



# Determining Effects of Planting Date and Land Preparation on Forage Yield and Quality of Forage Brassica

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## Introduction

- Forage type brassicas (*Brassica napus*, *B. rapa*, and others) have the ability to produce large amounts of herbage that can be useful in a livestock grazing system especially during transition periods between warm season and cool season forages in Georgia.
- Forage brassicas have the ability to rapidly establish high forage yields that are high quality, with dry matter digestibility and metabolizable energy concentrations that are higher than grasses and legumes (Ayres, 2002; Barry, 2013; Mulcock et.al. 2012).
- This study focuses on evaluating different planting methods (conventional till, no till burn, no till mow, no till with residue) and planting dates (1 September, 15 September, 1 October, 15 October) to determine optimal conditions for planting a forage type brassica in Georgia.

**Objective:** Determine the effects of planting date and land preparation methods on forage quality, yield and seasonal distribution.

## Materials and Methods

Treatment combinations of four land preparation methods and four planting dates were compared in a randomized complete block design and replicated four times. Each plot was 2 m x 6 m.

### Land Preparation Methods

- Conventional Till (CT)** - Rotatiller & Cultipacked
- No Till Burn (NB)** - Chemical burn with glyphosate (2.3 liters ha<sup>-1</sup>) then physically burned one week later
- No Till Mow (NM)** - Material cut to 5 cm, residue removed
- No Till With Residue (NR)** - No mowing or residue removal

### Planting Dates

- September 1
- September 15
- October 1
- October 15

### Data Collection

Three seedling count observations were obtained 14 days after planting. This was done using the drop stick method.

Three destructive samples were obtained for each plot at 30, 45, 60 & 90 days after planting. Destructive samples include: leaf count, plant count, growth stage, wet weight (g) and dry weight (g). Rising plate meter measurements were also obtained.

60 and 90 day samples were ground and sent to the UGA Agricultural & Environmental Services Laboratories for nutritional analysis.

A two-way ANOVA statistical analysis was performed on the forage yield results.

## Preliminary Results

- Forage yield was significantly effected by:
  - Planting date
  - Land preparation method
  - Interaction between planting date and land preparation
- Mean weekly temperatures were higher at 1 Sept & 15 Sept planting dates than 1 Oct & 15 Oct planting dates. Rainfall/irrigation was consistent throughout all planting dates (Fig. 1).
- Both CT and NB were significantly higher in forage yield at 30, 45, 60 & 90 DAP than NM and NR for 1 Sept & 15 Sept planting dates (Fig. 2 & Fig. 3).
- Overall significantly less forage yield was observed between Sept plantings and Oct plantings (Fig. 3 & Fig 4).
- Both CT and NB were significantly higher in forage yield at 60 & 90 DAP than NM and NR for 1 Oct & 15 Oct planting dates (Fig. 4 & Fig. 5).
- CP content was comparable to legume forage and higher than a grass forage across all planting dates. TDN and RFQ values were higher than a legume or a grass (Table 1).
- Average K and S concentrations were higher than maximum tolerable levels. Ca, P and Cu had average concentrations lower than required levels (Table 2).

