Sowing time, false seedbed, row distance and mechanical weed control in organic winter wheat

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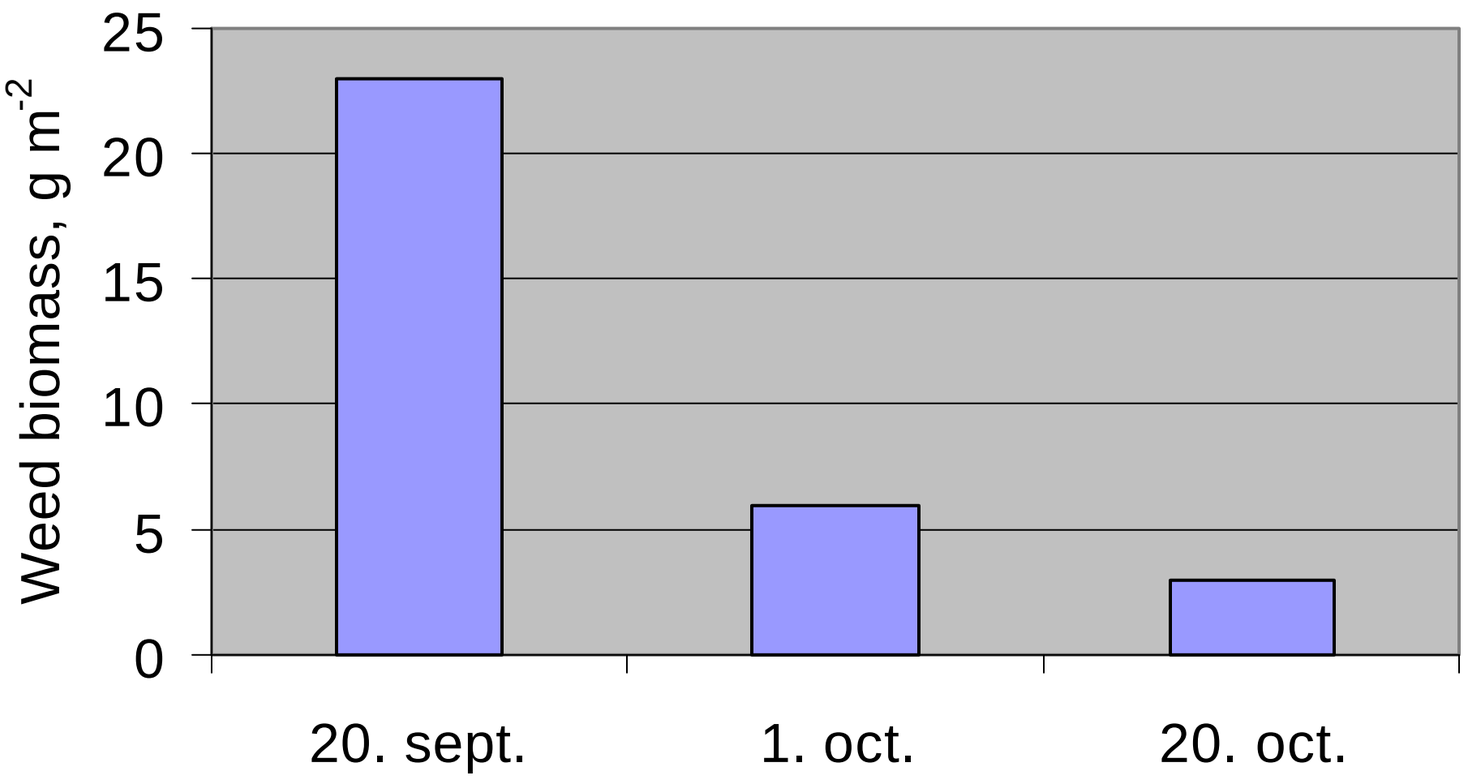
Mechanical weed control in organic winter wheat

- Prevention:
  - sowing time
  - false seedbed
  - competitive crop
- Row distance
- Control:
  - harrowing
  - hoeing

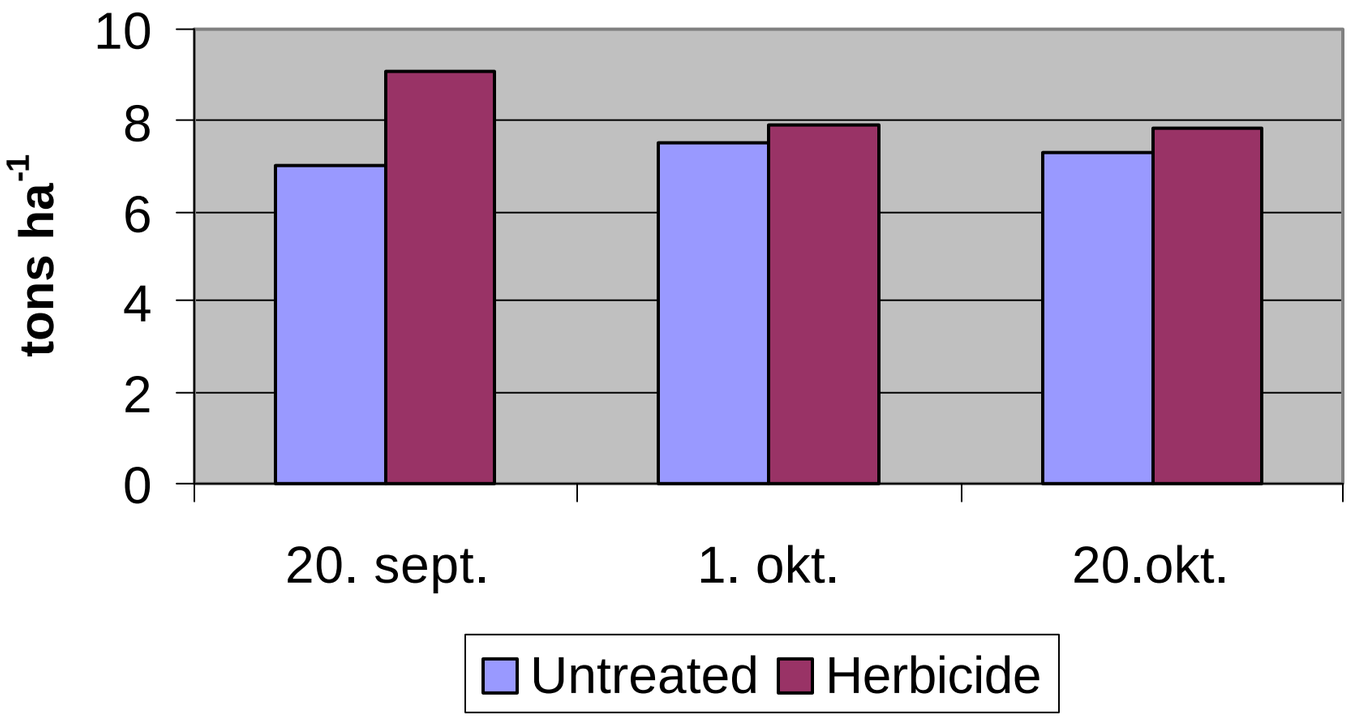
Sowing time

- Delayed sowing time reduced the amount of weeds without weed control
- Delayed sowing time reduced the yield with chemical weed control ~ weed free conditions
- Delayed sowing time did not reduce the yield without weed control
  - Olsen et al. 1997

