

# Nitrogen management in winter barley

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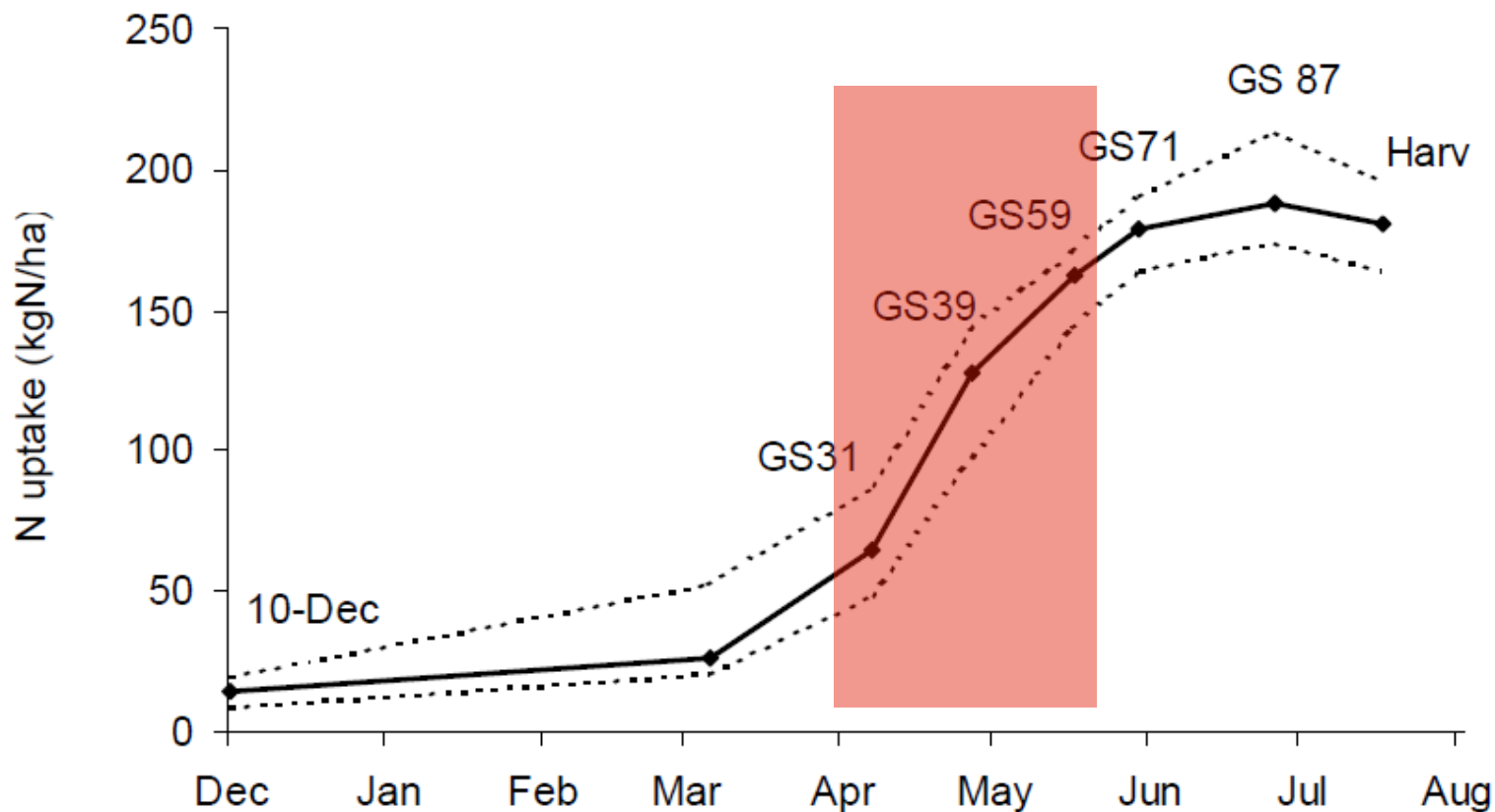
# Timing of first N on winter barley

- Advice
  - First N at late tillering - GS 30
  - Typically around mid-March
  - Typically 25-30% of total applied in first split
- Current advice based on research from 70's and 80's
- Recent work in UK suggests
  - Earlier timing
  - At least 50% of total in first split
- French work suggests benefit to delaying first N to just before GS30 (15-20 days later than normal )
- Have things changed in Ireland?

## When does winter barley need N

- Yield in barley closely related to ear number
- Ear number a function of tiller production and survival
- Nitrogen important for tiller survival in winter barley
- N requirement of any crop low before stem extension
- N requirement closely related to leaf area production
- High early N applications must remain in soil for extended period
- Research indicates that applying near to time of uptake improves efficiency

## Pattern of N uptake in winter barley



Source: ADHB

## Experiments

- 3 timings of first N
    - Late Feb/early March - tillering
    - Mid March - tillering
    - Late March/early April - GS30/31
  - 3 proportions of total in first split
    - 30%
    - 50%
    - 70%
  - 2 vs 3 split strategy also investigated
- 2 splits  
180 kg N total applied  
Cassia  
Sown late Sept/early Oct  
2012-2016