Fig. 1. Average Weekly Temperature and Cumulative Weekly Rainfall

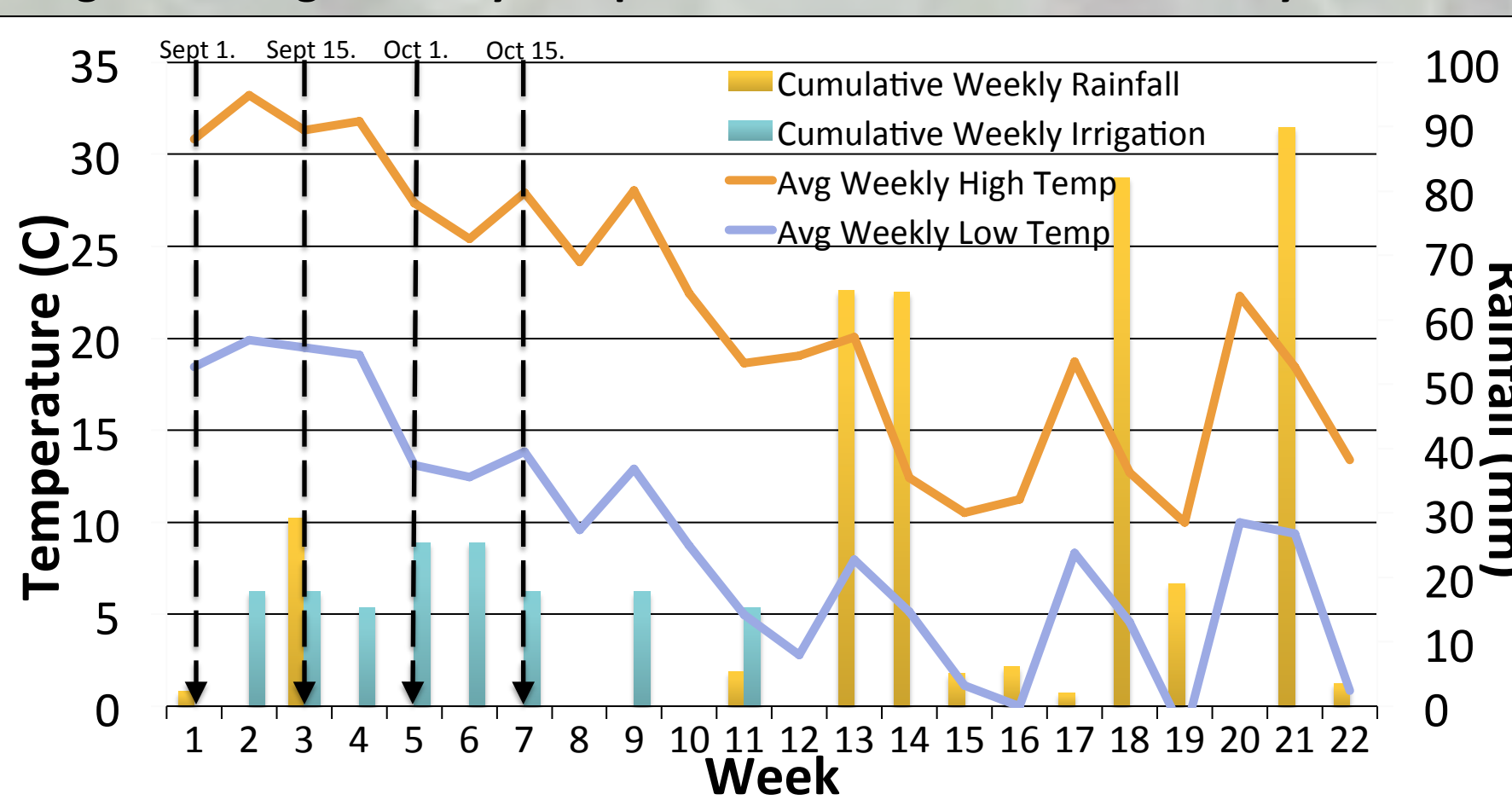


Table 1. Forage Quality of Forage Brassica at 90 DAP

	% CP	TDN	RFQ
Sept 1	22.44	74.64	370.2
Sept 15	21.64	75.52	381.91
Oct 1	23.61	76.92	403.45
Oct 15	22.6	76.41	403.04
Legume Forage <sup>1</sup>	22.63	61.21	158.45
Grass Pasture <sup>1</sup>	15.46	60.89	114.03

<sup>1</sup>Dairy One. Feed Composition Library. Accumulated Years: 5/1/2000 – 4/30/2016.

Table 2. Plant Tissue Analysis on Forage Brassica at 90 DAP

	Min	Avg	Max	NRC Requirement <sup>1</sup>	NRC Max Tolerable
Ca (%)	1.19 <sup>3</sup>	2.15	2.99	6 - 14 <sup>2</sup>	-
K (%)	1.79	3.22 <sup>4</sup>	5.15	0.6	3
Mg (%)	0.19	0.32	0.46	0.1	0.4
P (%)	0.17	0.36	0.61	5 - 11 <sup>2</sup>	-
S (%)	0.21	0.5	0.73	0.15	0.4
Cu (mg/kg)	2.81	7.6	24.28	10	100

<sup>1</sup> Nutrient Requirements for Beef Cattle (NRC) are requirements for growing and finishing cattle.

<sup>2</sup> Requirements vary based on live weight of cattle.

<sup>3</sup> Values highlighted in yellow are below required concentrations according to NRC.

<sup>4</sup> Values highlighted in red are above the maximum tolerable concentrations according to NRC.

