# Potential of forage brassicas for use in pasture-based livestock systems

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### INTRODUCTION

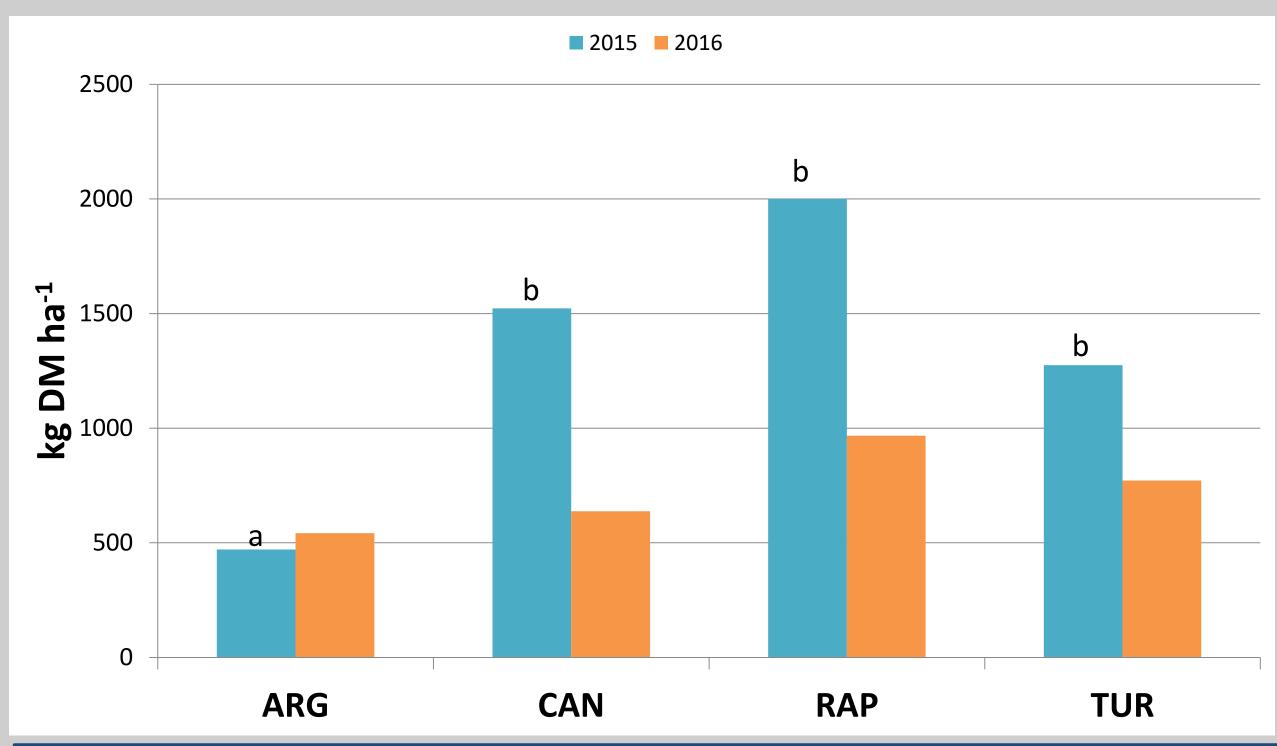
- Brassicas (Brassica sp.) are cool-season annual forages that can be grazed or harvested in as little as 45 days after planting (Hall and Jung, 2008; de Ruiter et al., 2009)
- Brassicas provide forage during the 'summer forage slump' and during the fall, resulting in up to 3 additional months of grazing annually (Hall and Jung, 2008)
- Brassicas contain a group of phytochemicals (glucosinolates) that can decrease palatability, decrease animal gains, and cause copper and iodine deficiencies in livestock
- Brassicas have been linked to reductions in enteric methane emissions in ruminants (Reid et al., 1994; Dillard et al., 2017)
- Little information regarding yield, nutritive quality, or glucosinolate concentration of new forage brassica varieties is available for livestock producers

