

Preplant Weed Management and Planting Date

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Influence Barley Forage Yield and Quality



Background

Annual hay crops, including barley, are well adapted to the Northern Great Plains. In-crop herbicides typically are not used on annual forages, but weed control is done prior to planting, either by tillage or herbicide application.

Objectives

Compare the influence of preplant weed management and planting date on:

1. weed density
2. barley and weed forage yield and quality
3. water use and water use efficiency
4. weed seed production

Material and Methods

Description:

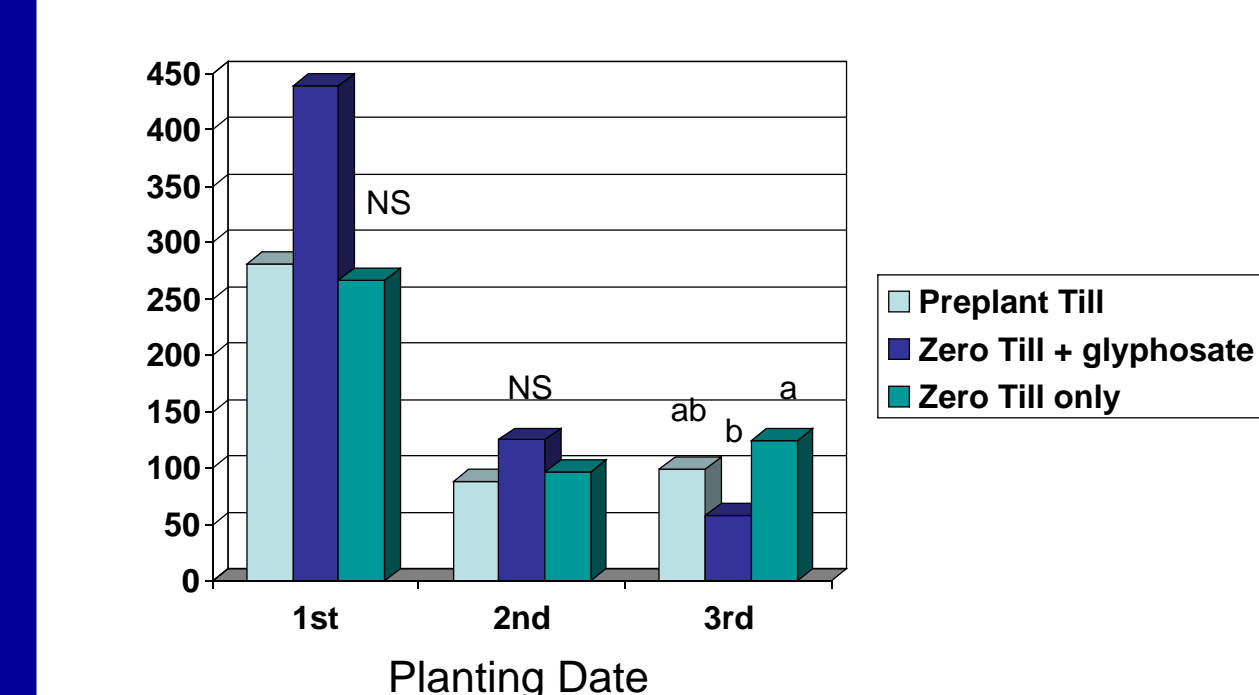
- 1) randomized complete block in a split-plot arrangement
- 2) whole plot factor is three planting dates
- 3) subplot factor is three preplant weed management systems
- 4) experiment was conducted in 2004 and 2005 near Froid, MT

Preplant weed management methods:

