

Storage temperature affects ginger and turmeric

Toktam Taghavi

Ginger and Turmeric Field Day

Research Problem

- A new emerging niche crop for small farmers in Virginia
- Very limited knowledge for their storage
- Fresh and tender, loses water dramatically, prone to fungal diseases

Ginger & Turmeric

- Traditionally cold storage and fungicides are used to store produce
- A tropical crop, and effect of cold storage was not tested
- Consumers concerned about fungicide residue and prefer alternate methods
- Development of storage methods are needed

Objectives

- To identify the optimal storage temperature to extend shelf life
- To optimize the postharvest practices to improve shelf life

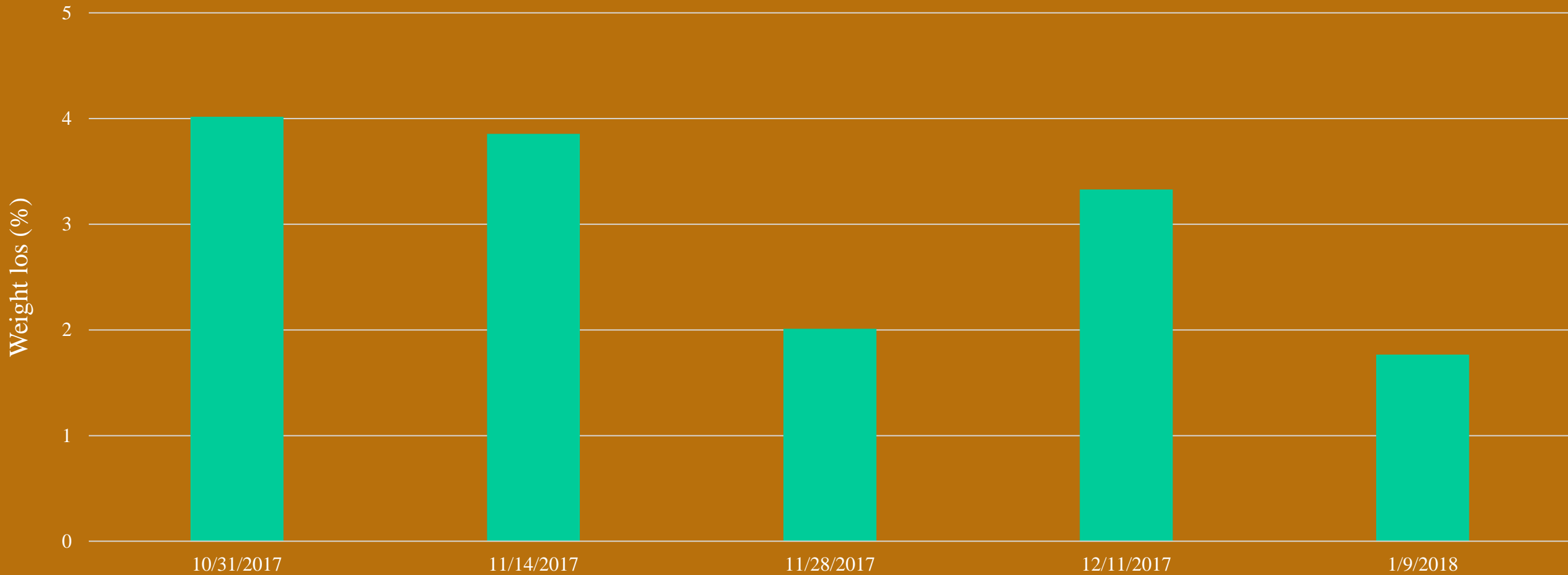
Methods

- Cleaned and washed ginger tubers received bi-weekly
- Air-dried and divided into two groups
- Two temperatures (4, 25 °C or 39, 77 °F)
- Three replicates
- Before and weekly during storage for 4 weeks
 - Weight loss
 - Total Soluble Solids (TSS, Brix)
 - Titratable acidity (TA)
- Before storage
 - Dietary fiber
- Rhizome rot caused by *Fusarium oxysporum*