#### **Objective:**

 Determine yield, nutritive quality, and glucosinolate concentration of 3 brassica varieties compared with annual ryegrass grown during the fall grazing season in central Pennsylvania

# METHODS

- Field plot study conducted at the Pennsylvania State University Russell Larson Agricultural Research Farm, Rock Springs, PA
- Forage Treatments (n = 4):
  - 'KB Supreme' Annual Ryegrass (ARG)
  - 'Inspiration' Canola (CAN)
  - 'Barisca' Forage Rapeseed (RAP)
  - 'Appin' Forage Turnip (TUR)
- Three random forage samples (4 cm stubble height) were taken biweekly during
   Oct. and Nov. of 2015 and 2016
- Forage samples were composited within plot and sent to Dairy One Laboratories (Ithaca, NY) for wet chemistry analysis
- Glucosinolates were determined using the methods of Dillard et al. (2017)
- PROC GLIMMIX of SAS (SAS Inc., Carey, NC) was used for statistical analysis
- Significance was declared at P < 0.05 and trends at 0.05 < P < 0.10

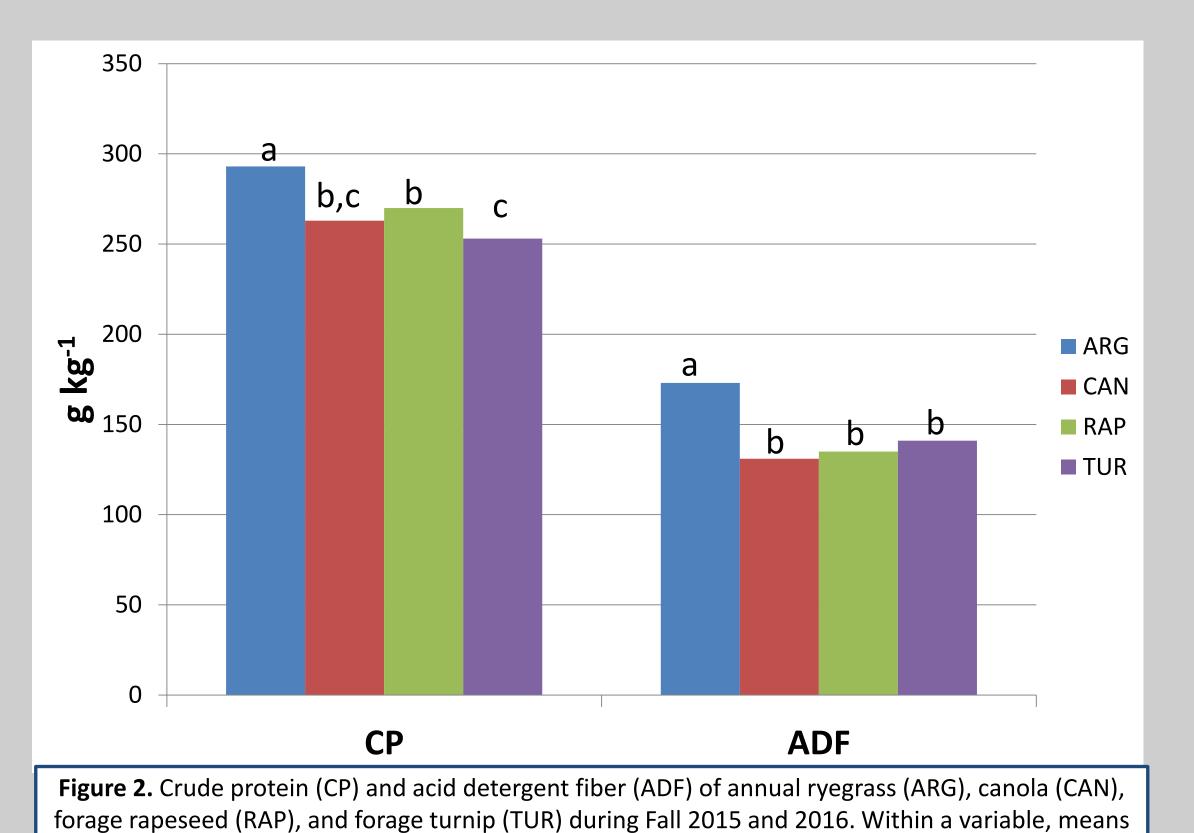


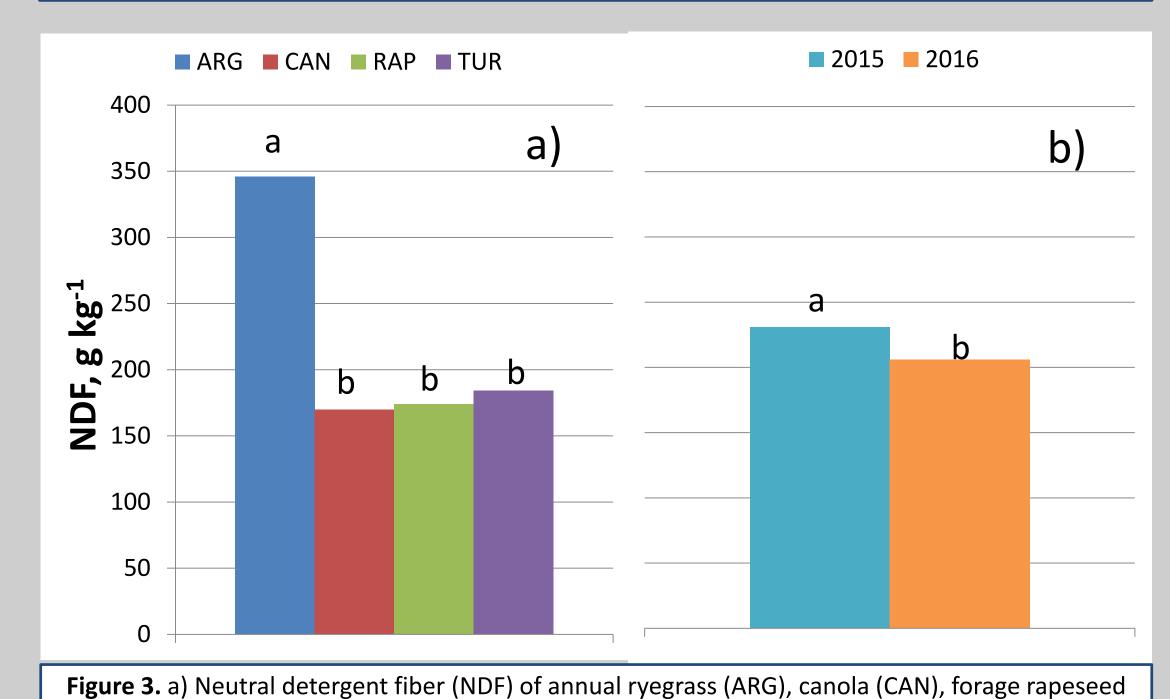
**Figure 1.** Accumulated forage biomass (75 days after planting; kg DM/ha) of annual ryegrass (ARG), canola (CAN), forage rapeseed (RAP), and forage turnip (TUR) during Fall 2015 and 2016. Within a year, means without a common superscript differ (P < 0.05).