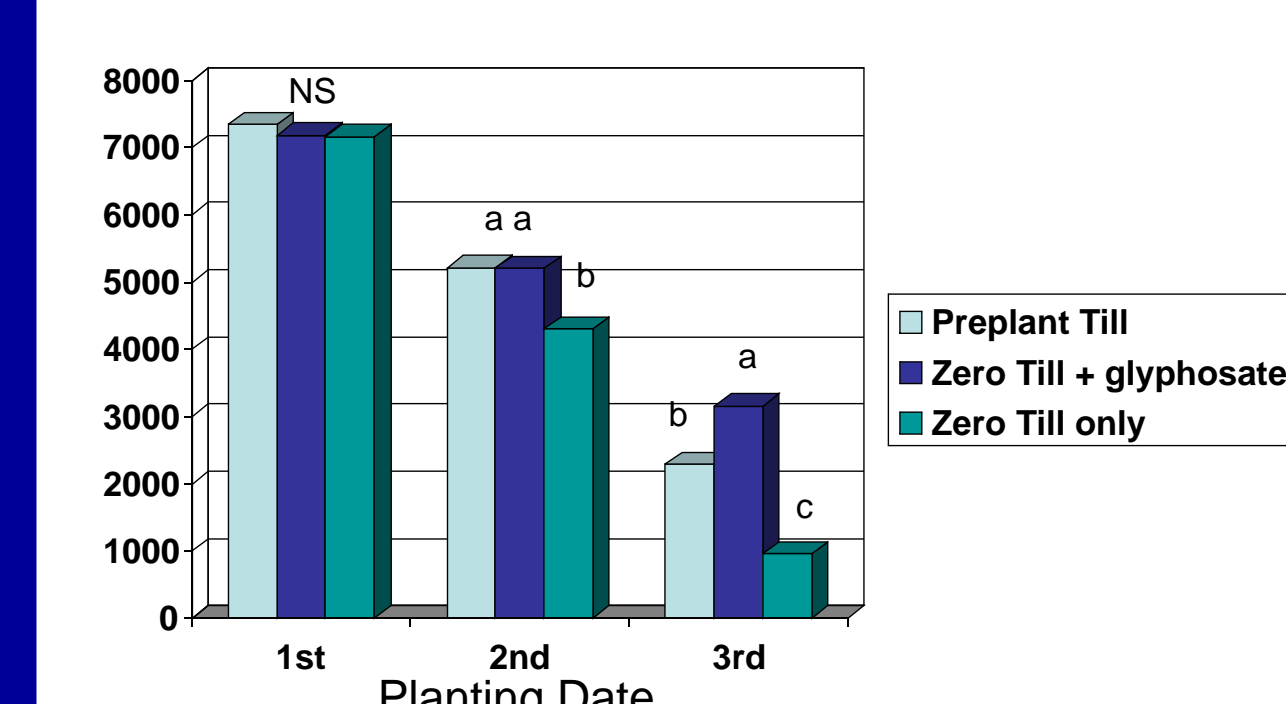
- 1) tillage with sweeps,
- 2) zero tillage with glyphosate applied within 24 after planting, and
- 3) zero tillage without preplant weed control.

Planting dates: 2004: 23 April, 1 June and 16 June
2005: 20 April, 24 May and 15 June