# Timing

# Photo: mid March



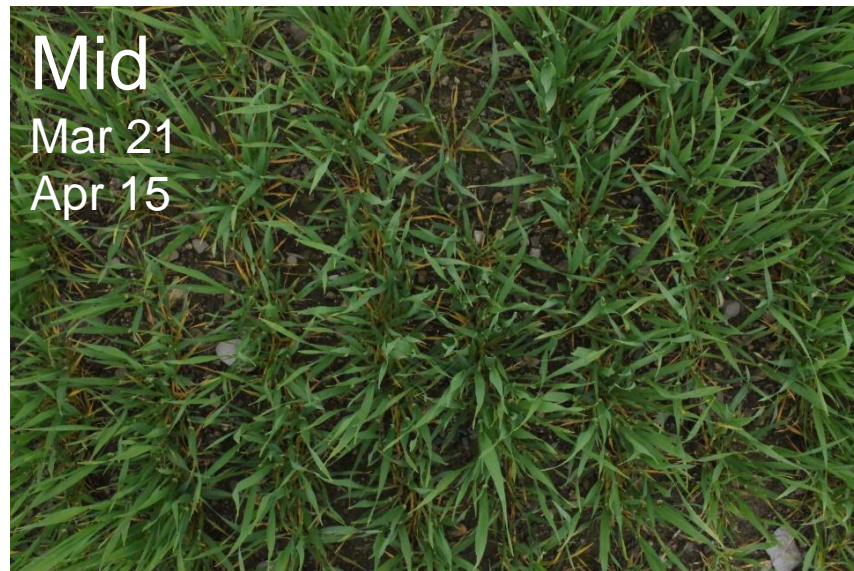




Early

Mar 4

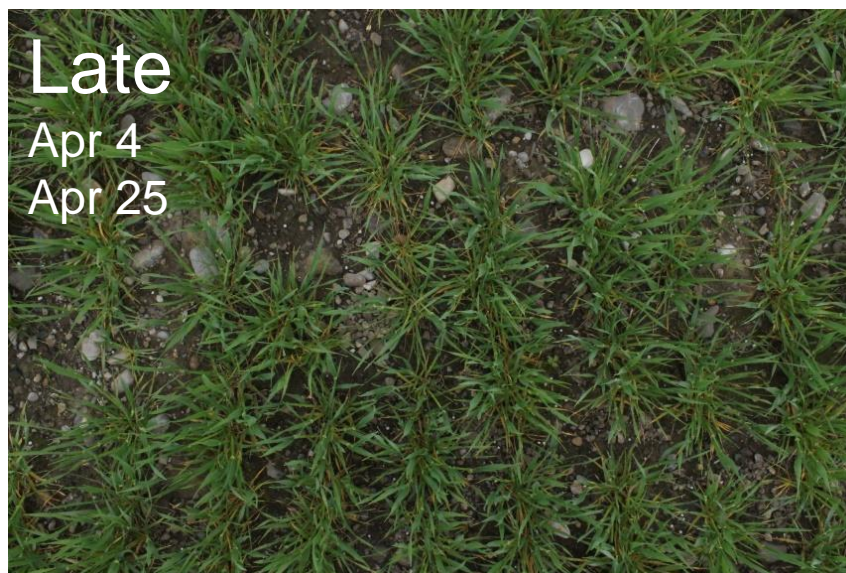
