Planting Date and Seeding Rate Impact Ear Rots, Mycotoxins, and Quality in Corn Silage

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Corn Silage in Diet Ration

- Makes 50% of the forage dry matter
- Constitute the fiber portion of the diet
- Digestibility is an important factor
Producing High Quality Corn Silage

- Hybrid Selection
- Planting Date
- Seeding Rate
- Fertilizer Application
- Irrigation
- Harvest timing and height

- Insect and Disease Levels
- Mycotoxins
- Forage Quality
Conditions Favoring Ear Rots and Mycotoxins

Temperature: 24-28° C
RH >80%

Western Bean Cutworm (larvae and eggs)

Host

Pathogen

Disease

Environment Temperature: 24-28° C
RH >80%
Objectives

➢ To evaluate impact of planting date and seeding rate on insect (western bean cutworm), disease (ear rot), mycotoxin accumulation, quality, and yield in corn silage.

_Hypothesis:_ Planting corn silage late April to early May in Michigan will help escape the highest insect and disease pressure for the most susceptible growth stage (silking).

➢ To quantify optimum seeding rate across wide environmental conditions.

_Hypothesis:_ Optimum seeding rate will differ with change in surrounding environment due to variable insect and disease pressure.
Design and Method of Work

Objective 1:
- Field trials in Split plot design with 4 reps at Ingham county location.
- Treatments: Planting Date and Seeding Rate
  - Planting Date: Early, Mid and Late
  - Seeding Rate: 69,160; 83,890; 98,800; 113,690 seeds per hectare

Objective 2:
- Multi-location seeding rate trials in Randomized Complete Block Design with 4 reps
Data Collection

➢ Insect Damage Ratings
  ➢ Western Bean Cutworm Incidence
  ➢ Western Bean Cutworm Severity

➢ Ear Damage Ratings
  ➢ Ear Rot Incidence
  ➢ Ear Rot Severity
  ➢ Ear Rot Index

➢ Mycotoxin Concentrations
  (Deoxynivalenol, DON; Zearalenone, ZON)

➢ Quality and Yield parameters
Results – Insect Damage

➢ Insect damage did not differ significantly in 2019 and 2021.
➢ Corn planted around last week of May had highest insect damage.
Insect damage varied across the seeding rate only at Huron.

WBC Severity was higher for higher seeding rates.
➢ Highest disease damage was seen in mid planted crops at Ingham 2020.
➢ Disease damage was similar across seeding rates in both 2019 and 2021.
Weather Conditions

![Graph showing temperature, precipitation, and leaf wetness from May 1 to October 1, 2020. The graph includes lines for precipitation (mm), temperature (°C), and leaf wetness (% of day).]
Results – Dry Yield

- Planting date impacted yield only at Ingham 2020
- Mid planted corn suffered a yield penalty due to higher insect and disease damage.
Results – Dry Yield

- Planting date impacted yield only at Ingham 2020
- Seed rate trials at Ingham 2019 showed a linear relationship but at Huron and Allegan 2020 it followed a quadratic regression curve.
Quantification of Silage Quality

- Neutral Detergent Fiber (low value desirable)
- Acidic Detergent Fiber (low value desirable)
- In Vitro Digestibility (higher value desirable)
- Neutral Detergent Fiber Digestibility (higher value desirable)
- Crude Protein (higher value desirable)
- Starch (higher value desirable)
- Milk yields (Milk per hectare and milk per Mg)
### Results - Silage Quality

<table>
<thead>
<tr>
<th>Quality Parameters</th>
<th>Ingham 2020</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Early</td>
</tr>
<tr>
<td>NDF</td>
<td>20.03 a</td>
</tr>
<tr>
<td>ADF</td>
<td>15.31 b</td>
</tr>
<tr>
<td>IVD</td>
<td>88.09 a</td>
</tr>
<tr>
<td>NDFD</td>
<td>40.52 a</td>
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<tr>
<td>CP</td>
<td>7.67 a</td>
</tr>
<tr>
<td>Starch</td>
<td>46.34 a</td>
</tr>
</tbody>
</table>
Results – Milk Yields

➢ Milk yield per unit area and per unit dry matter, highest in early May planted crop.

Milk per hectare (Mg ha\(^{-1}\))

- **Early**: A
- **Mid**: B
- **Late**: B

Milk per Mg (kg Mg\(^{-1}\))

- **Early**: A
- **Mid**: B
- **Late**: B

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p=0.0008

p=0.0002
Conclusion and going forward

- Corn planted in late May was more prone to western bean cutworm infestation and ear rot infection.
- Yield was lowest in late May crop, whereas the highest yield was observed in early May crop.
- Overall quality parameters and milk yields were improved for early planted corn.
- Seed rate impact on insect, disease, yield, or quality of silage was location specific.
- Explore additional factors that impact the disease, yield, and quality.
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