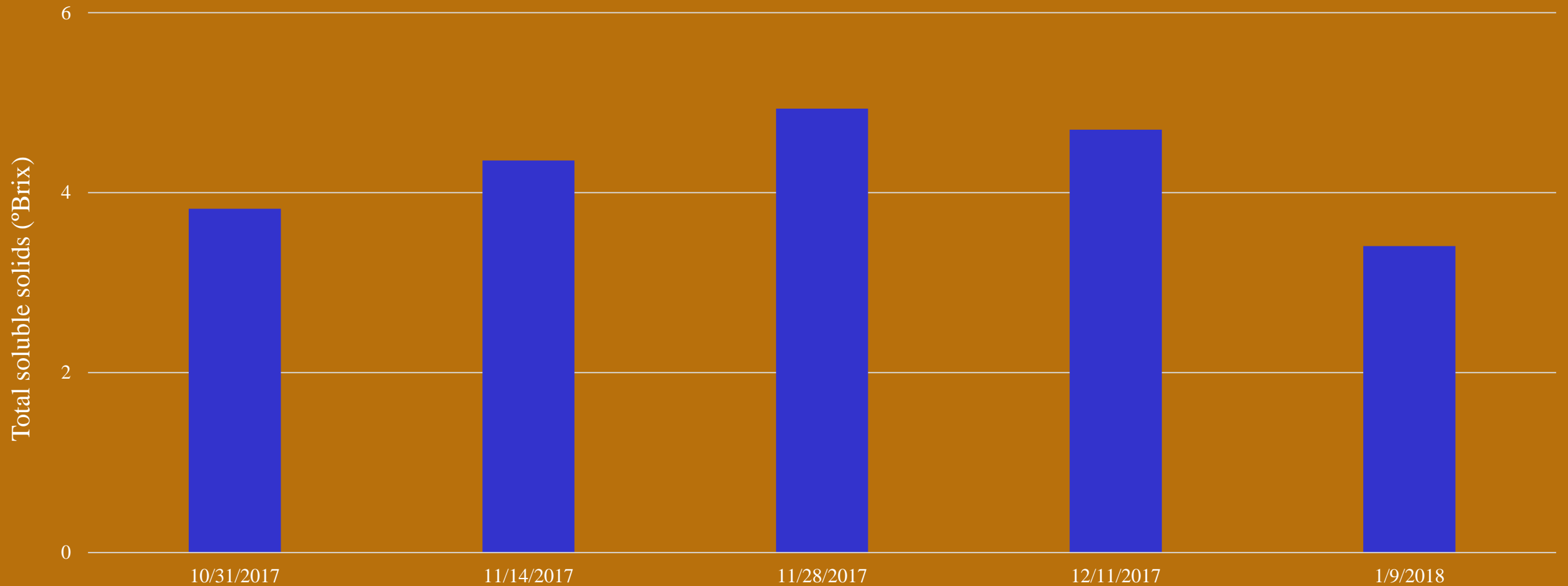
Weight Loss (%) of ginger

Changes in weight loss of ginger tubers harvested over four months (October 2017 till January 2018)