Weed biomass at different sowing times in winter wheat (conventional)



Yield of winter wheat at different sowing times with and without chemical weed control



False seedbed

- Preparing a seedbed enhances weed germination
- Cultivation 1-2 weeks later kill some of the germinating weeds
- Preparing a new seedbed after this should not enhance weed growth as much (in the fall situation)

False seedbed

please look on the pictures on the next slide

Without false seedbed

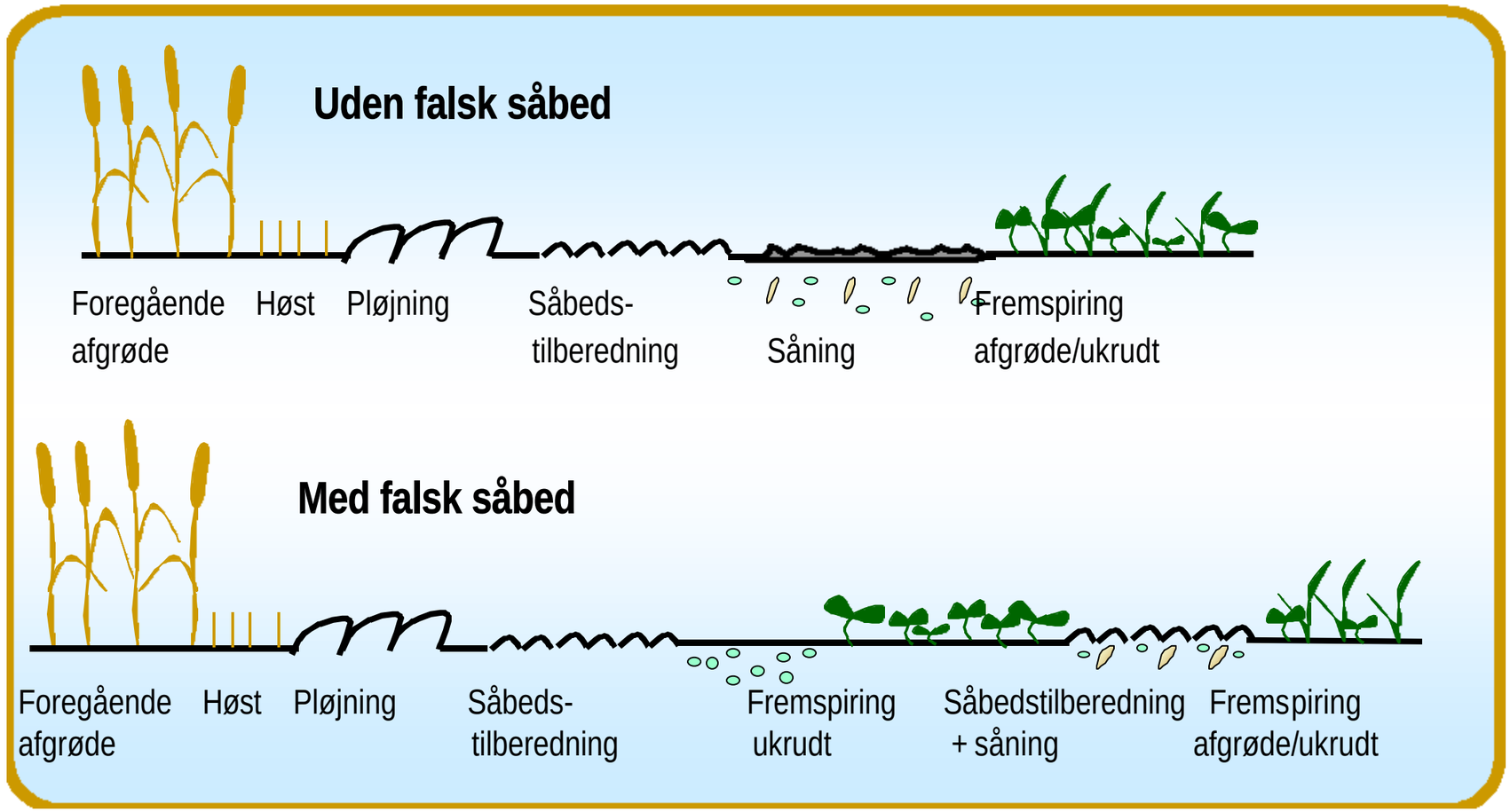
Previous crop | Harvest | Plowing | Seedbed preparation | Sowing | Germination crop/weeds

With false seedbed

Previous crop | Harvest | Plowing | Seedbed preparation | Germination weeds | Seedbed prep. + sowing | Germination crop/weeds

Falsk såbed

please look at the English text on the presious slide



Competitive crop

- May be enhanced by:
  - crop cultivar
  - plant density
  - row distance/plant distribution
  - fertilising strategy
  - more …
- Not included in these experiments
- Row distance as part of control strategy

Row distance

- Normal row distance app. 12 cm
- Larger row distance 16 - 24 cm
- Same plant density m^{-2} = larger plant density within the row
- Without weed control:
  - larger row distance may increase weed biomass
- With weed control:
  - should not reduce yield

Weed harrowing in winter wheat

- Pre-emergence harrowing
  - Should not harm the crop
  - Could enhance weed germination
  - Is not always possible due to soil conditions
- Post-emergence harrowing in the fall
  - Very liable to harm the crop
  - May reduce important weeds
  - Is often not possible due to soil condition

Weed harrowing in winter wheat

- Early harrowing in the spring
  - Important to loosen the soil for later harrowing/hoeing
  - May kill some fall-germinated weeds
  - May enhance spring weed germination
  - May enhance crop growth (soil aeration, nitrogen dynamics)
  - Not very harmful to the crop

Weed harrowing in winter wheat

- Selective harrowing in the spring
  - can be done at high speeds without harming the crop
  - will not control weeds with tap roots and/or erect growth
  - will not control weeds within the row
  - can control prostrate weeds between the rows
  - may be more effective at greater row distances than normal

