Cover Crop Mixtures as Alternative Forage in the Southern High Plains Silage Corn Production

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Introduction

- Dairy farming is the largest component of New Mexico’s livestock industry and accounts for over 40% of the state’s agricultural revenue.
- Silage corn is the main feed source for dairy cows, but long winter-fallow periods in silage corn production often result in reduced forage supply during winter months.
- Growing winter cover crops could bridge the gap between silage corn crops and provide alternative feed source for dairy producers.

Objectives

- To evaluate different cover crop mixtures for biomass yield and forage nutritive value and their effect on subsequent silage corn yield and forage nutritive value.

Materials and Methods

- Location: NMSU Agricultural science center, Clovis, NM
- Study Year: 2019 - 2020
- Cropping System: No-till silage-winter cover crop rotation
- Design: Randomized complete block with 4 replications
- Treatments:

<table>
<thead>
<tr>
<th>Cover Crop Species</th>
<th>GBL</th>
<th>GB</th>
<th>GL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berseem clover</td>
<td>2.2</td>
<td>-</td>
<td>4.5</td>
</tr>
<tr>
<td>Austrian winter pea</td>
<td>4.5</td>
<td>-</td>
<td>9</td>
</tr>
<tr>
<td>Annual ryegrass</td>
<td>9</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>Winter triticale</td>
<td>18</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>Turnip</td>
<td>2.2</td>
<td>2.2</td>
<td>-</td>
</tr>
<tr>
<td>Daikon radish</td>
<td>2.2</td>
<td>4.5</td>
<td>-</td>
</tr>
</tbody>
</table>

- GBL = grasses + brassicas + legumes, GB = grasses + brassicas, GL = grasses + legumes. A no-cover crop control (NCC) was also included among the treatments.

Management:

Cover crops were planted in September and terminated in April of the following year.

Silage corn was planted in May and harvested in September in each year.

Irrigation was provided only to the corn

Measurements:

- Cover crop biomass and silage corn yield
- Cover crop and silage corn nutritive values

Results

Figure 1. Cover crops at different growth stages: (A) cover crops recovering after winter freeze, (B) cover crop biomass ground cover one month before termination, (C) corn planting at three weeks post cover crop termination and (D) visual differences in silage corn growth between cover crop and no-cover crop plots.

Figure 2. Biomass yield of different winter cover crop species mixtures and their effect on silage corn yield in 2019 and 2020. Bars with different letters within a year are statistically different at p ≤ 0.05

Discussion

- Cover crops provided ground cover, helped in minimizing wind erosion and suppressed the proliferation of native weeds (Figure 1 A & B)
- Cover crops biomass yield was higher with the GL mix than the GBL and GB mixes in 2019, but it was similar for all cover mixtures in 2020 (Figure 2).
- On average, silage corn yield was 8-26% higher with cover crops than the no-cover crop in both years, with the GL mix obtaining the highest percentage yield increase (Figure 2)
- Cover crops had minimal effect on corn silage nutritive values (data not shown)
- Cover crops mixes GBL and GL had higher forage nutritive values such as non-fat carbohydrates (NFC) and relative forage quality (RFQ) in 2019, but the GB mix had higher neutral detergent fiber NDF in 2019, while fat was similar for all mixtures in both years (Figure 3)

Conclusions

- The GBL and GL mixture could be good alternative winter forage for dairy producers in the southern high plains
- Higher corn silage yields with cover crops can be attributed with nutrient cycling and better soil moisture retention arising from cover crop residue left on the surface during corn growth.

Acknowledgements