Photo Taken: November 15, 2016



Photo Taken: November 18, 2016

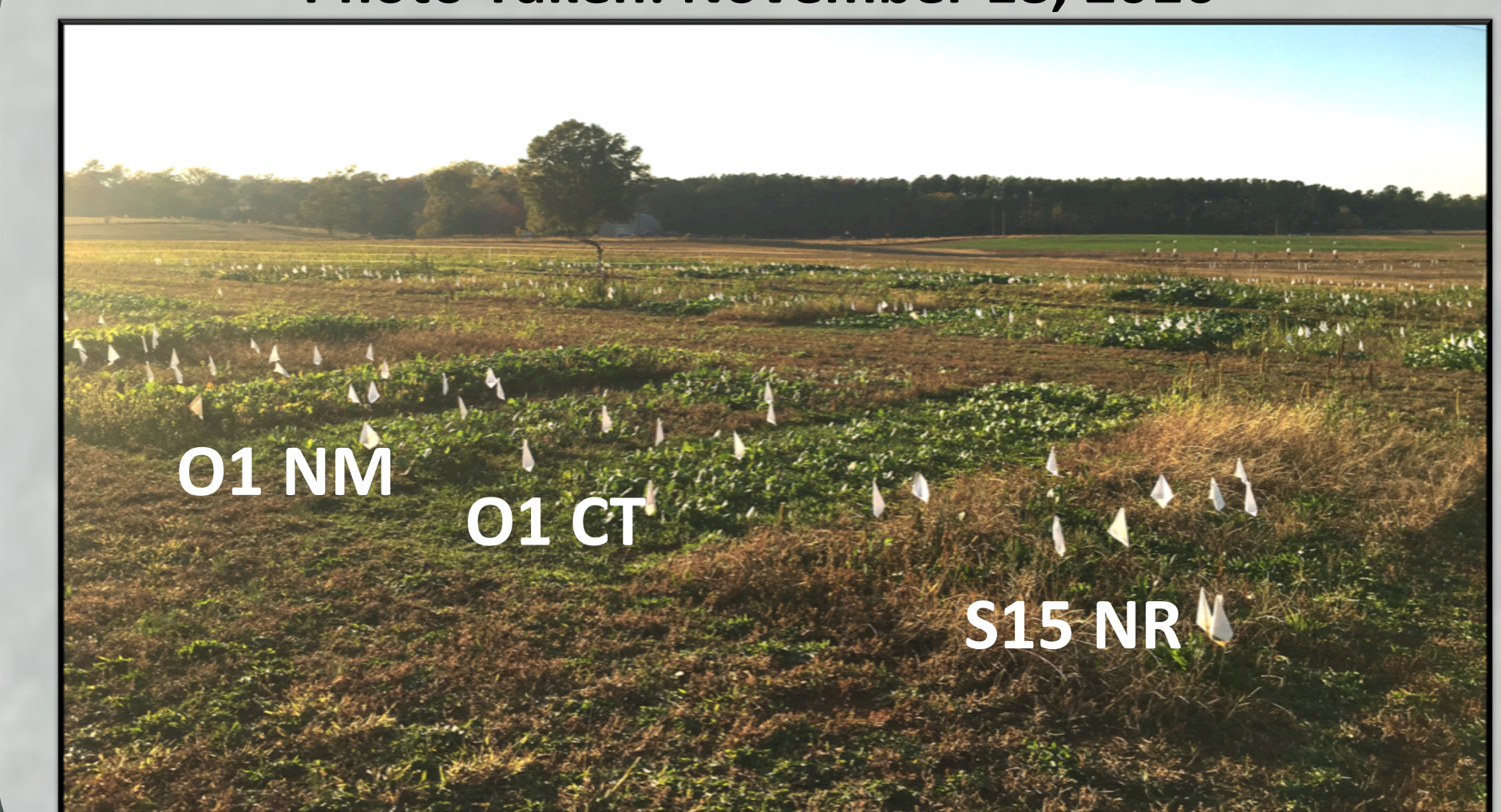