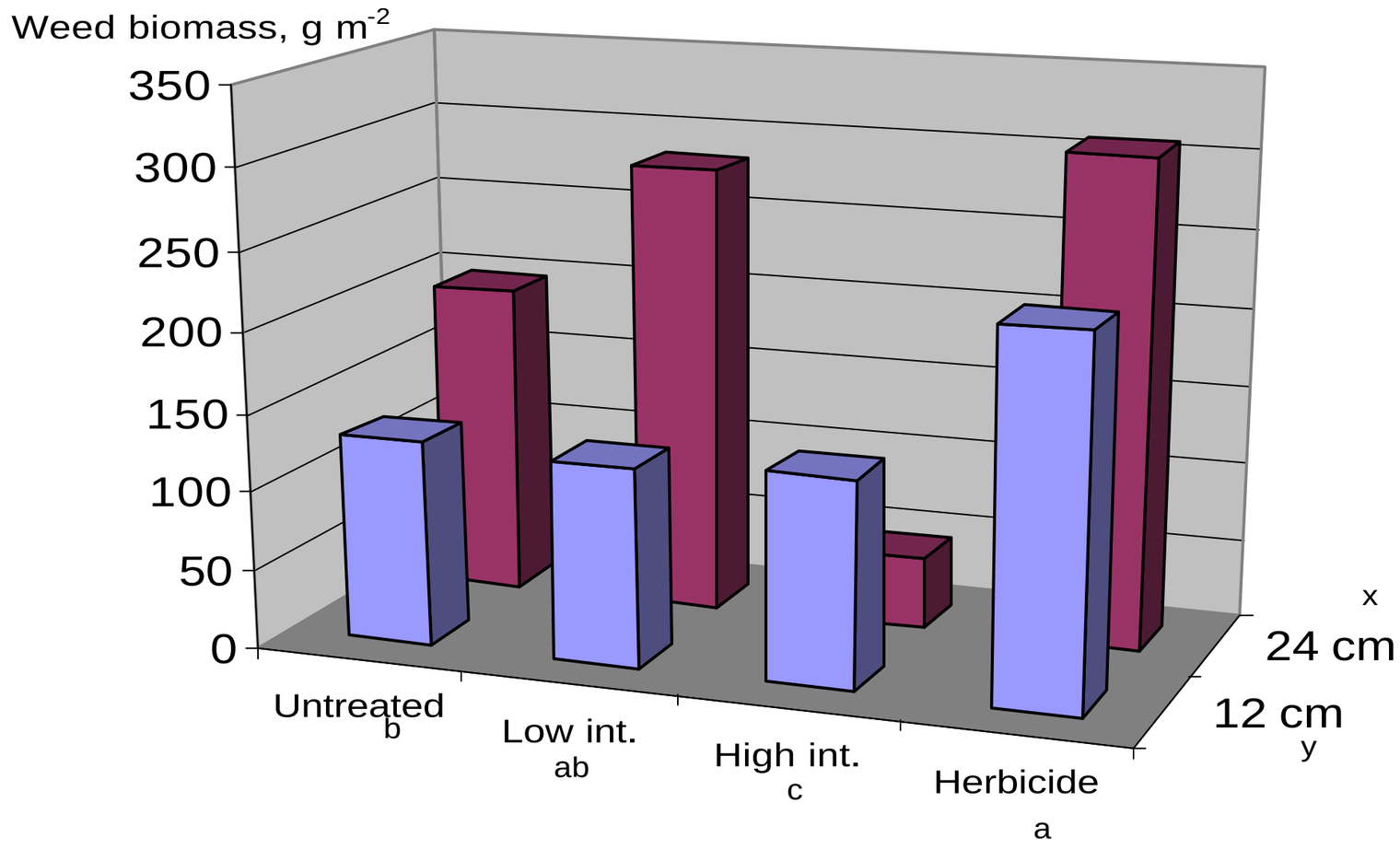
Row hoeing in winter wheat

- Row hoeing
  - a supplement to harrowing
  - carried out at larger row distances
  - only in the spring
  - does not harm the crop
  - kills weeds between rows
  - may damage prostrate weeds within rows by soil covering

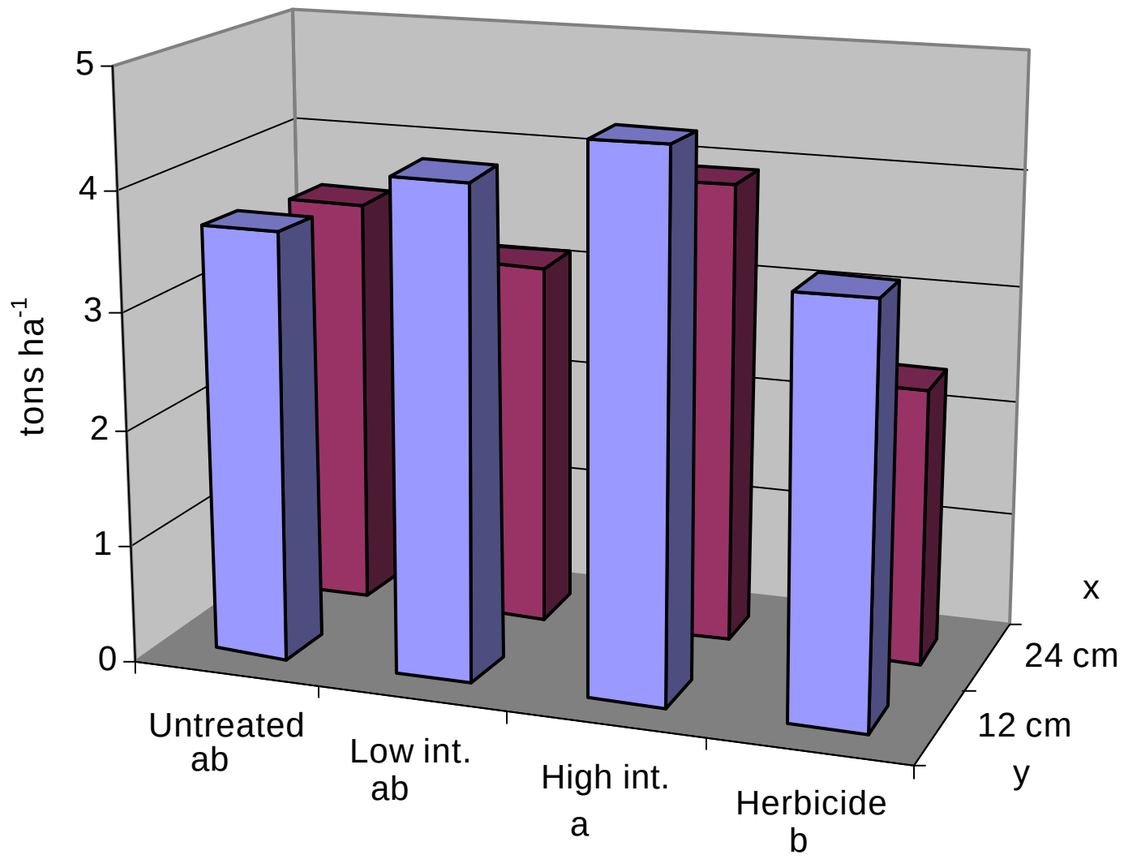
Experiments

- 1 experiment 1998
- normal and double row distance (12 and 24 cm)
- 2 controls: untreated and herbicide
- 2 intensities of mechanical control
- Row hoeing at large row distance and high intensity of control
- Organic conditions - > 500 weeds m^{-2}

