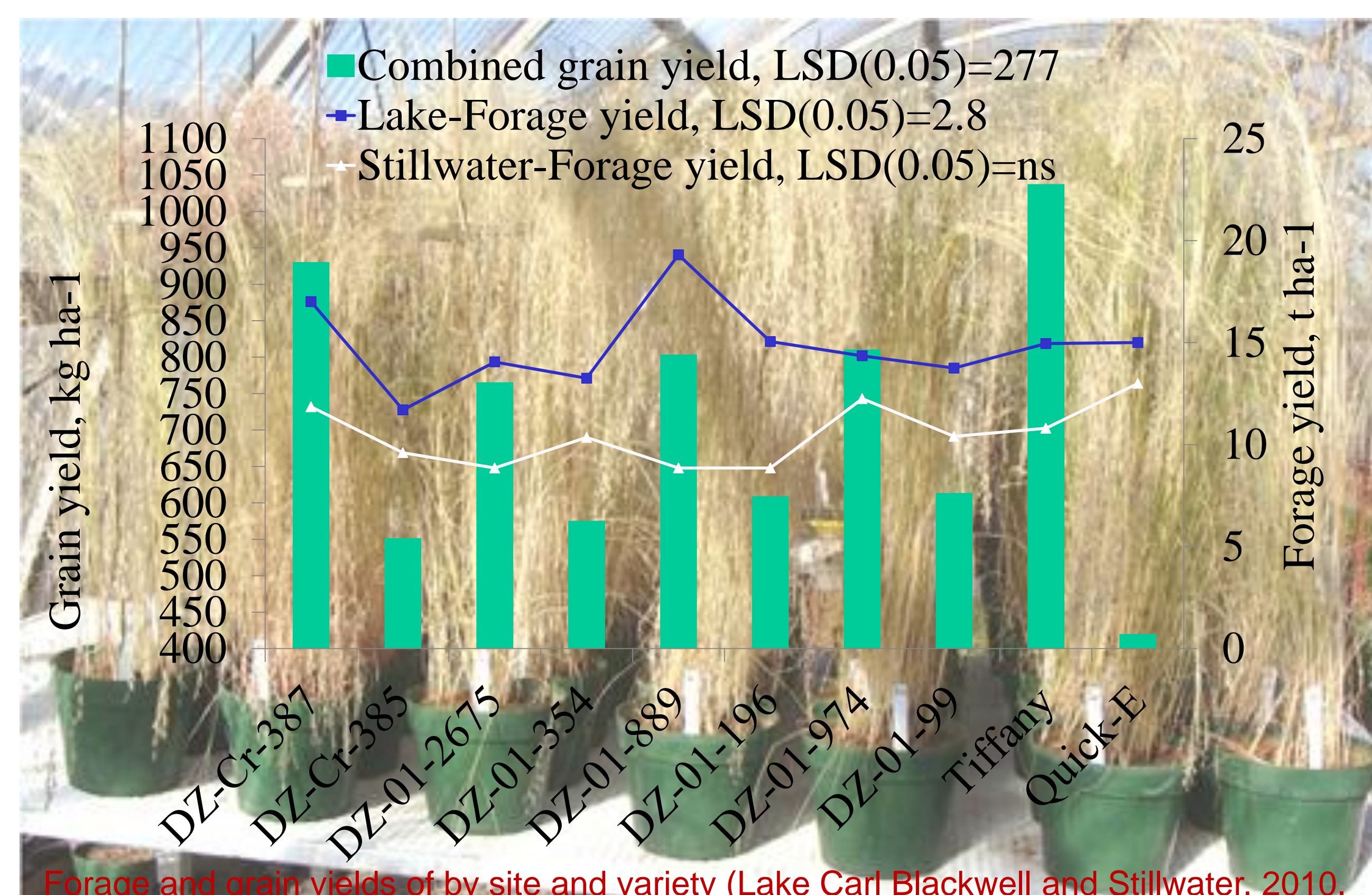
Teff establishment time in North Central Oklahoma.

## SWEET HAY MIGHTY GRAIN



Forage yield of six varieties of teff averaged over three sites in 2009.

- In 2009, DZ-01-99 had the highest forage yield.
- Over sites, plant height and forage yield were positively correlated ( $r=0.7$ ,  $p<0.01$ ) with each other. However, grain yield was highest (1.5 t/ha) for the shortest variety- Quick-E.
- In 2010 at both sites average grain yield was comparable to 2009. In both years high heat index in July and early August caused flower abortion.
- Almost all varieties but Quickie were not able to cope the extreme high temperature.
- Grain yield was not different between sites but forage was 4 ton/ha higher for Lake than Stillwater in 2010.
- In 2010, some varieties such as DZ-01-974, DZ-Cr-387 and Tiffany performed well at both sites and had the highest grain yield.



Forage and grain yields of by site and variety (Lake Carl Blackwell and Stillwater, 2010).

- DZ-01-889 at Lake had the highest forage/hay yield.
- A preliminary analysis of stability of forage and grain yields (data not shown) suggested that Tiffany and DZ-Cr-387 had relatively better stable forage yield over two years than other varieties. DZ-01-99 and DZ-Cr-387 had better grain yield stability compared with other varieties considered in the study in both 2009 and 2010.



Some teff grain quality characteristics compared with common cereals.

Description	Ca (%)	Fe (ppm)	Mg (%)	Zn (ppm)	Protein (%)
Unwashed white teff	0.17	94	0.22	63	14.5
Unwashed red teff	0.16	109	0.21	65	15.3
Washed white teff	0.15	70	0.21	63	14.2
Washed red teff	0.17	88	0.22	88	14.8
T-test (p<0.05)	ns	*	ns	ns	ns
Wheat grain	0.05	37	0.13	35	11
Sorghum grain	0.02	68	0.17	0.99	9.5
Corn grain	0.02	50	0.12	24	10.9

- Teff grain had the highest Ca, Fe, Mg, Zn and protein content vis-à-vis winter wheat, corn and grain sorghum.
- Red colored variety had higher Fe than white colored teff (see table).
- Grain sorghum had Fe content close to white teff.

## SUMMARY

- Some teff varieties were good for both forage and grain. Some were good for grain but not for forage. Conversely, varieties such as Quick-E were good for forage but not grain. Benefits can be maximized if the crop is grown for forage/hay and grain.
- After 3<sup>rd</sup> week of July decrease in heat index and day length enhances flowering and grain filling.
- Almost all varieties are susceptible to lodging but with multiple cutting and final grain production, this problem is significantly lessened.
- Quality of teff grain and forage is indisputable.