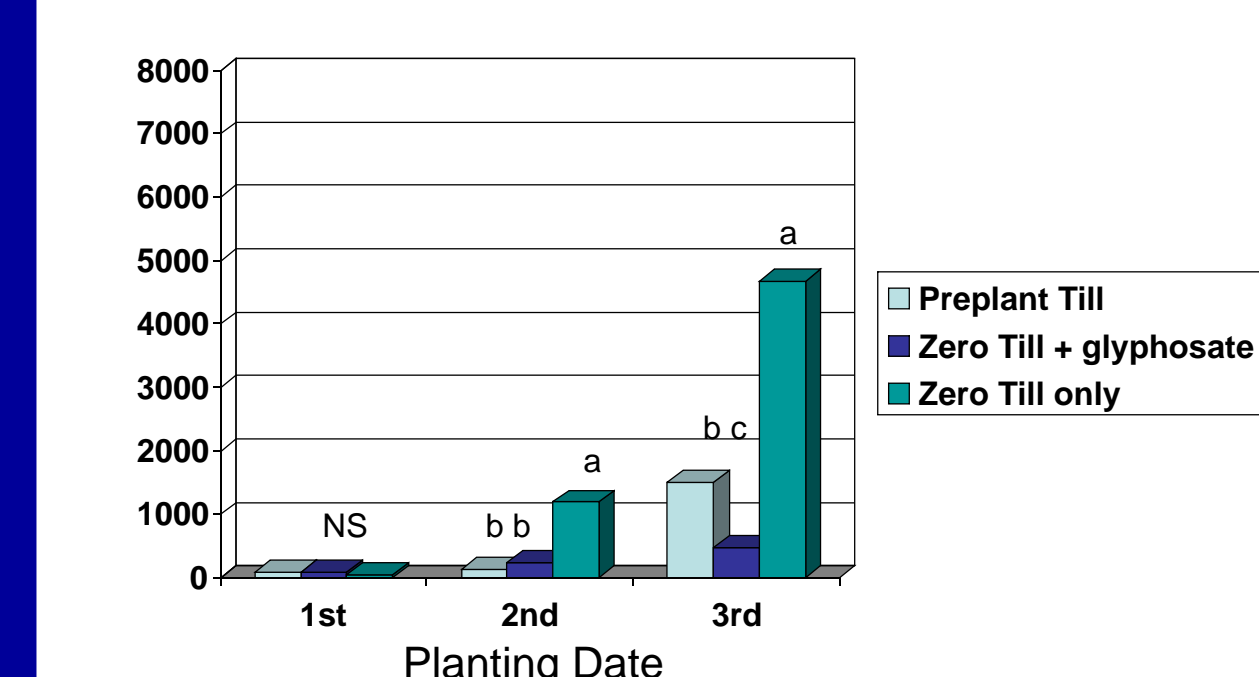
1 Weed Density at Harvest, # m⁻²



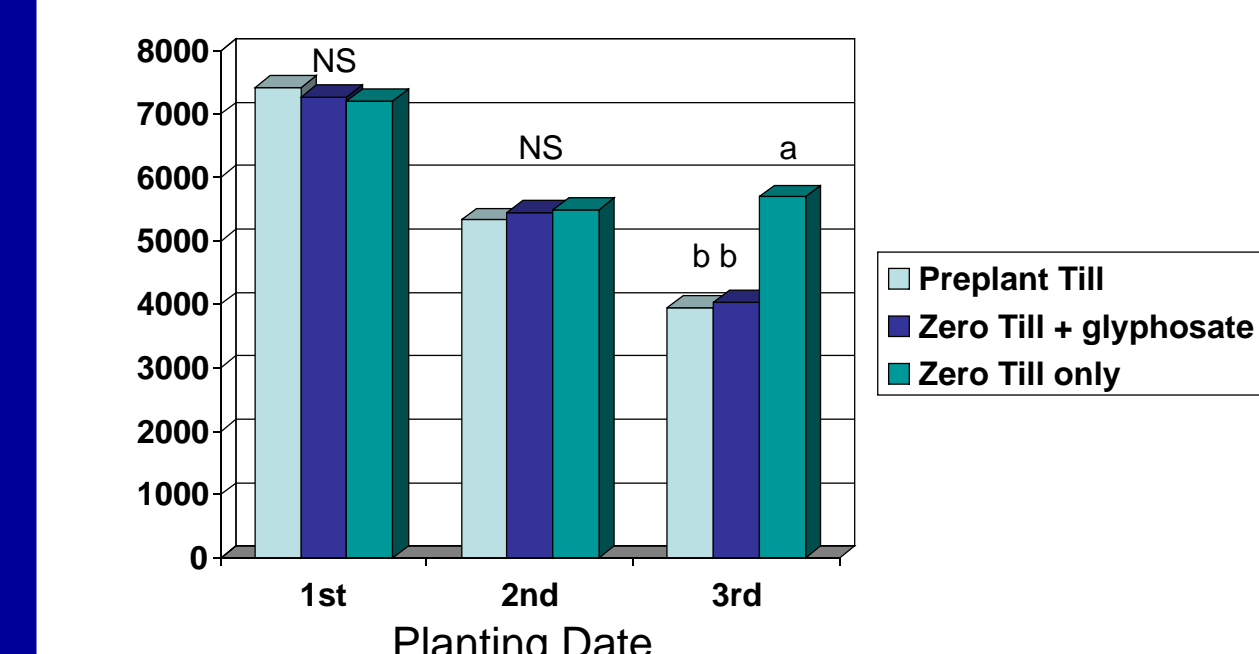