Apr 4



Mid

Mar 21

Apr 15



Late

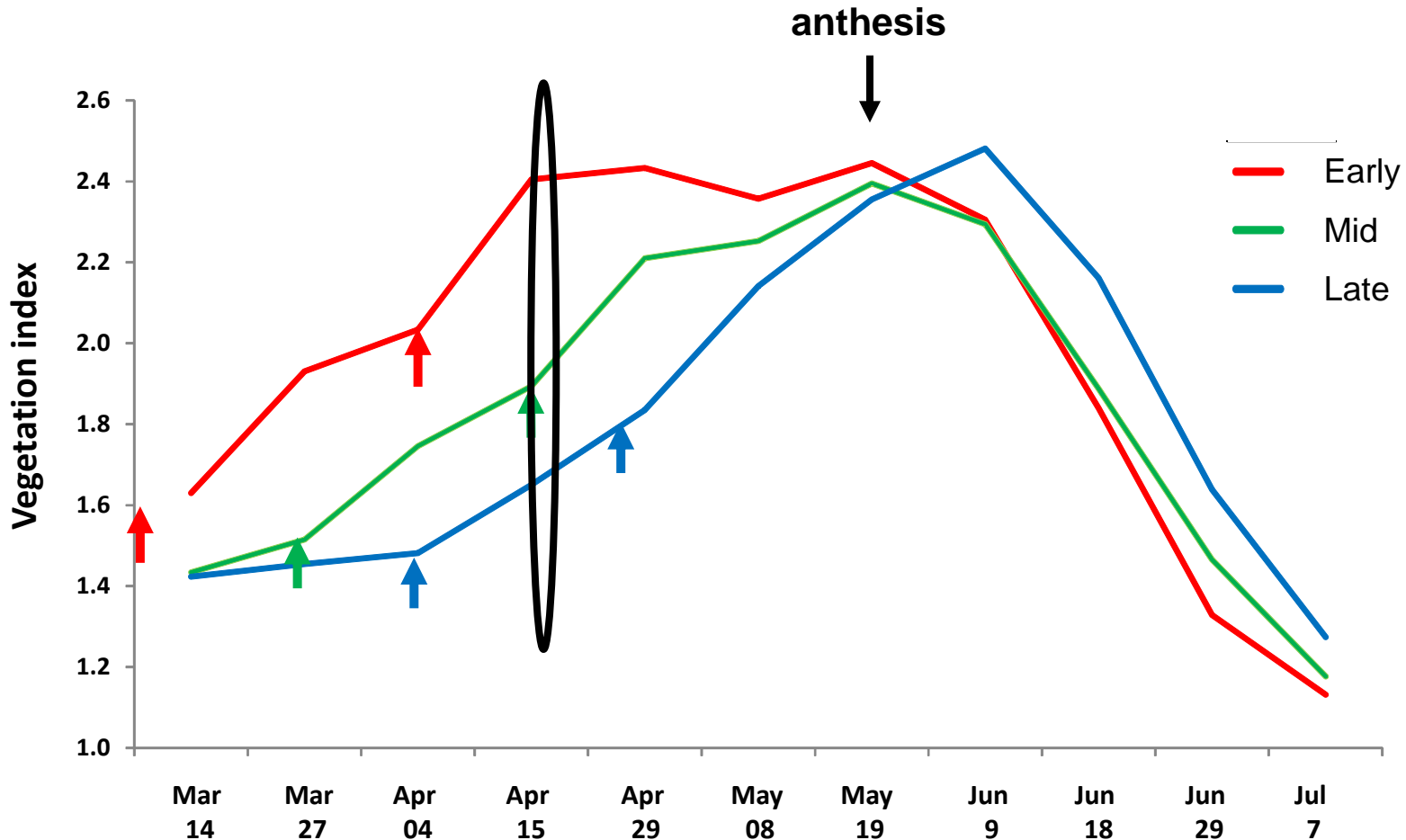
Apr 4

Apr 25

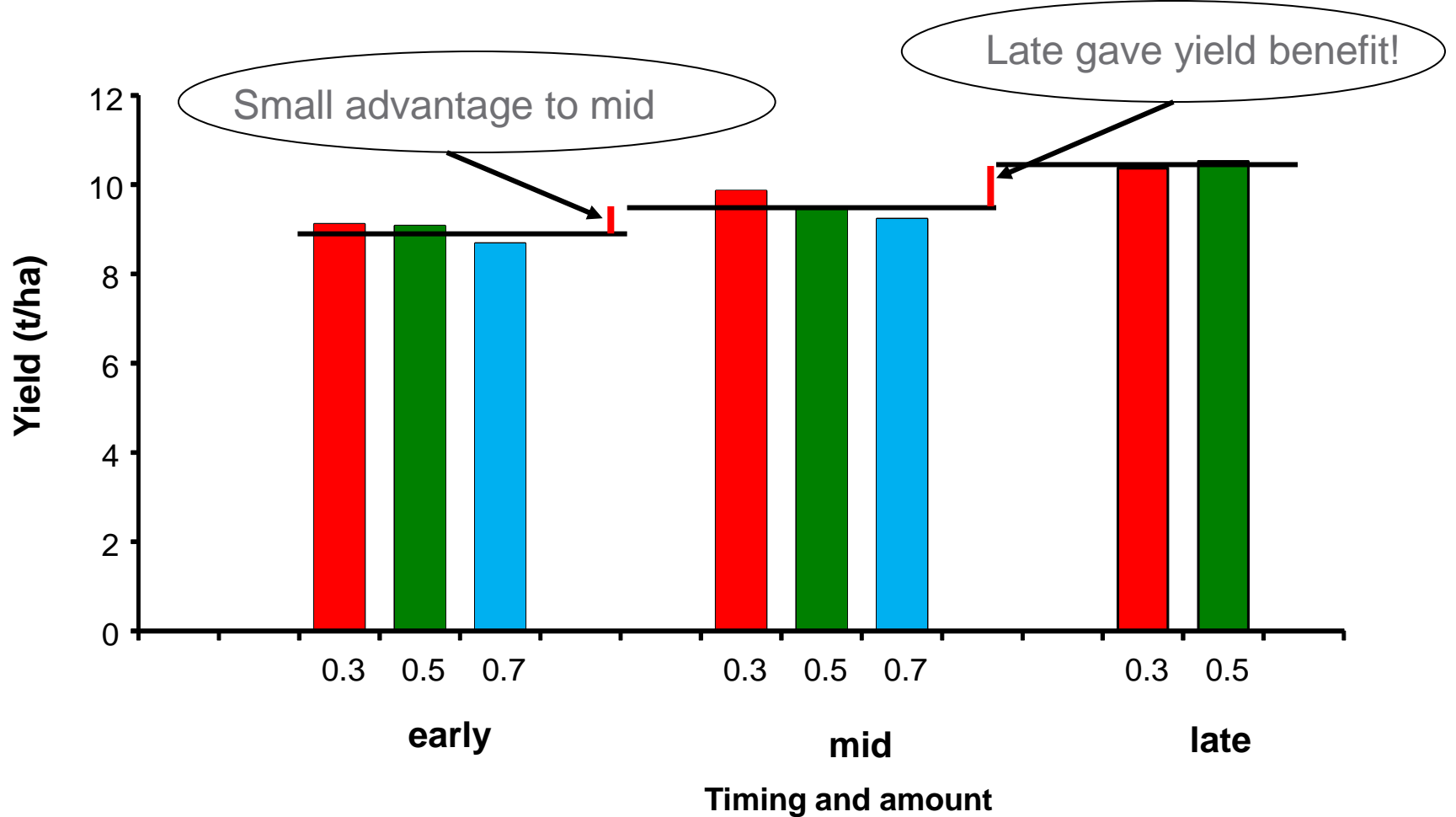
