

Winter Grain - Silage Corn Double Crop Systems for New England

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Introduction

Sustainability of the organic dairy industry is largely dependent on growers producing quality feed and minimizing weed pressure. High feed cost demands on-farm production of quality forages and grains. Growers need alternative systems to meet these needs.

Project Objectives

- Evaluate winter grain / short season silage corn double crop systems for yield, quality and weed biomass.
- Determine optimum harvest for grains
- Identify risks and benefits to producers



Figure 1. Winter barley survival questionable

Methods

- Planted winter barley (WB), winter wheat (WW), and winter triticale (TC) in mid September
- Harvested winter grains at boot stage (BS) and early soft dough (SD) development stages – total above ground biomass
- Planted full season corn (FSC) in late May. Hybrid and open pollinated corns were planted following each harvest – compared to FSC
- Harvested weeds at canopy closure and at harvest to assess effect of production system on weed dynamics.



Figure 2. Small grains following BS harvest



Figure 3. Row cultivating last planted corn

Environmental Conditions

- Winter kill reduced WB yield and increased weed pressure relative to WW/TC
- Excellent growing conditions for WW and TC growth and development 2008 and 2009
 - Record warmth in April, 2009
- Less favorable conditions for corn growth:
 - record rainfall in 2009 / cool
 - killing frost 10/22/08 / 09/26/09
- Cultivation moderately effective
 - one tine cultivation possible
- FSC yield good due to well drained soils

Results: Small Grain Yield–3 Site Years

- WW and TC produced significantly higher yield than WB – 2008 and 2009 – See below

| DM Yield (kg ha ⁻¹) | SY-1 ME-08 | SY-2 ME-09 | SY-3 VT-09 |
|---------------------------------|------------|------------|------------|
| WW | 8890 a | 10093 a | 7185 a |
| TC | 7777 b | 9070 b | 7386 b |
| WB | 5260 c | 5570 c | 5594 c |
| LSD (0.05) | 790 | 880 | 739 |

- Harvesting grains at soft dough stage significantly increased SG yield, and often forage quality
- Winter barley had consistently higher forage quality: crude protein, ADF, NDF, and NFC (Figure 4)
- Poor winter barley yield negated quality benefit

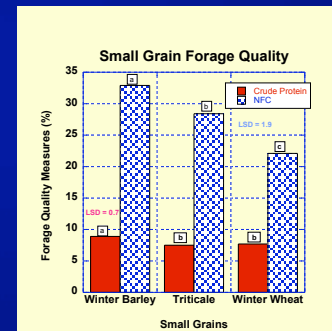


Figure 4. Influence of grain type on forage quality

Results: Weed Biomass

- Due to winter kill – WB weed biomass was consistently higher (lambsquarters and mustard)
- Interaction with stage of harvest: always higher at soft dough with WB with almost no weeds in WW and TC with no cultivation

| Weed Yield (kg ha ⁻¹) | SY-1 ME-08 | SY-2 ME-09 | SY-3 VT-09 |
|-----------------------------------|------------|------------|------------|
| WB | 59 a | 269 a | 582 a |
| TC | 6 b | 16 b | 135 b |
| WW | 11 b | 4 c | 100 b |
| LSD (0.05) | 21 | 62 | 205 |

Results: Corn

- Significant year*corn*grain*stage interaction
- Corn planted after BS harvest outyielded corn planted after SD by > 2000 lb DM ac⁻¹
- WB matures 1-2 weeks sooner than WW/TC. Corn planted after WB produced 1000 – 2,000 lbs DM ac⁻¹ more than corn following WW/TC
- 2008 – planting date did not affect corn quality - Due to short growing season in Maine in 2009, corn quality (ADF, NDF, TDN, NEL) were all affected by planting date

Results: Total Yield

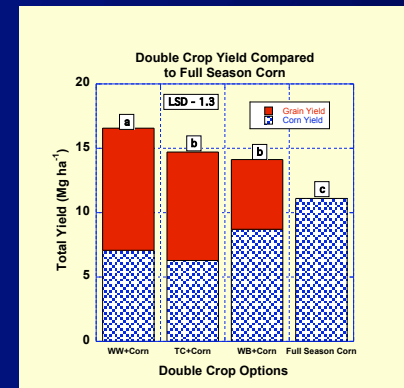


Figure 5. Total Yield – Orono 2008/2009

Key Conclusions to Date:

- WW and TC crops compete well with annual weeds - no cultivation is required
- WB has significantly better forage quality but winter kill in ME/VT reduced yield / viability
- Boot stage corn – safe bet / good yield and quality – Corn after SD ... risky in ME/VT
- Double crop yields well exceed FSC – forage quality is good, but weed pressure in corn stage is equivalent to FSC.