2 Barley Biomass, kg ha⁻¹



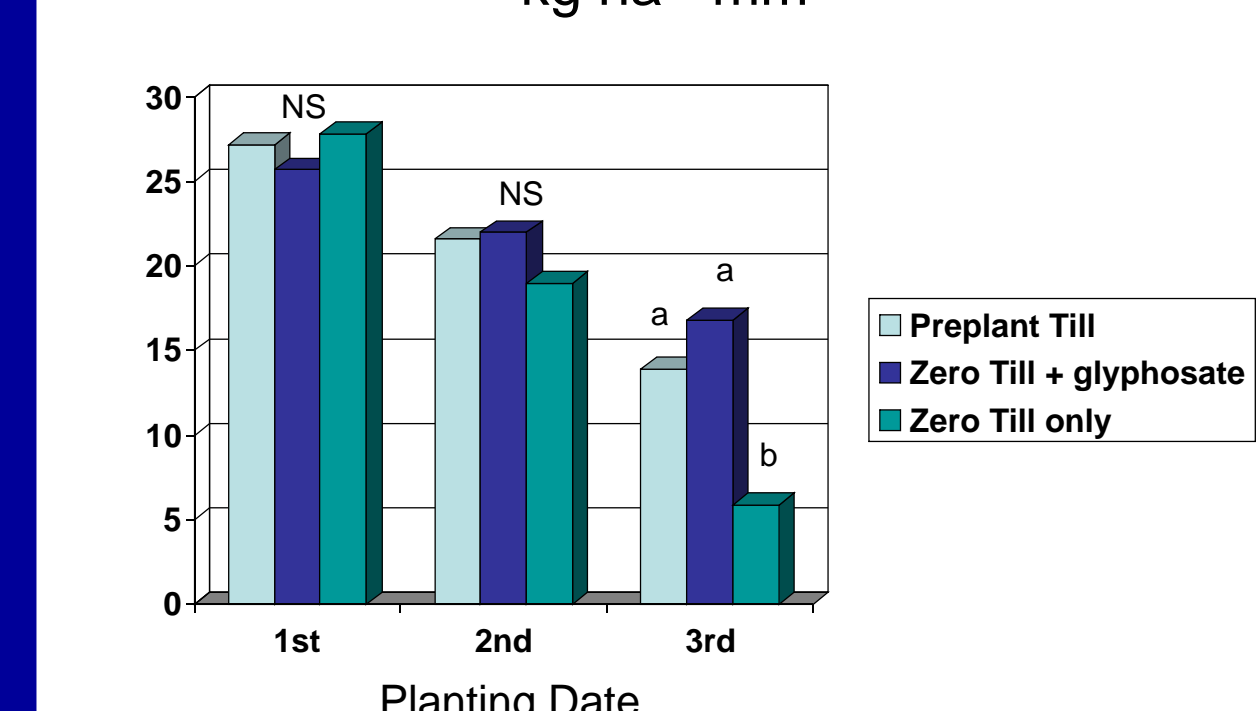
3 Weed Biomass, kg ha⁻¹



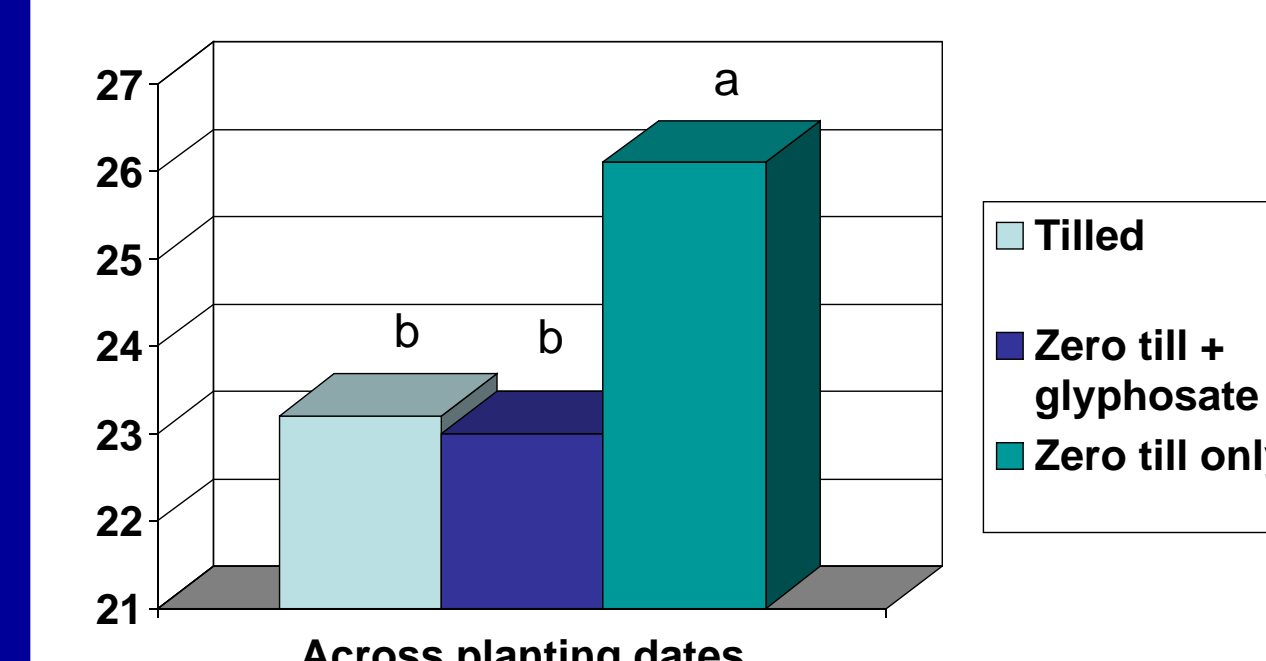