Photos  
Apr 16 GS 31



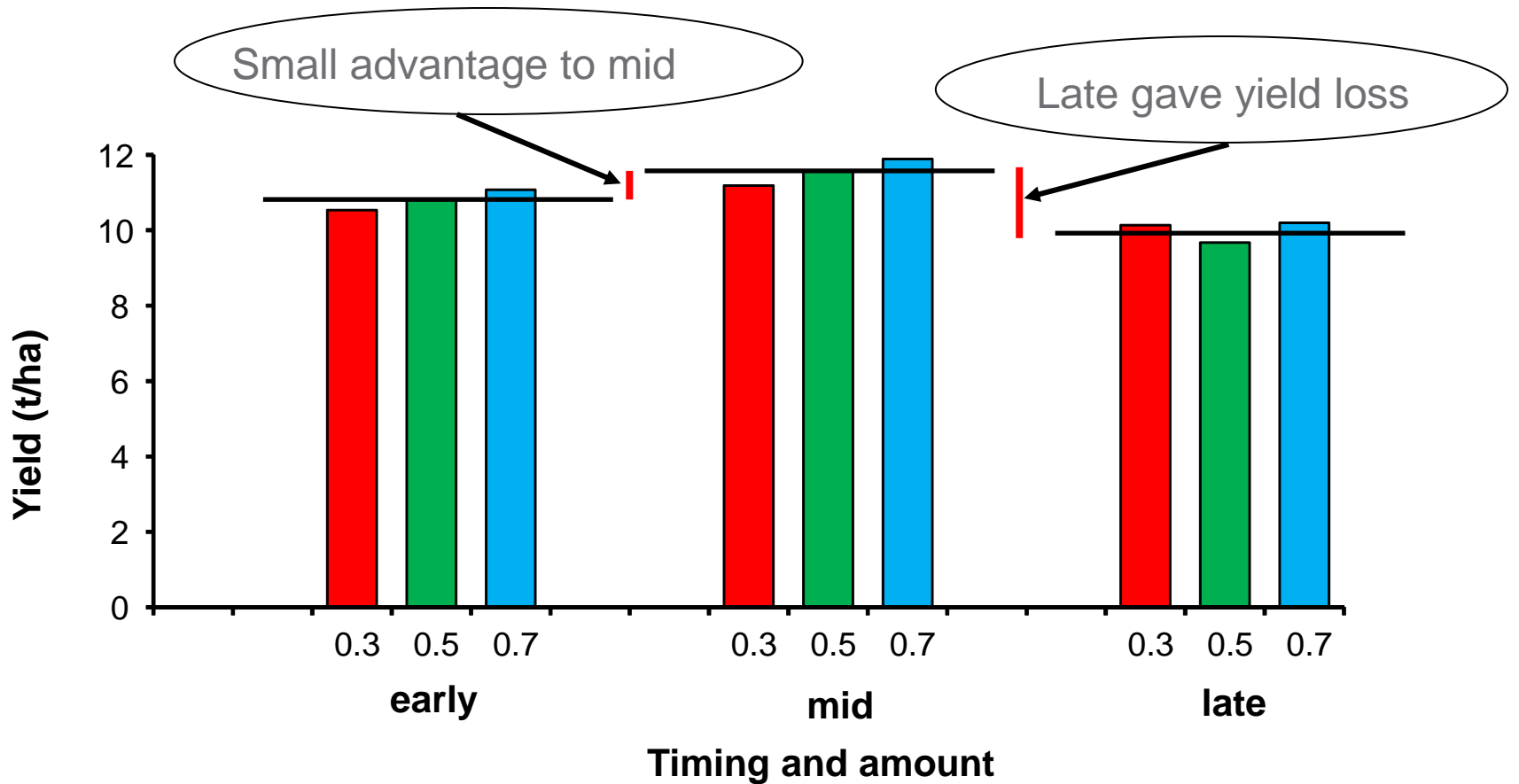
# Early N gave 'bigger/greener' crop in April with earlier senescence



