Double cropping with winter cereals and forage sorghum in New York

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Nutrient Management Spear Program

Dairy Forage Production

- Dairy farms aim to grow most if not all of the forages fed to cows on the farm itself
- Typically one main crop per growing season
  - Corn silage (3-4 years) and alfalfa/grass hay (3-4 years)
- Cover cropping became of interest because of its many benefits for erosion control, soil health and nutrient cycling
- Demand for forage made dairy farms wonder about harvesting the cover crop as forage

Nutrient Management Spear Program (NMSP)
Cornell University

General Agronomic

- Pest management:
  - Crop is harvested before most pests can do any damage
  - Geese and deer could be an issue
  - None of the farmers who replied to our survey used any form of pest control...unless it involved collection of dinner at the same time

Nutrient Management Spear Program (NMSP)
Cornell University

General Agronomic

- Harvest management:
  - For dairy cow forage, harvest at stage 9 (flag leaf; no heads visible)
  - Across the farm, cut triticale or rye first, then follow with cool season grasses, alfalfa/grass mixtures, and clear alfalfa

Nutrient Management Spear Program (NMSP)
Cornell University
General Agronomic

Harvest management:
- Mow at full-width; conditioning not needed but tedd to expose lower layers
- Dry to 30% DM and ensile the same day as mowing
- Allowing a narrow swath to sit 2-3 days will result in poorly fermented, high butyric, lows-sugar, mediocre silage
- Wetter silage: chop at ≥ ¾ inch total length of cut; inoculate with a homolactic bacteria

Land preparation next crop:
- Use a strip-tiller or zone builder or no-till
- Full-width tillage will require 2-3 passes to break-up root masses (especially triticale) and will likely not be economical

Fertility management:
- A 2 ton DM/acre crop:
  - 90 lbs N/acre (14% CP)
  - 30 lbs P2O5/acre
  - 155 lbs K2O/acre
  - Apply P and K according to soil test
  - For nitrogen...research was needed

To determine the K recommendations use the Cornell Morgan soil test K (lbs K2O/acre) and the following equation:

\[ K (\text{lbs K}_2\text{O/acre}) = (110 - \text{STK}) \times 0.70 \]

So, if the soil test is 53 lbs K2O/acre, the recommended amount of K2O for triticale is: (110 - 53) x 0.70 = 40 lbs K2O per acre.

Thanks to all our participants who coordinated local trials throughout NY!!
Correctly predicted 78% of trials included in analysis.

- Plant by late-September for fall growth, fall N uptake, and spring growth.
- For well-drained soils, or fields with recent manure histories with early planting additional N at green-up may not be needed.
- Fields with poor drainage, no recent manure history: forage winter-cereals may not yield well and will likely require additional N inputs.
- Nitrogen management at green-up did not greatly affect forage quality except for CP, which increased with N addition even if the additional N did not increase spring yield.

Cornell University
Lyons et al., in review

Conclusions Winter Cereals

- Weather (wet/dry springs)
- Timing (overlap with corn silage growing season)

Is there a suitable alternative to corn as summer crop?

Double Cropping Challenges

Typical New York Forage Rotation

Double Cropping in the Northeast

- Soil conservation
- Nutrient recycling
- Soil health & fertility
- YIELD

Bare Ground
- Erosion
- Nutrient loss
- Opportunity loss

Forage winter cereal: 3-4 yrs
Forage Sorghum

- Brown midrib (BMR) brachytic dwarf sorghum is a high-quality short season (85-89 d), single-cut forage crop.
- Tolerates drought and resists lodging.
- Requires soil temperatures of at least 60°F for planting, which normally occurs in early June in New York.
- Yield assessments show that this forage sorghum variety has the potential to compete in yield with corn silage.

Forage Sorghum Timing of Harvest

<table>
<thead>
<tr>
<th>Growth stage at harvest</th>
<th>8/15 – 9/18</th>
<th>8/23 – 9/23</th>
<th>9/19 – 10/16</th>
<th>9/20 – 10/30</th>
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<tbody>
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<td>Boot</td>
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<td>Flower</td>
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<td>Milk</td>
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<td>Soft dough*</td>
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Forage Sorghum Summary

- BMR forage sorghum can be harvested at the late-flower to early-milk stage without losing much yield.
- Additional energy supplementation may be needed in the diet to account for a lower starch content.

Double Cropping Forage Sorghum and Triticale

- Trial at Musgrave Research Farm.
- 5 spring N rates for triticale
  - 0, 30, 60, 90, 120 lbs N/acre.
- 2 summer N rates for forage sorghum
  - 0N and +N (200 lbs N/acre)
- 4 timings of sorghum harvest/triticale planting
  - Every ~2 weeks starting early Sept.

Week 1 sorghum harvest (boot-flower), plant triticale
- Soil sample, plant, and fertilize sorghum
- Soil testing, apply fertilizer to triticale
- Green up
- Sample fall triticale biomass
- Week 2 sorghum harvest (flower-milk), plant triticale
- Week 3 sorghum harvest (milk-soft dough), plant triticale
- Week 4 sorghum harvest (soft dough-hard dough), plant triticale
Conclusions for Forage Sorghum

- We recommend harvest of sorghum grown in New York during warm, dry years once ~1150 GDD (°C scale; 2070 GDD in °F scale) have accumulated. This supports both sorghum and triticale yields.
- If 1150 GDD have not accumulated by the soft-dough growth stage (cool, wet years), harvest sorghum at soft dough to maximize total season yield.


Conclusions

- Double cropping with forage sorghum and forage winter cereals is a viable alternative to corn silage in New York.
- N management is needed for both crops. If sorghum is properly managed for N, additional N may not be needed for the following winter cereal.
- Planting date, soil drainage, and manure history are important indicators of winter cereal performance.
- Forage sorghum can be harvested early without losing yield, but dairy TMRs should be adjusted for energy.
Extension Articles


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