Weed biomass at two row distances and different weed control



Yield of winter wheat at two row distances and different weed control



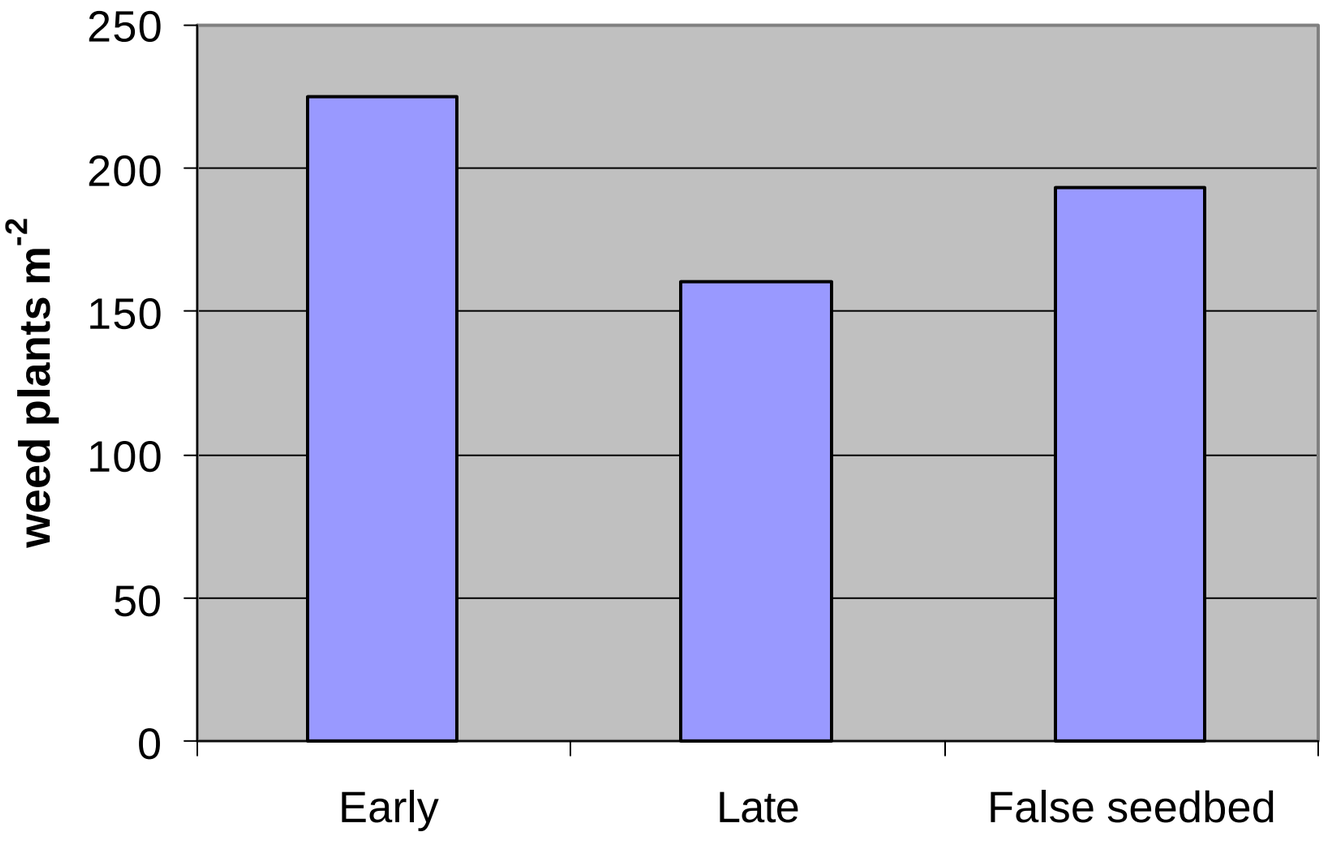
Experiments

- 2 experiments i 1999 at two locations
  - 3 sowing strategies:
    - early sowing (app. 20th Sept.)
    - late sowing (app. 10th Oct.)
    - late sowing with false seedbed
  - two row distances as 1998
  - two controls as 1998
  - harrowing at normal row distance
  - harrowing and hoeing at larger row distance

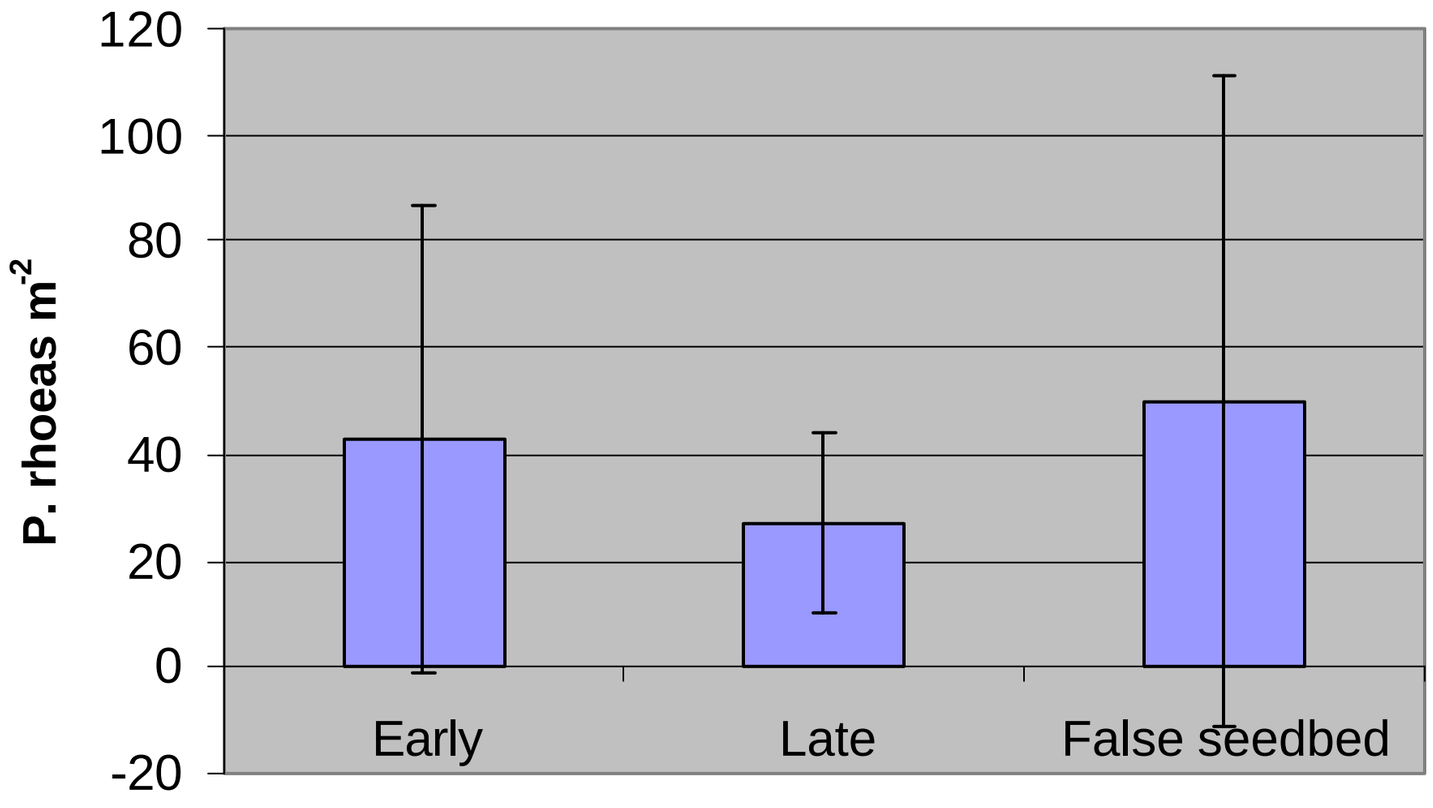
Experiments

- Flakkebjerg:
  - organic conditions
  - > 200 weed plants m^{-2}
  - soil type: sandy loam
- Foulum:
  - organic treatments
  - < 50 weed plants m^{-2}
  - soil type: loamy sand