## Early N not beneficial for yield



# Early N not beneficial for yield Yield penalty for late N



2015 medium soil

## Late first N – uneven maturity

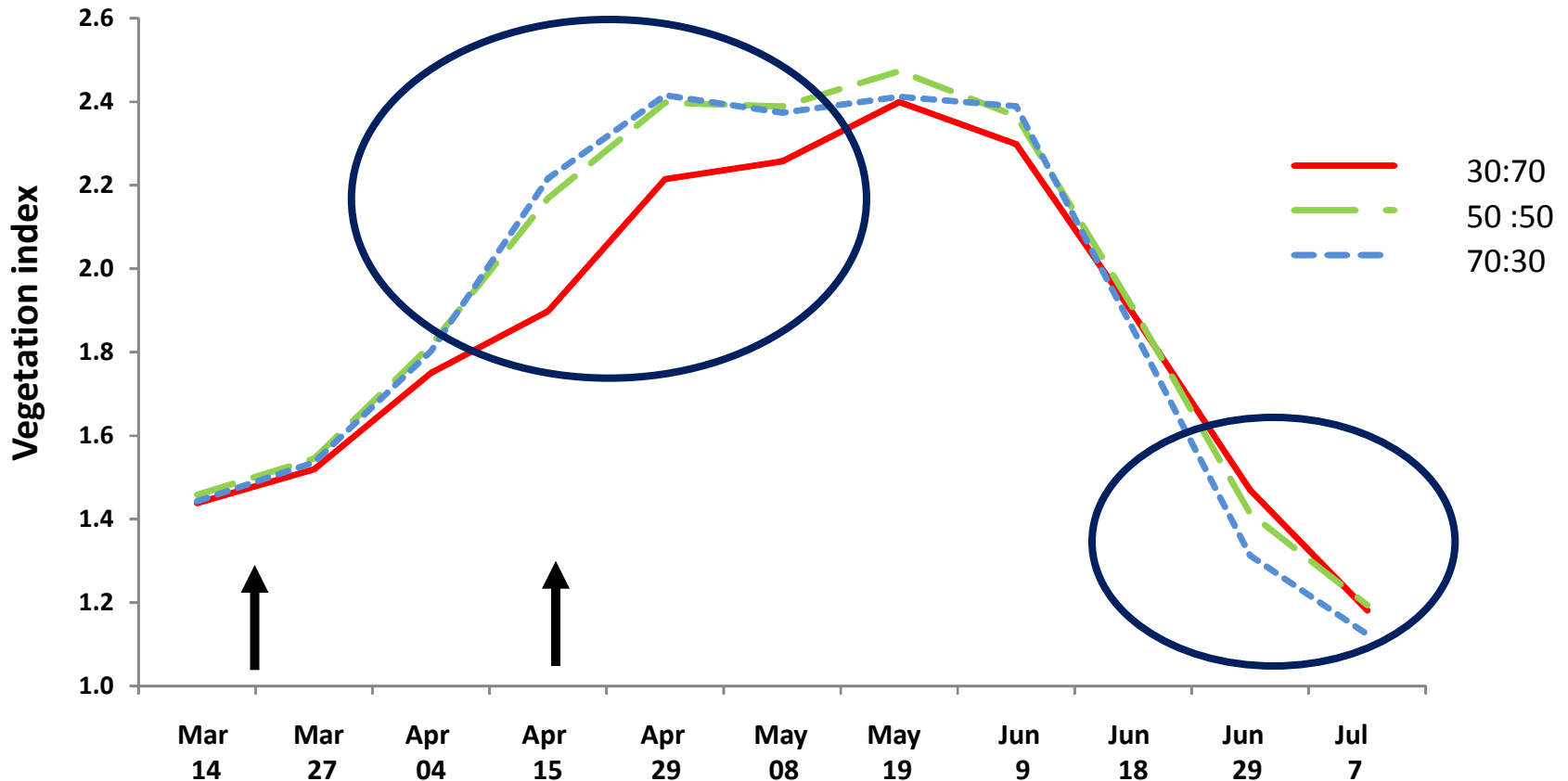