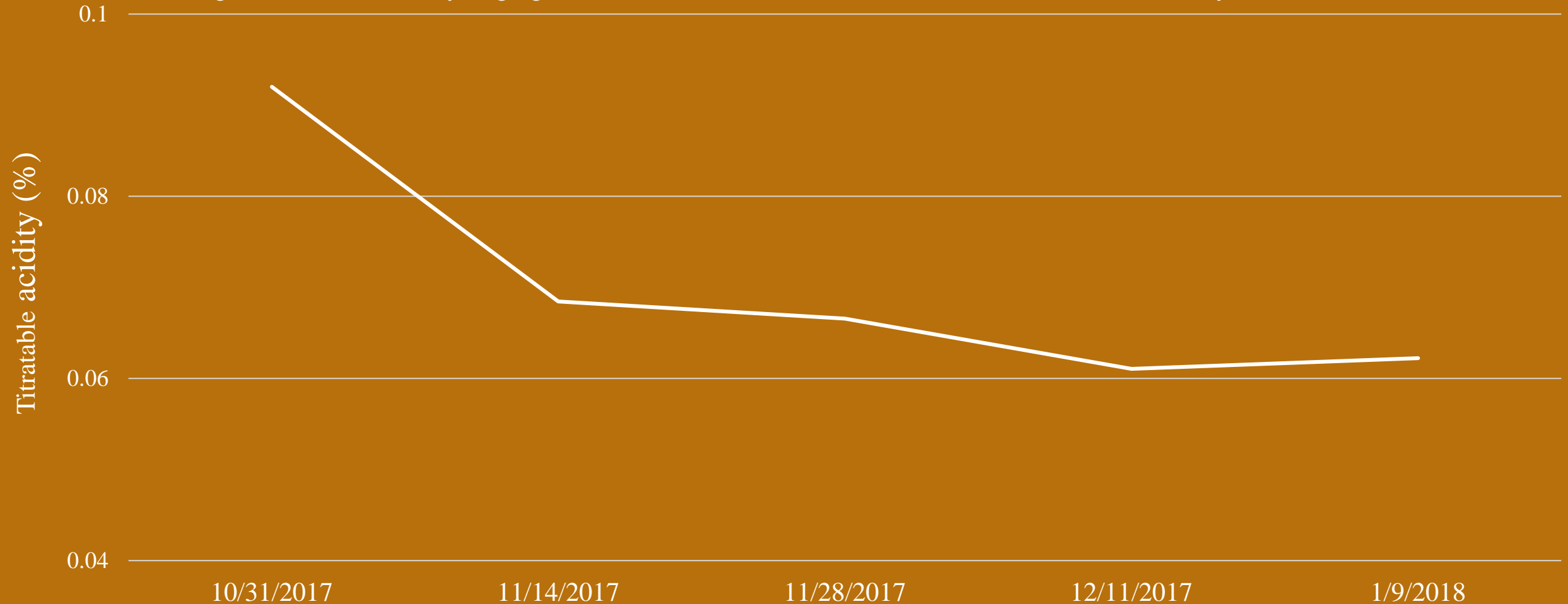
Total soluble solids (°Brix) of ginger

Changes in total soluble solids of ginger tubers harvested over four months (October 2017 till January 2018)



Titratable Acidity (%) of ginger

Changes in titratable acidity of ginger tubers harvested over four months (October 2017 till January 2018)



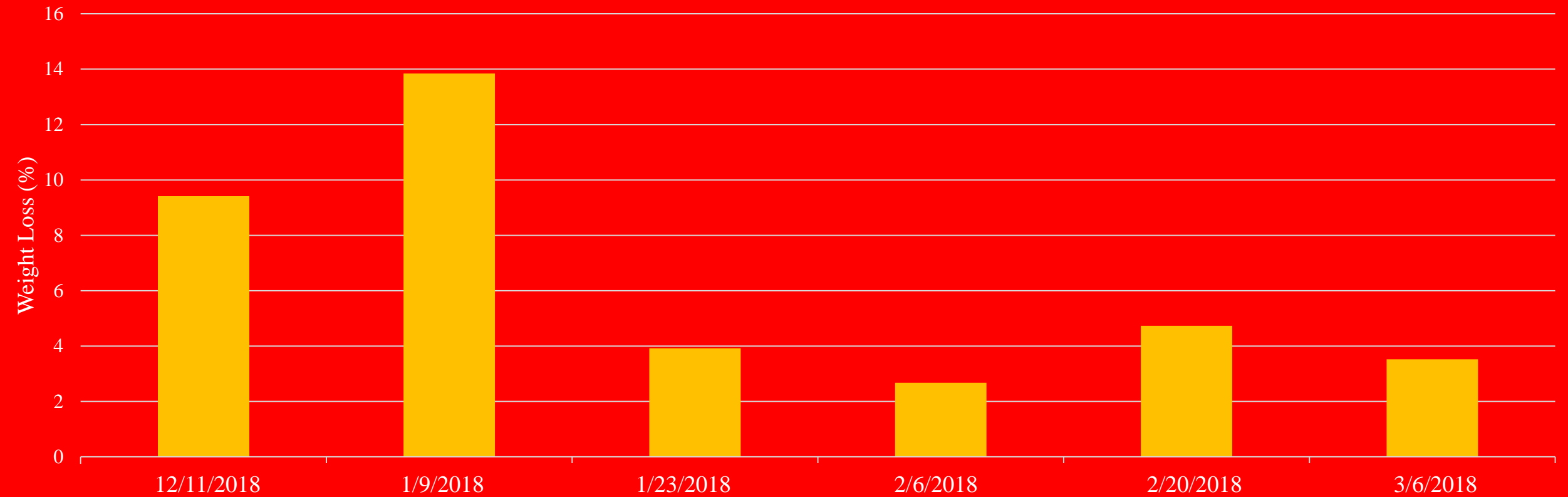
Ginger

Table1: Weight loss, total soluble solids, and titratable acidity of ginger tubers after storage at 4 and 25 °C for four weeks