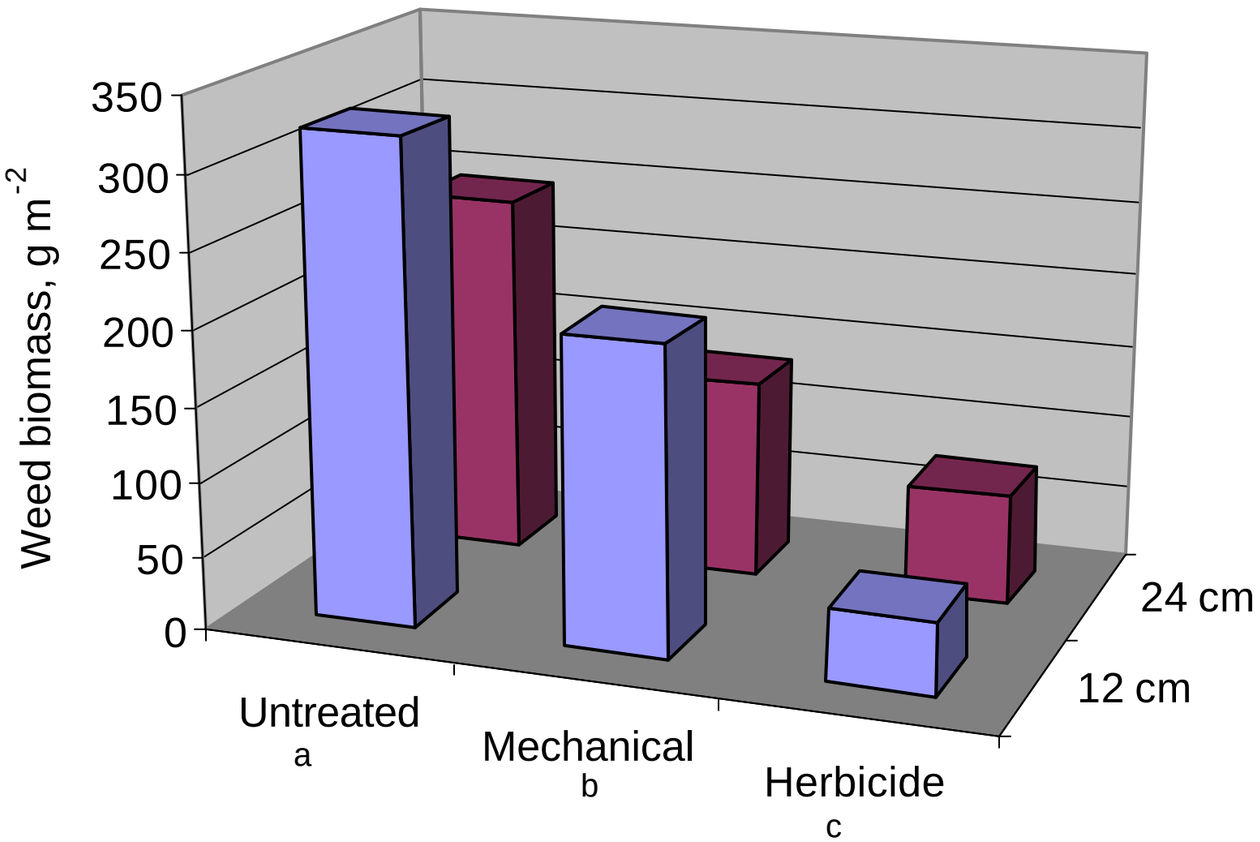
Effect of sowing strategy on weed density in early spring at Flakkebjerg



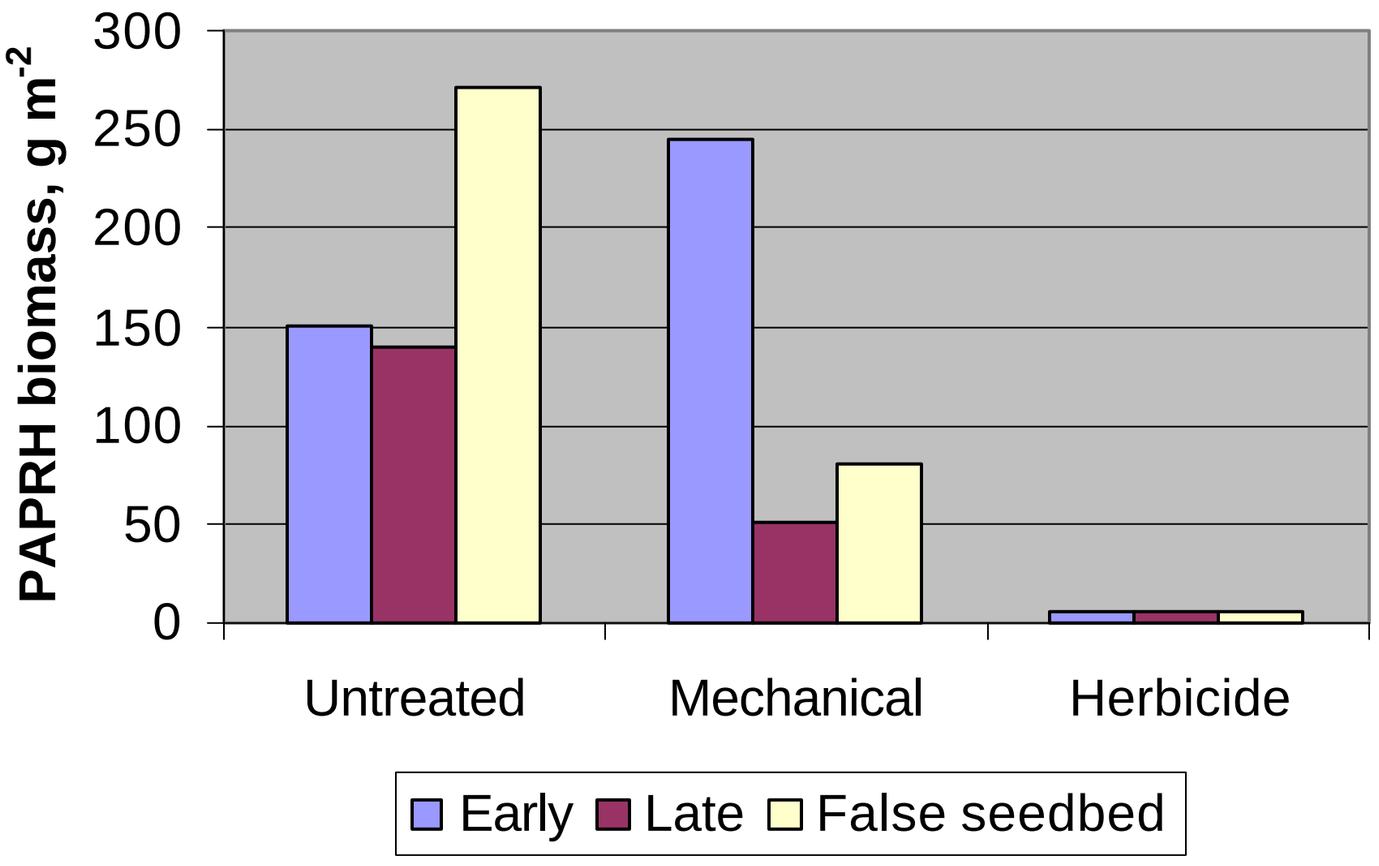
Effect of sowing strategy on P. rhoeas density in early spring