# Proportion in first split

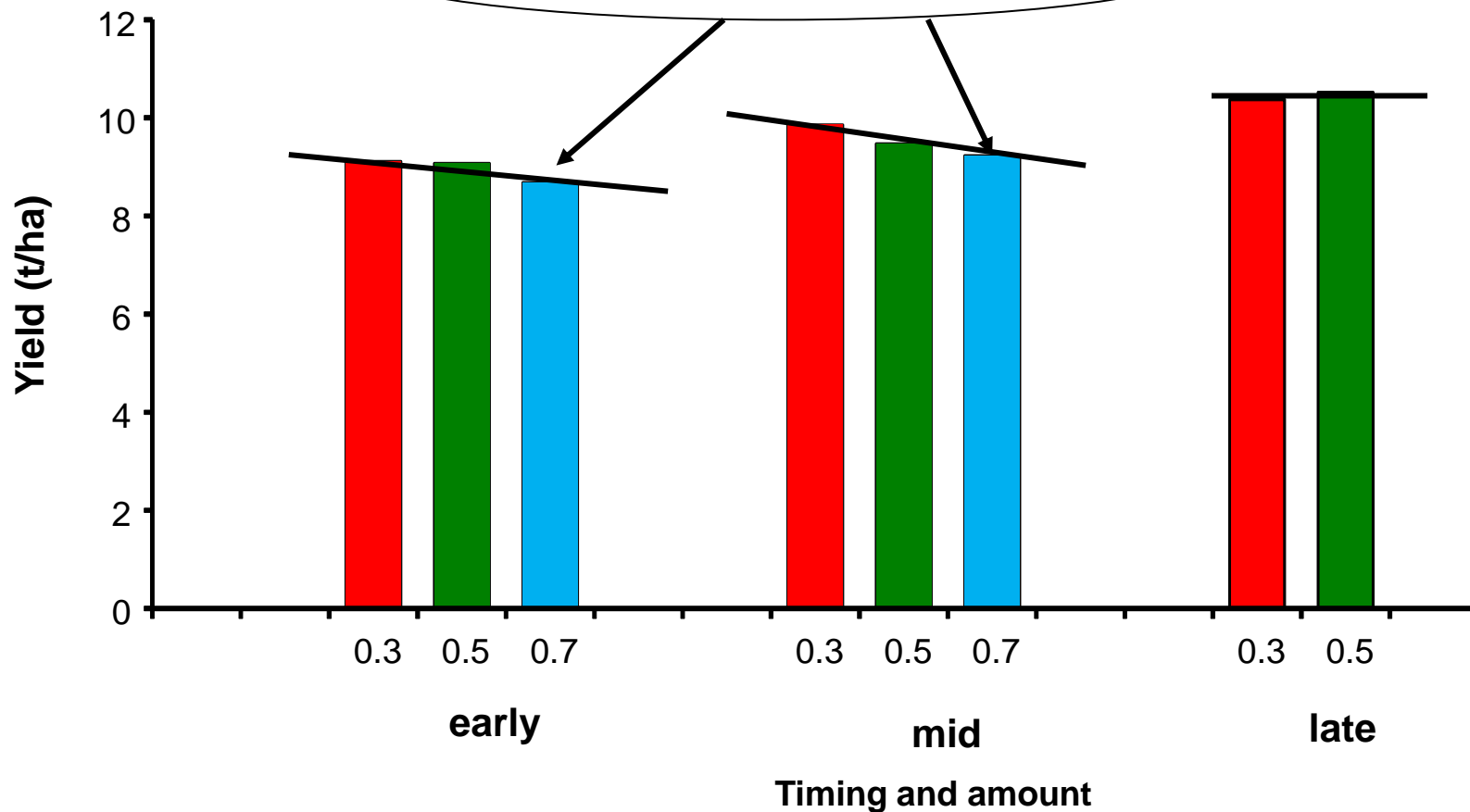


# High N in first split gave 'bigger/greener' crop in April with earlier senescence



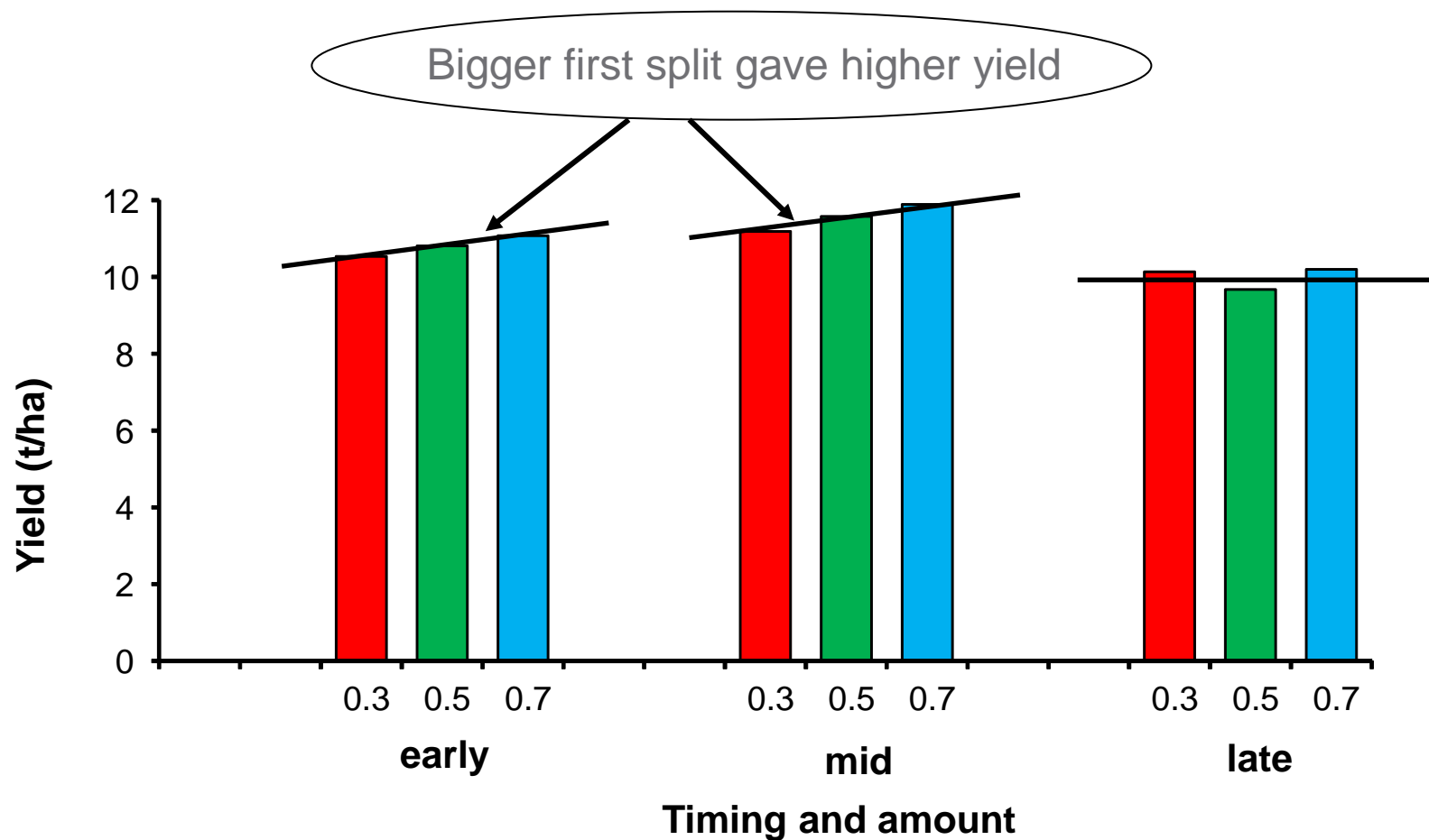
## Increased size of first split decreased yield