Temperature	N	WL		BX		TA	
		Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
4 °C	3	1.6	0.4	4.07	0.01	0.06	0.0008
25 °C	3	5.4	0.6	4.11	0.06	0.07	0.0064

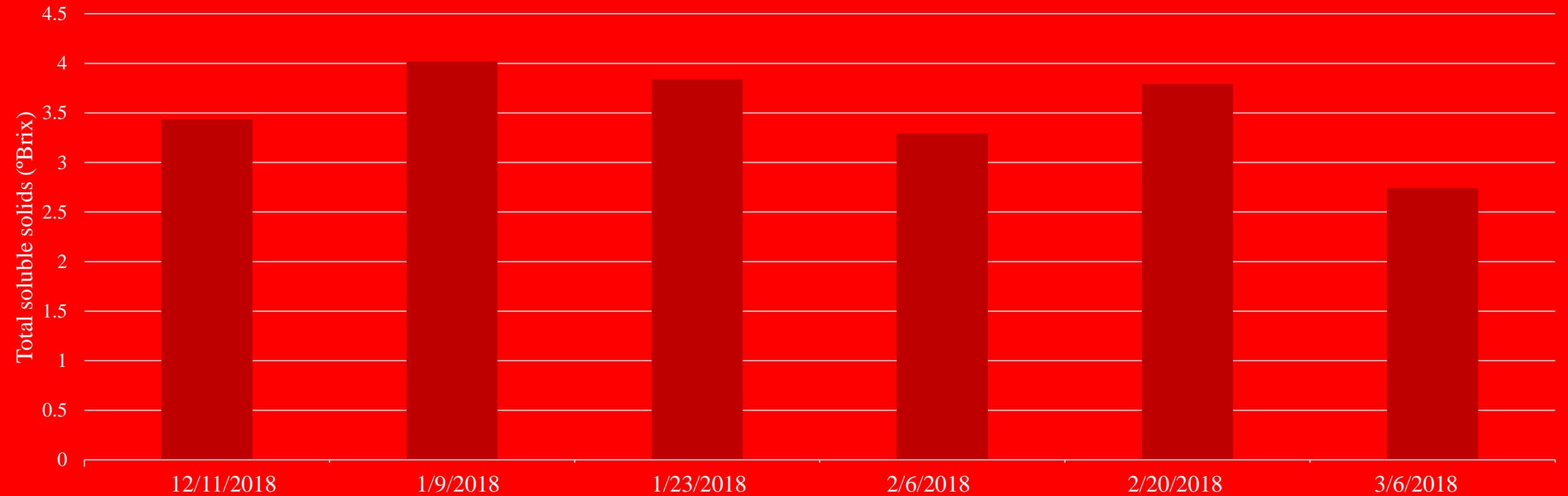
Weight Loss (%) of turmeric

Changes in weight loss of turmeric samples harvested over three months (December 2017 till March 2018)