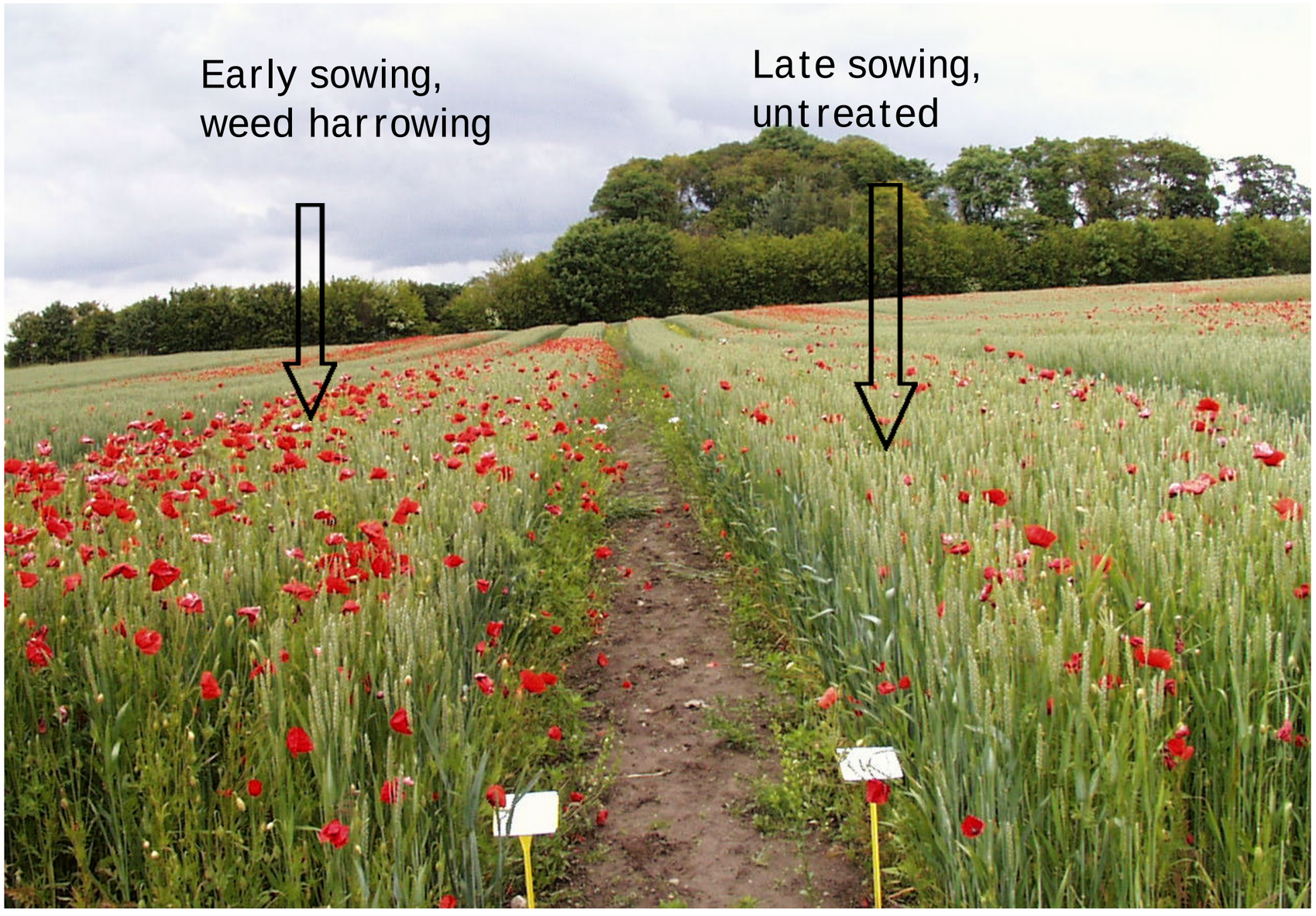


Weed biomass with different weed control at two row distances, Flakkebjerg

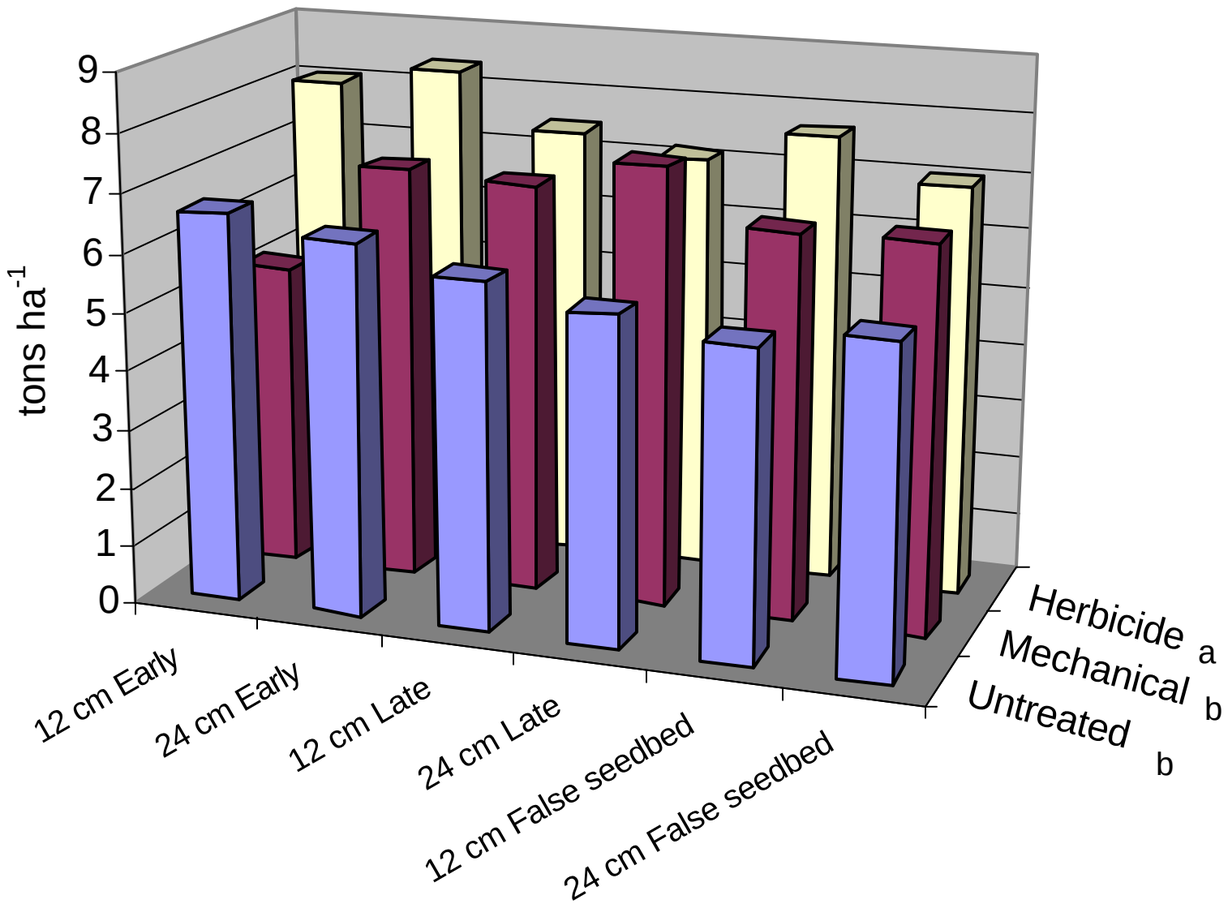


Biomass of poppies by different weed control and sowing strategies, Flakkebjerg