Bigger first split gave lower yield



2014 light soil

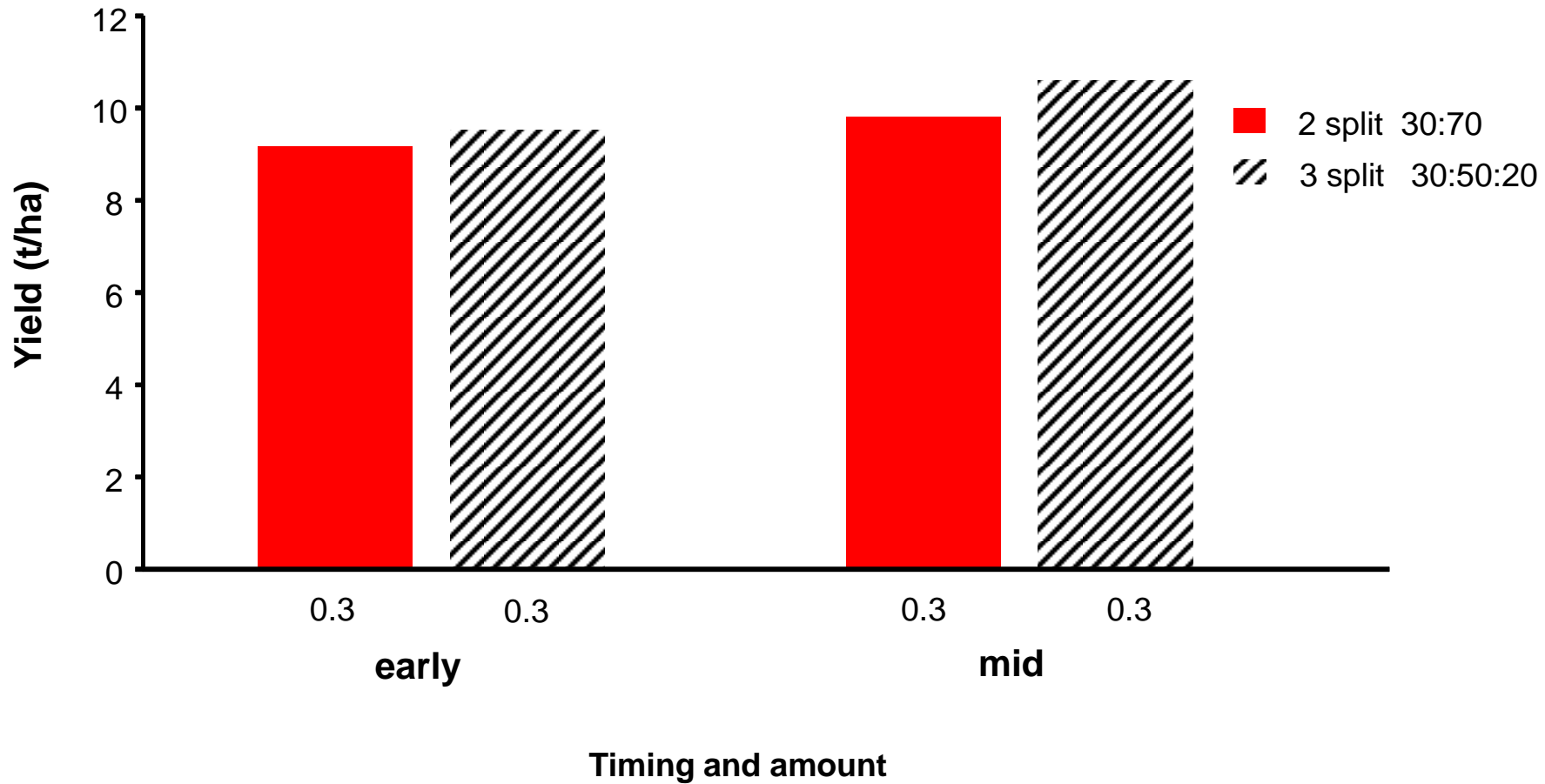
## Increased size of first split increased yield - exception