4 Total Biomass, kg ha⁻¹



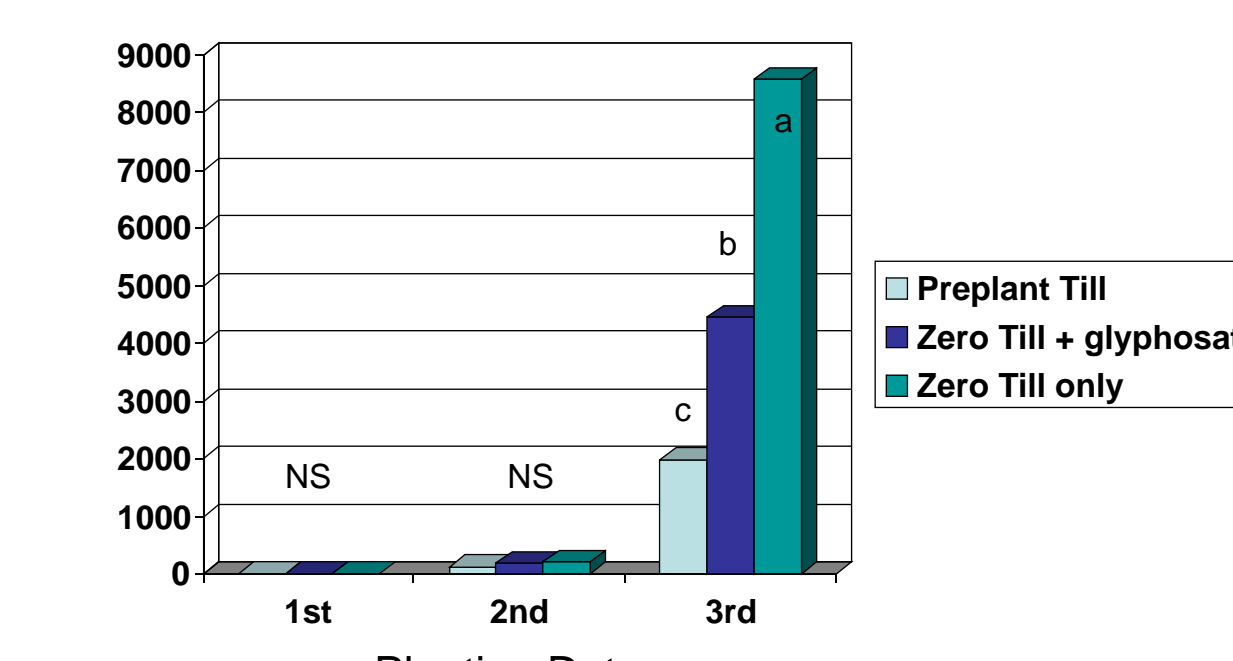
5 Barley Water Use Efficiency, kg ha⁻¹ mm⁻¹