# ACKNOWLEDGEMENTS

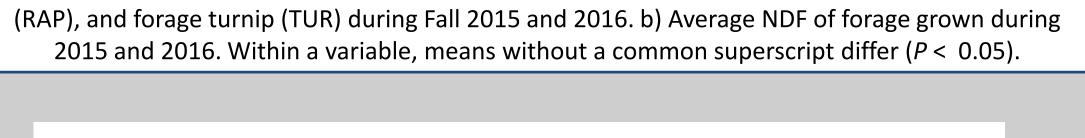
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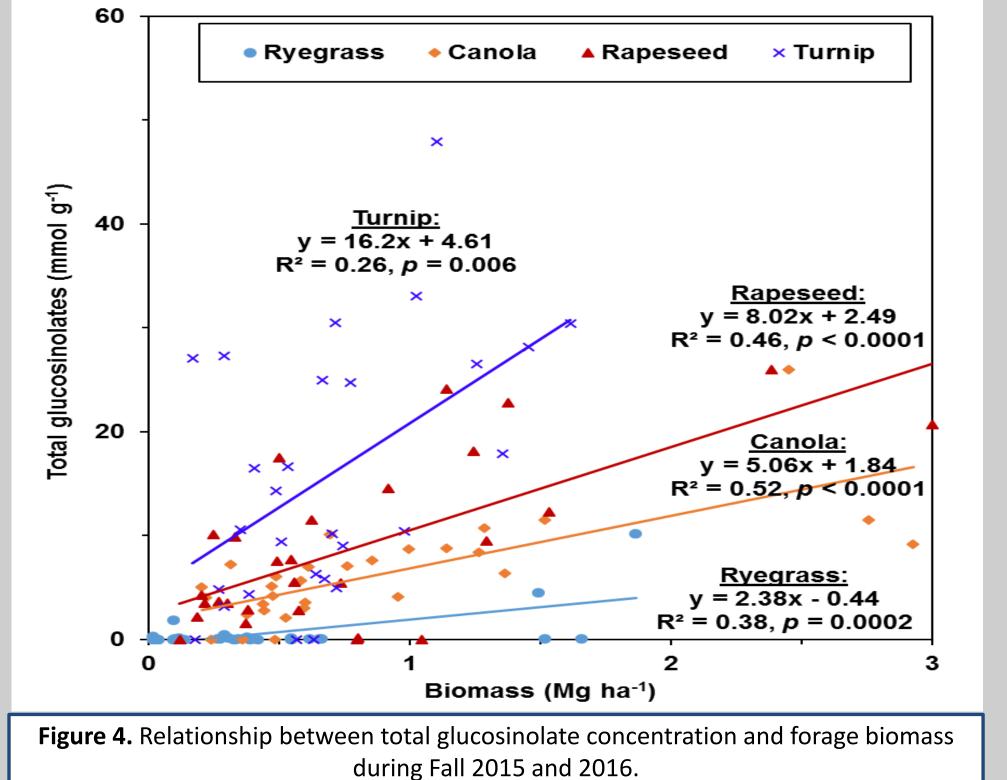






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## RESULTS

- Weather
  - 2015- 69 d fall growing season
    - 491 mm total precipitation
    - Mean air temp 14.8°C
  - 2016- 76 d fall growing season
    - 366 mm total precipitation
    - Mean air temp 15.2°C
- Seasonal Biomass (Figure 1)
  - Significant forage × year interaction
    - 2015- Brassicas (RAP, CAN, and TUR) were greater than ARG
  - 2016- No difference among any forages
- CP (Figure 2)
  - ARG had the greatest CP
  - RAP was greater in CP than TUR, with CAN intermediate among brassicas
  - No effect of year
- ADF (Figure 2)
  - ARG was greater in ADF than brassicas
  - No effect of year
- NDF (Figure 3)
  - ARG had greater NDF than brassicas
  - No differences in NDF among brassicas
  - NDF greater in Fall 2015 than Fall 2016
- Total Glucosinolates (Figure 4)
  - Significant year effect among brassicas
    - 2015- TUR > RAP > CAN
    - 2016- TUR > RAP > CAN
- Glucobrassicanapin, glucobrassicin, gluconasturtiin, progoitrin, and gluconapin accounted for 95% of glucosinolates detectable in brassicas (data not shown)

# CONCLUSIONS

- During cool, wet fall conditions, brassicas show potential to increase forage biomass by 423% compared with ARG
- Brassicas are similar in biomass to ARG during warmer, drier fall conditions
- However, forage quality of brassicas and ARG was not greatly impacted by meteorological differences between years
- This also resulted in magnitudinal differences in total glucosinolate present in plant tissues
- These data suggest that both productivity and the presence of anti-quality factors are largely influenced by meteorological conditions

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