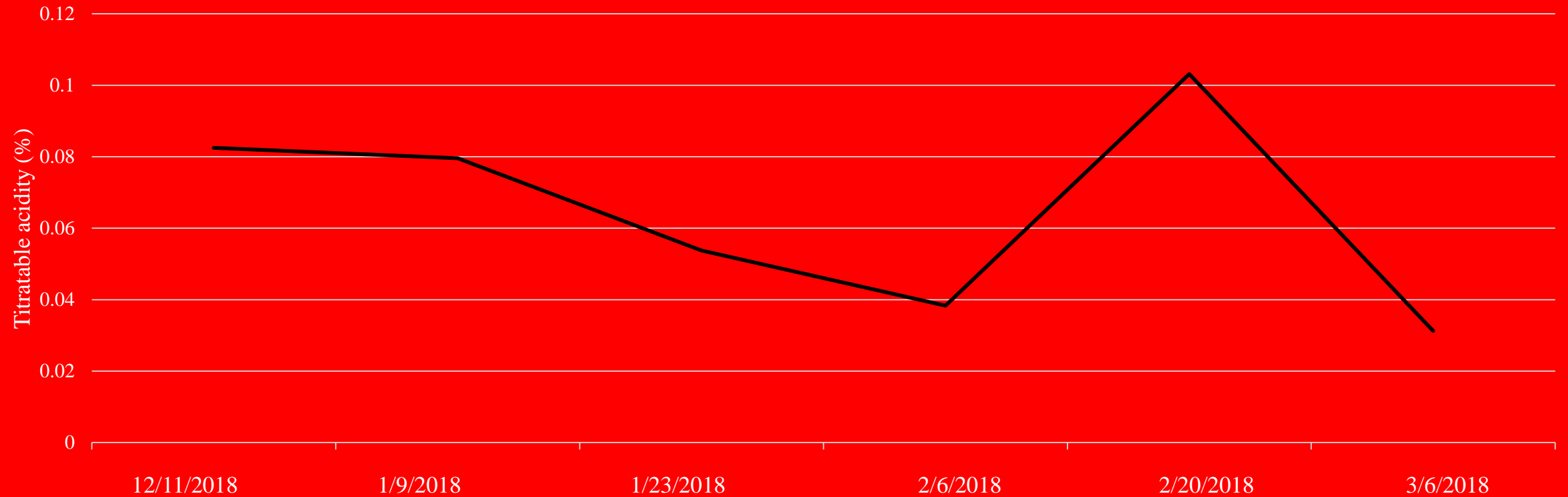
Total soluble solids (°Brix) of turmeric

Changes in brix of turmeric samples harvested over three months (December 2017 till March 2018)



Titratable Acidity (%) of turmeric

Changes in titratable acidity of turmeric samples harvested over three months (December 2017 till March 2018)



Turmeric

Table 1: Weight loss, titratable acidity and total soluble solids of turmeric tubers after storage at 4 and 25 °C for four weeks.

Temperature	WL		BX		TA		
	N	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
4 °C	3	4.2	1.5	3.46	0.06	0.07	0.005
25 °C	3	9.4	1.1	3.58	0.03	0.06	0.002



Storage temperature 25 °C

4 °C



Storage temperature 25 °C

4 °C

Harvest Date 10-10-2017



Before storage



25 °C

4 °C



4 °C

25 °C

Water condensation





Figure 11/10

10-17

Temp 4°C

1/9/18

1
25°



2
4°



Storage temperature 25 °C

4 °C

Acknowledgment



Center for Agricultural
Research, Engagement
& Outreach (CAREO)

CAREO Seed Grants



Growing Ideas...Together!

Dr. Siddiqui and lab members
Dr. Rafie and field crew
Dr. Kim
Administrative staff

Undergraduate students
Michelle Opoku
Carissa James
Shannon Lee
Monae Bell
Efam Taylor

References

- Connell, DW, 1970, The chemistry of the essential oil and oleoresin of ginger (*Zingiber officinale*), *Flavour industry*, 1: 677-693
- Ya-chao, F., P. Biao, C. An-jun, L. song-ming, W. chun-xia, L. Chao, 2016, Effect of high temperature short time steam blanching on the quality and volatile compounds of baby ginger slices, *Food and Fermentation industries*.
- Ghasemzadeh, A., Jaafar H.Z.E, and A. Rahmat, 2010, Antioxidant activities, total phenolics and flavonoids content in two varieties of Malaysia young ginger, *Molecules*, 15: 4324-4333.

Questions?



#4

25°

2/06/2018



#2

1



Storage temperature 25 °C

4 °C



Storage temperature 25 °C

4 °C



Storage temperature 25 °C

4 °C

- Ginger is one of the spices native to South Asia, nowadays major spices around the world. The consumption of fresh ginger has increased considerably in US, from 32,000 to 62,000 metric tons with a total value of 80 million dollars in 2015 (1).
- Currently ginger is being grown and marketed by many Virginia farmers and are considered profitable niche crops.

- Postharvest optimization will help increase shelf life and help growers to meet local demand, improve local, regional and national economy
- Opportunity: is to develop the best postharvest handling
- Overall goals: obtain comprehensive information for ginger production, storage and provide this information with framers, retailers, consumers and scientific community