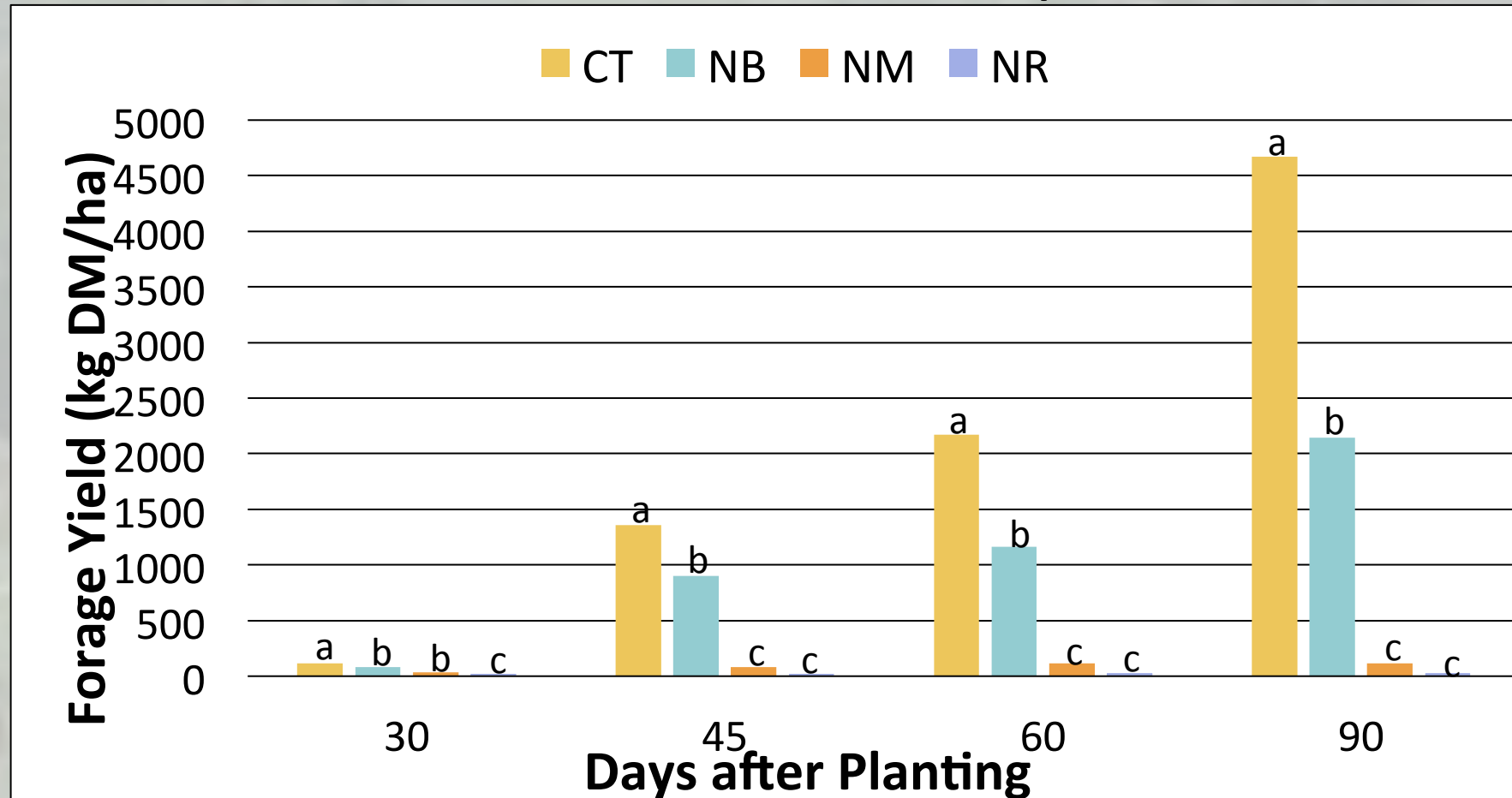
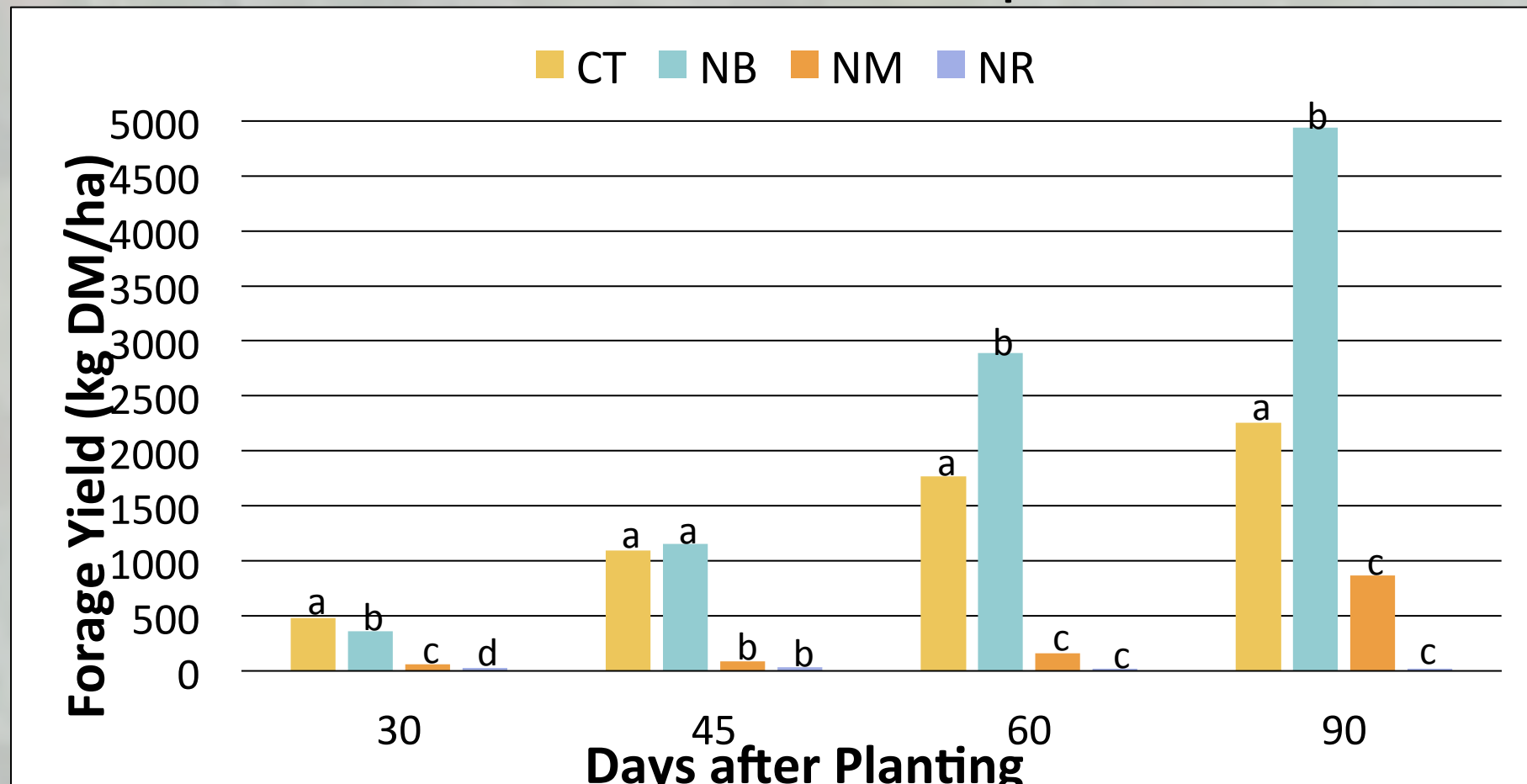


