# Improving Forage Production Systems for Organic Dairy Producers

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## ntroduction

Many dairies in the Northeast are converting to rganic production systems. Quality forage production ith minimal weed pressure is key to long-term ustainability. Research was initiated in 2004 and 005 to evaluate alternative forage production systems hat utilize narrower row spacing and early crop mergence to out-compete weeds. Producers who row silage corn need improved cultivation methods to crease corn yields and quality. Timing is essential see Figure 1).

**Figure 1. Optimum Corn Cultivation Timing - 1999**

## Project Goals

- Evaluate methods to improve effectiveness of field orn cultivation
  - Use of solaria to initiate first cultivation
  - Search for thread stage weeds (number/length)
  - Determine optimum number of cultivations
- Evaluate yield / quality of alternative forage systems
  - Spring barley followed by one cut BMRSS (2004)
    - (tilled and no till) – (2005 tilled only)
  - Winter grains followed by two cut BMRSS (2005)
    - (soil tilled following each crop)
- Examine weed population differences between corn nd alternative forage based systems

## Corn Trial

- Tine Cultivation: Evaluated timing and intensity
  - Timing based on cotyledon stage weeds in solaria or 1" thread stage compared to calendar based approach
  - Intensive early season cultivation (2 Tine - Two Directions)
- Row Cultivation: (3rd and 6th leaf stage)

**Figure 2. Cultivation Practices for the Alternative Forage Systems**

**Figure 3. Use Of Solaria To Enhance Early Weed Emergence**

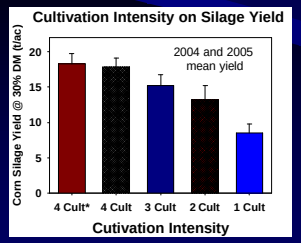


**Figure 4. Cultivation Intensity Impact on Average Corn Silage Yields**

### Results

- Increasing cultivation intensity improved corn yields
- Bidirectional cultivation (4 cult*) reduced weed biomass, but did not improve 2004/2005 average yields
- Rainfall and soil moisture influenced cultivation timing more than stage of weed development
- Recommendations: Cultivate frequently when soil is dry enough to work after planting

## Alternative Forage Production System

- Spring barley followed by one cut BMRSS
  note: manure application required before each crop*
- Winter barley, winter wheat, triticale, or winter rye followed by two cut BMRSS
- Production / Weed management advantages:
  Narrow row width – rapid canopy closure
  Rapid emergence given planting season temperatures

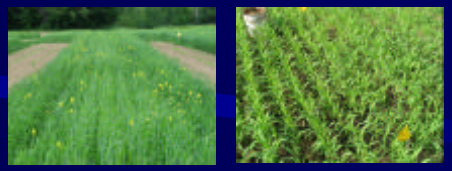

**Figure 5a / 5b. Spring Barley Followed by BMRSS**

### Results

Spring barley/BMRSS double crop approached corn yields in 2004 where there was sufficient nitrogen (see Figure 6), but was much lower in 2005 due to poor spring barley yield.

- Winter wheat/BMRSS yield was equivalent to silage corn yield in 2005.
- Weed biomass was significantly lower in alternative forage production systems in both 2004 and 2005 (Figure 7).

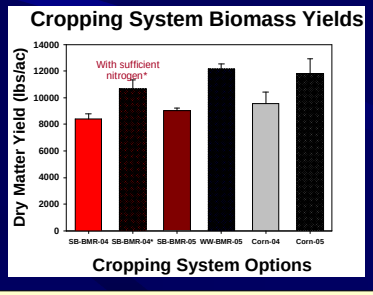


**Figure 6. Silage Yield of Corn and Double Crop Forages**

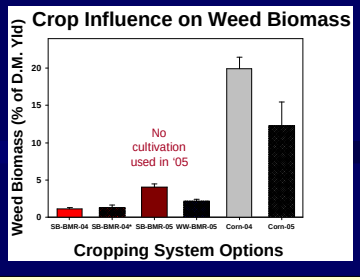


**Figure 7. Influence of Crop System on Weed Biomass**

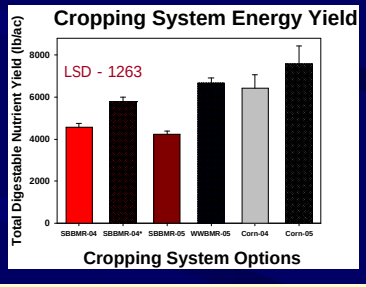


**Figure 8. Energy Yield of Corn and Alternative Crops**

## Research Conclusions

- Corn weed pressure was higher than alternative forage systen
- Alternative forage system has potential to produce equivalent yields with significantly lower weed biomass
  - Manure application necessary before each crop
  - Alternative system may require additional energy (grain)
- Successful, sustainable non-chemical forage production depends on systems that use:
  - Narrow rows to achieve rapid canopy closure
  - Crops that emerge more quickly in cool or warm conditions than competing weeds