6 Total biomass WUE, kg ha⁻¹ mm⁻¹



7 Weed Seed Production, 2004 only, #/m²



Results

Weed Density

First planting date had higher weed density at harvest than did later planting dates (Figure 1). Most common weed was green foxtail (*Setaria viridis*). Other weeds found included kochia (*Kochia scoparia*), wild oat (*Avena fatua*), wild buckwheat (*Polygonum convolvulus*), Russian thistle (*Salsola kali*), ribseed sandmat (*Chamaesyce glytopserma*), and prickly lettuce (*Lactuca serriola*).

Biomass

Barley forage yield decreased with later planting date (Figure 2). Barley yield did not vary by preplant weed management for the first planting date. Barley produced in zero tillage without preplant weed management had lower yields than zero tillage with herbicide or conventional tillage in the second and third planting dates.

Weed biomass was low for all preplant weed managements in the first planting date (Figure 3). Weed biomass was particularly high in the zero tillage without herbicide treatment for the third planting date.

Total biomass did not vary by preplant weed management for the first and second planting dates (Figure 4). Zero tillage only had higher forage yields than tilled or zero tillage plus glyphosate treatments for planting date three.

Forage Quality

Barley crude protein concentration (CP) increased with later planting, despite harvesting at the same stage of development. Neutral (NDF) and acid detergent fiber (ADF) concentrations were unaffected by planting date, averaging 601 and 339 g kg⁻¹, respectively.

Weed CP did not vary among preplant treatments for the first and second planting dates, averaging 208 and 149 g kg⁻¹, respectively. For the third planting date, preplant weed control by tillage or zero tillage with glyphosate resulted in CP of 187 and 176 g kg⁻¹, respectively, higher than the 134 g kg⁻¹ for zero tillage only.

Weed NDF and ADF from the zero tillage only treatment was greater than for tilled or zero tillage with glyphosate treatment.

Water Budget

Preplant and postharvest plant available water (0-107 cm) did not vary by preplant weed management, planting date, or the management x date interaction. Water use, determined by water balance, was 289, 248, and 221 mm for the first, second, and third planting dates, respectively.

The weed management x planting date interaction was significant for water use efficiency (WUE) of barley forage (Figure 5). The WUE for total biomass varied by preplant weed management (Figure 6).

Weed Seed Production

There was no weed seed production prior to harvest for the first planting date. Treatment differences were not significant for the second planting date. Zero till only produced many weed seeds in planting date three (Figure 7).

Conclusions

- 1 Early planted hay barley with zero tillage only had high yields of high quality forage.
- 2 Early planted hay barley with zero tillage only had no weed seed production prior to harvest.
- 3 Early planted hay barley with zero tillage only had high water use efficiency.

Figures