Fig. 2. The Effect of Land Preparation Method on the Forage Yield of Brassicas Planted on 1 Sept.



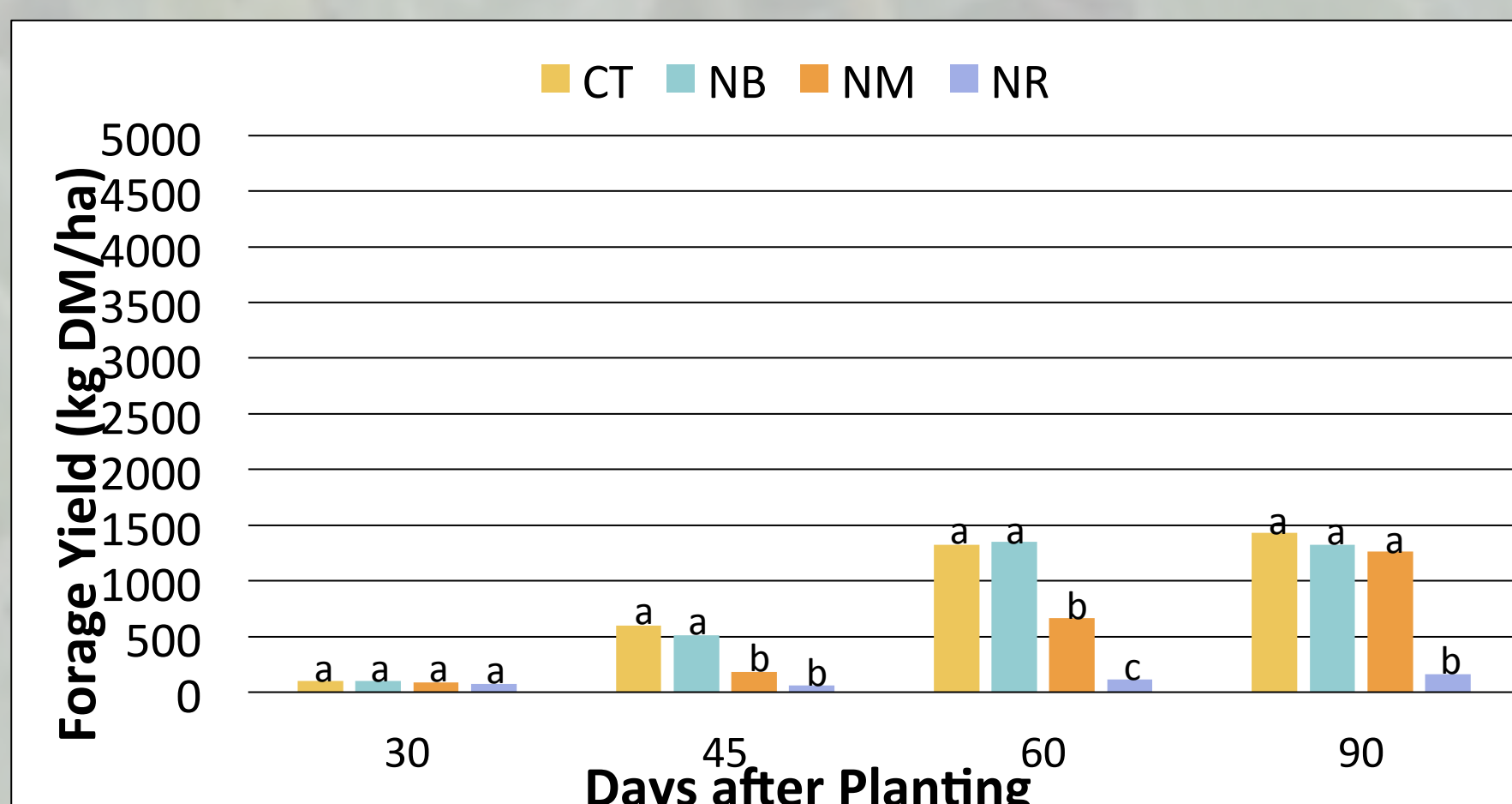
Within a given DAP, columns sharing the same letter are not significantly (P < 0.05) different

Fig. 3. The Effect of Land Preparation Method on the Forage Yield of Brassicas Planted on 15 Sept.