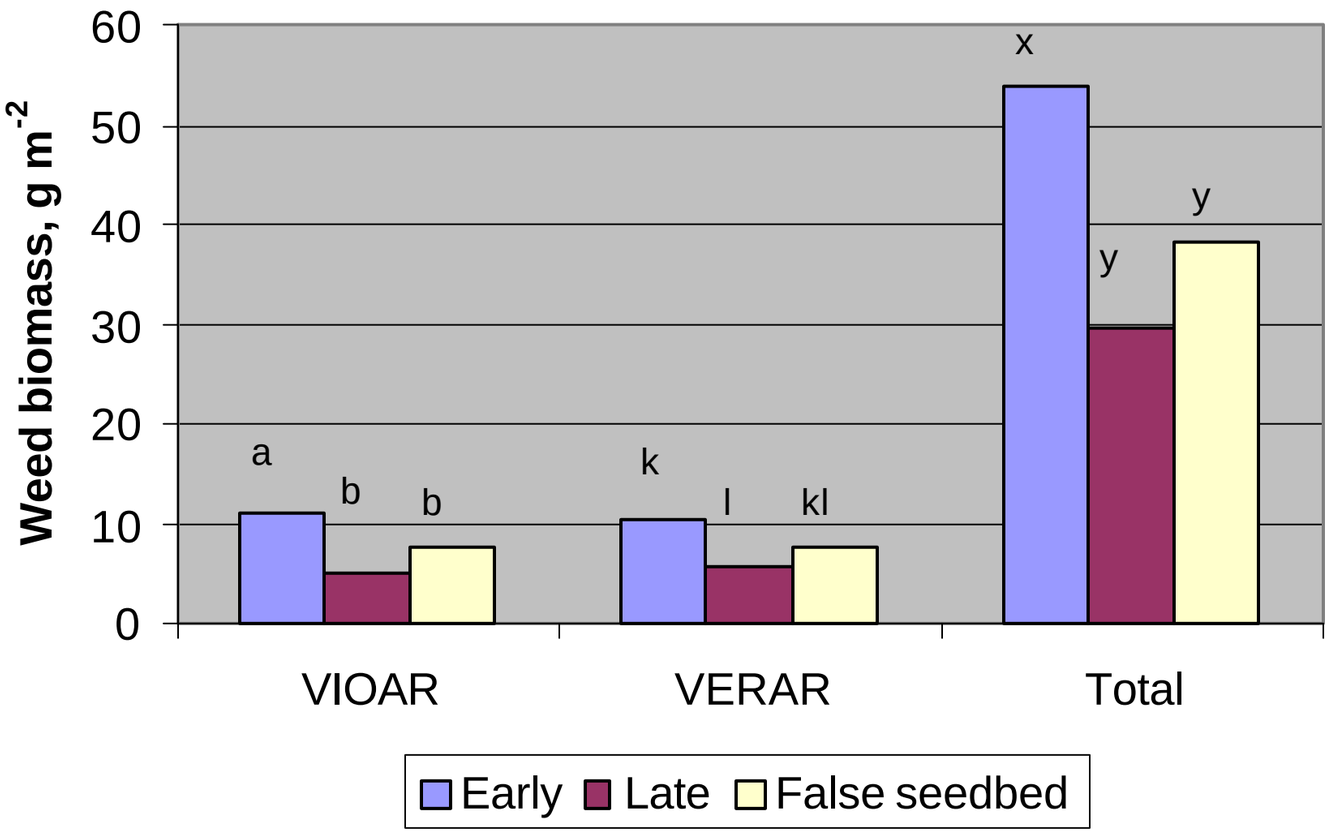



Early sowing,
weed harrowing
Late sowing,
untreated

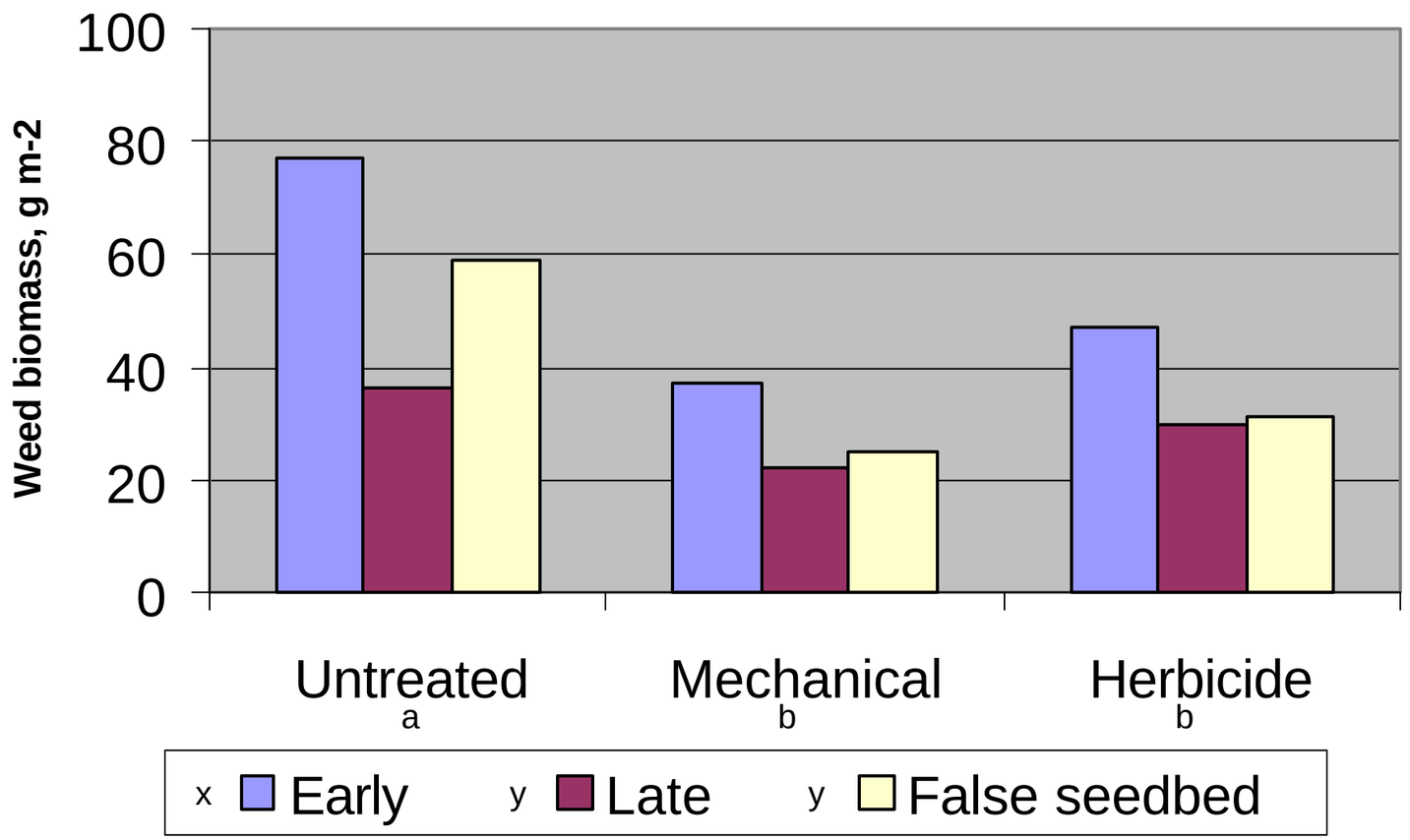
Yield of winter wheat in the experiment at Flakkebjerg



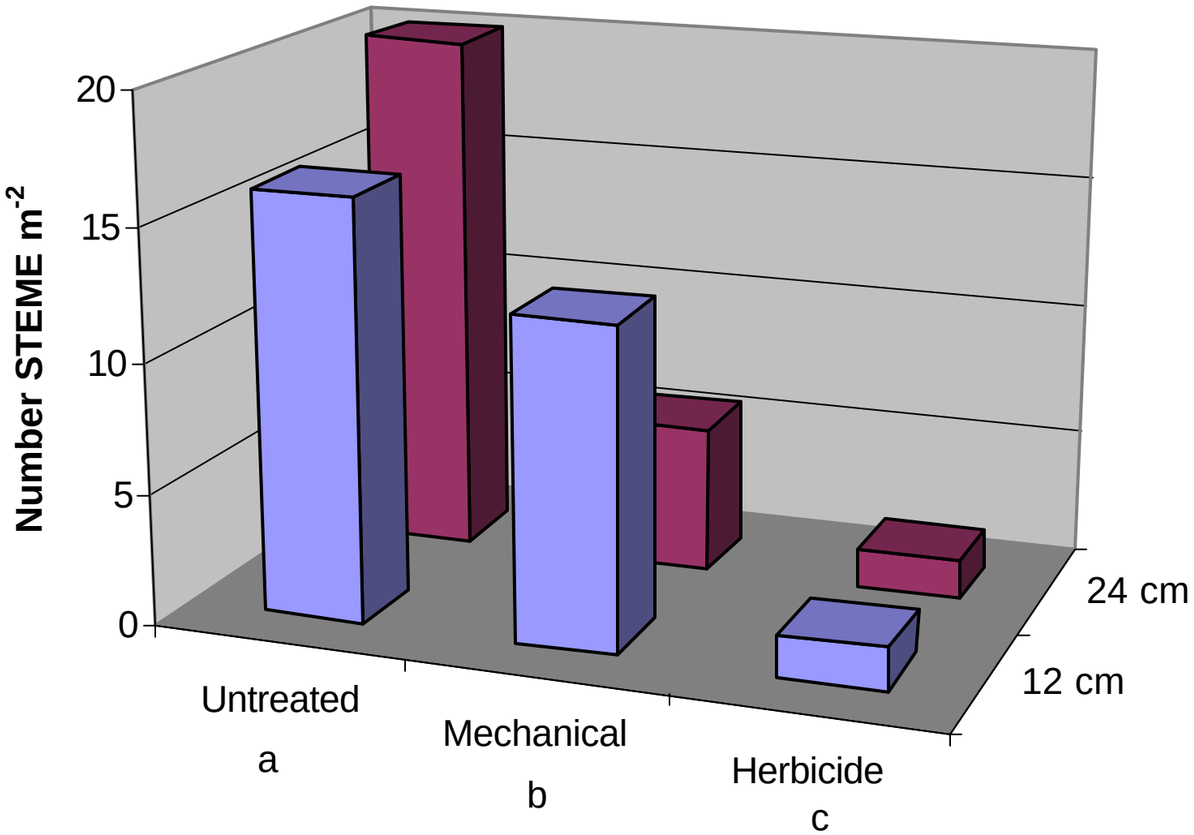
Weed biomass by different sowing strategies at Foulum



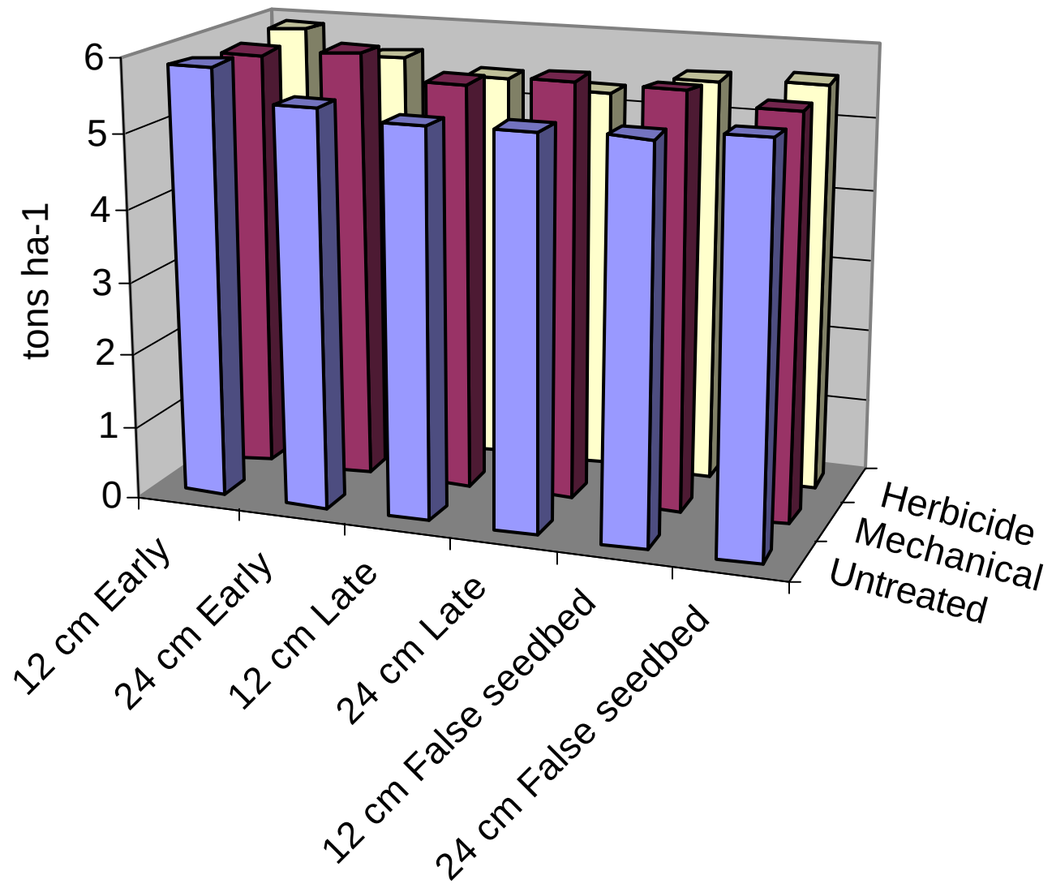
Biomass of weeds by different weed control and sowing strategies, Foulum



Number of chickweed with different weed control at two row distances, Foulum



Yield of winter wheat in the experiment at Foulum



Discussion

- Row distance:
  - at larger row distance without or with low intensity mechanical weed control, there may in some situations be more weeds
  - this may lead to lower yields
  - at larger row distance, row hoeing is more effective at controlling weeds than harrowing
  - this may increase yields

Discussion

- Sowing strategy:
  - generally there are most weeds at the early sowing time and least at the late, false seedbed being intermediate
  - the yield tends to be largest at the early sowing time, especially with effective weed control (herbicide)

Discussion

- At high weed pressure, with erect weeds present, a combination of late sowing, large row distance and intensive mechanical weed control (a combination of harrowing and hoeing) should be recommended
- At low weed pressure, without erect weeds, early sowing, normal row distance and weed harrowing might be sufficient to enhance crop competition and control weeds

Discussion

- False seedbed in combination with intensive weed control may be a way to reduce the soil seed reserve