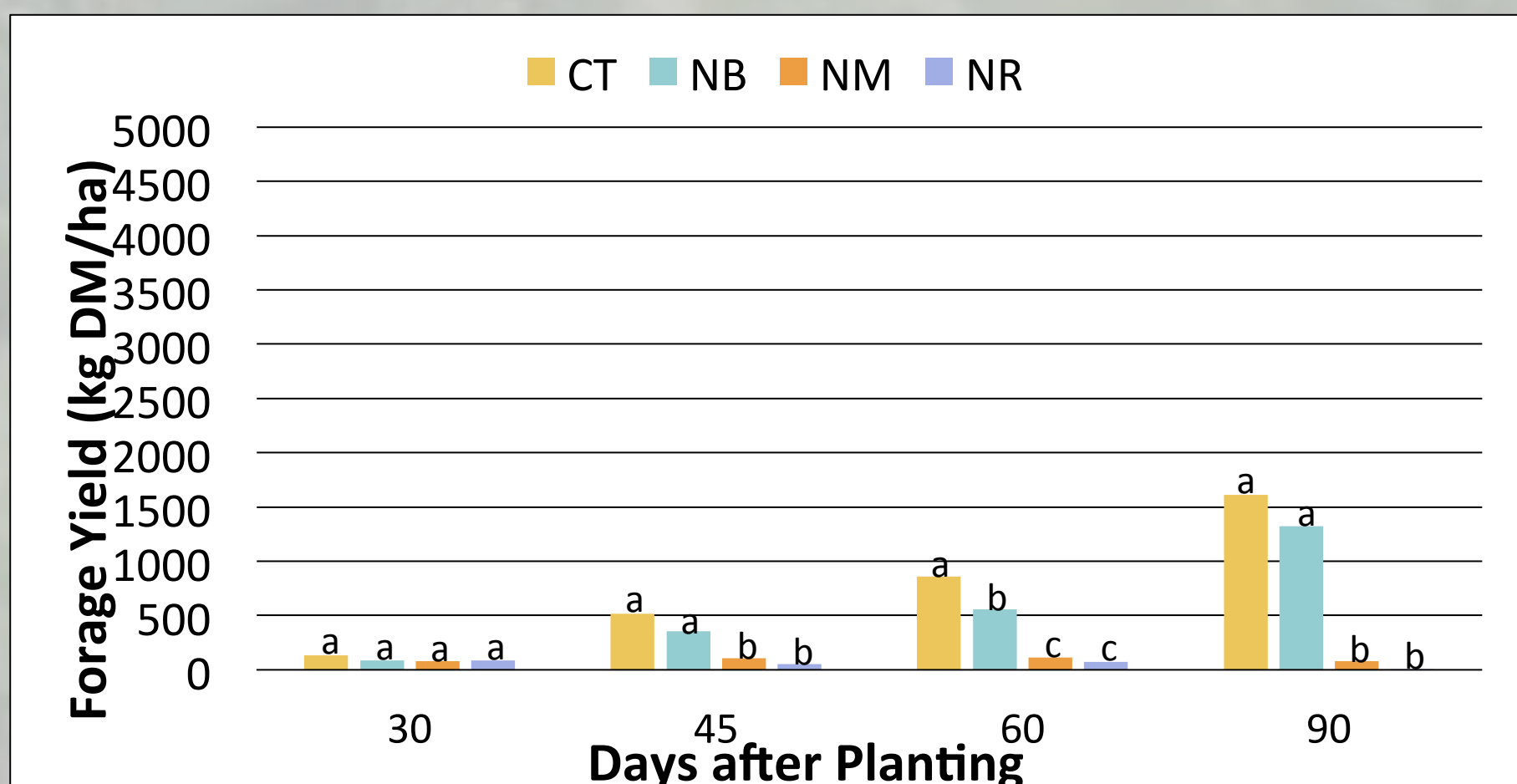
Within a given DAP, columns sharing the same letter are not significantly (P < 0.05) different

Fig. 4. The Effect of Land Preparation Method on the Forage Yield of Brassicas Planted on 1 Oct.



Within a given DAP, columns sharing the same letter are not significantly (P < 0.05) different

Fig. 5. The Effect of Land Preparation Method on the Forage Yield of Brassicas Planted on 15 Oct.



Within a given DAP, columns sharing the same letter are not significantly (P < 0.05) different

## Preliminary Conclusions

- More land preparation and removal of as much residue as possible (CT & NB) produces significantly higher forage yield (Fig. 6).
- Earlier planting dates (1 Sept & 15 Sept) produces significantly higher forage yield than later planting dates (1 Oct & 15 Oct) (Fig. 7).
- Brassica Relative Forage Quality (RFQ) exceeds other high quality forages however, brassica do not meet and in some cases exceed nutrient requirements.

### Take Home Message:

- Early September planting dates & drilling into little or no residue produced highest forage yields.
- Brassica though high quality, should NOT be utilized as a sole diet.

## Future Work

Additional research will be performed to assess the effects of the forage brassica in a winter grazing mixture on forage density along with average daily gain of the cattle and potential stocking rates. Another issue to be addressed is the effect of the large taproots on soil compaction and water holding capacity of soils that are often highly compacted due treading damage of cattle on pasture.

## References

Ayres, L., Clements, B., 2002. Forage Brassicas – quality crops for livestock production. NSW Agriculture. First Edition. Pg 1-13.  
 Barry, T.N., 2013. The feeding value of forage brassica plants for grazing ruminant livestock. Animal Feed and Science Technology. Pg 15-25.  
 Mulcock, H., Westwood, C. T., 2012. Nutritional evaluation of five species of forage brassica. Proceedings of the New Zealand Grassland Association 74: pg. 31-38.

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