2015 medium soil

# 2 or 3 splits?

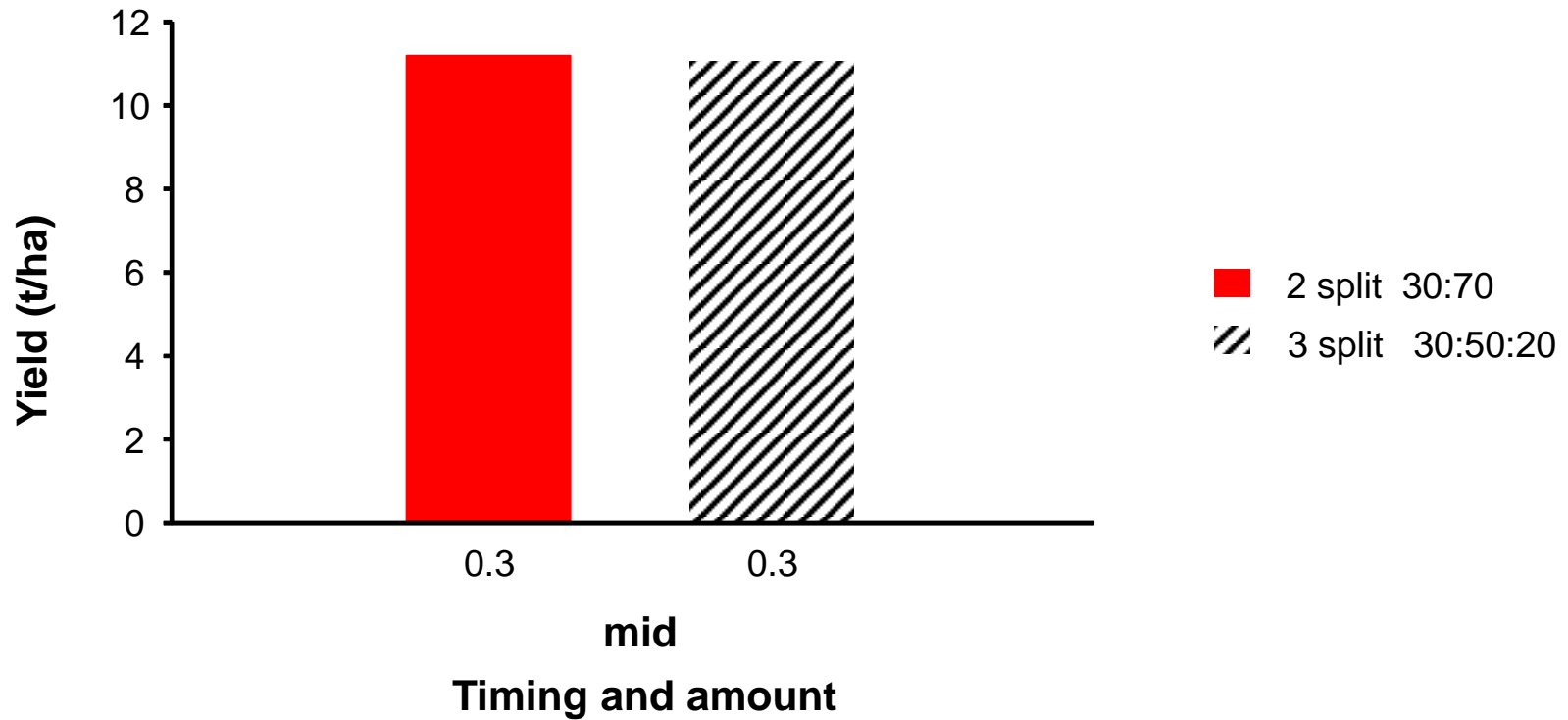
## Benefit of third split very small



2014 light soil



## No benefit of third split



2015 medium soil

## 2 or 3 splits

- No big yield advantage to third split
- 3<sup>rd</sup> split reduces risk of adverse weather after main split
- 3<sup>rd</sup> split may have a place in sensor guided N inputs

## Further investigations

Would early N be more beneficial in thin crops?

Would early N be more beneficial on six rows/hybrids?

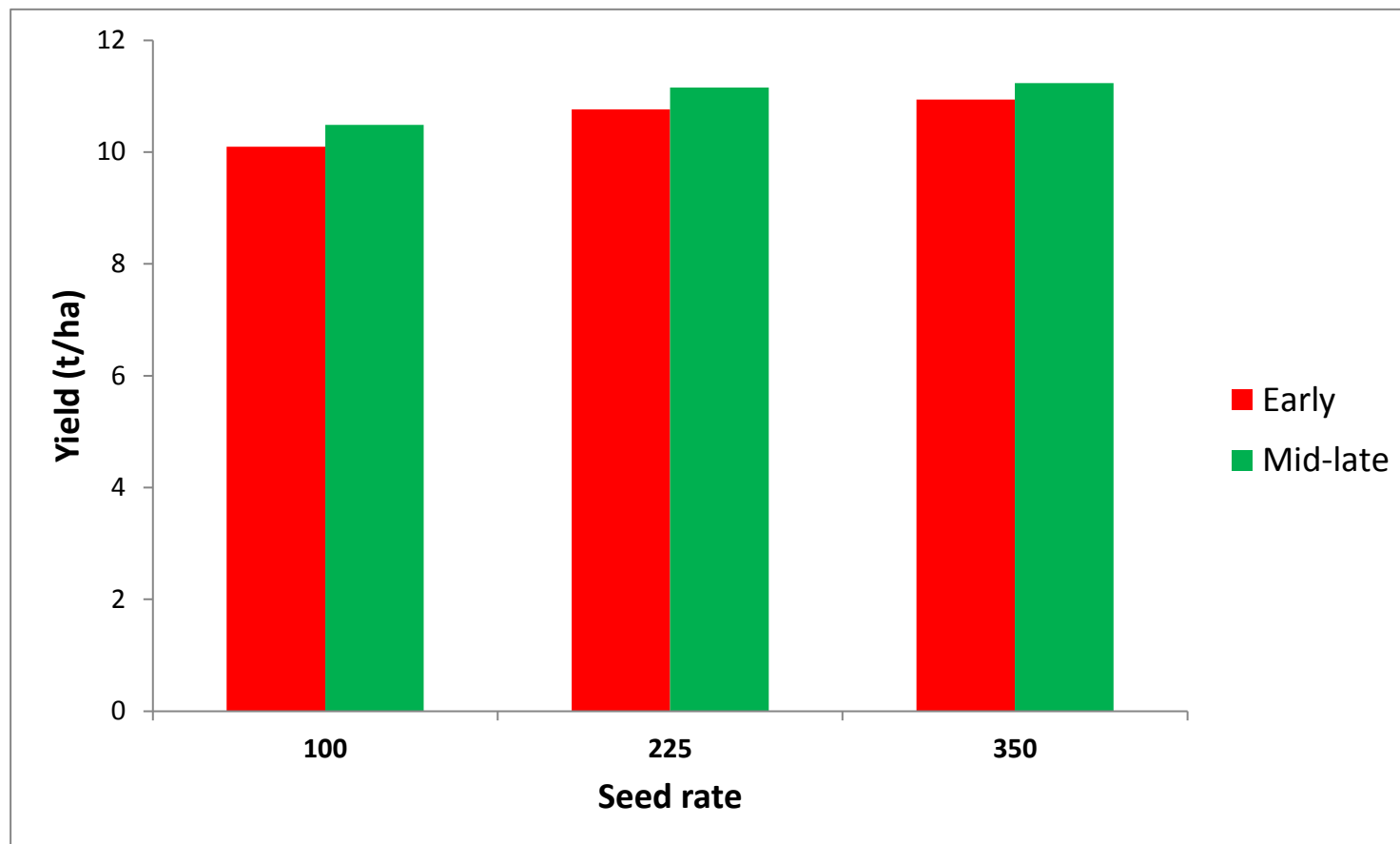
3 seed rates: 100, 225, 350 seeds/m<sup>2</sup>

2 varieties: Cassia, Volume

2 N timings : Early (late Feb/ early March)  
Mid-late (late March)

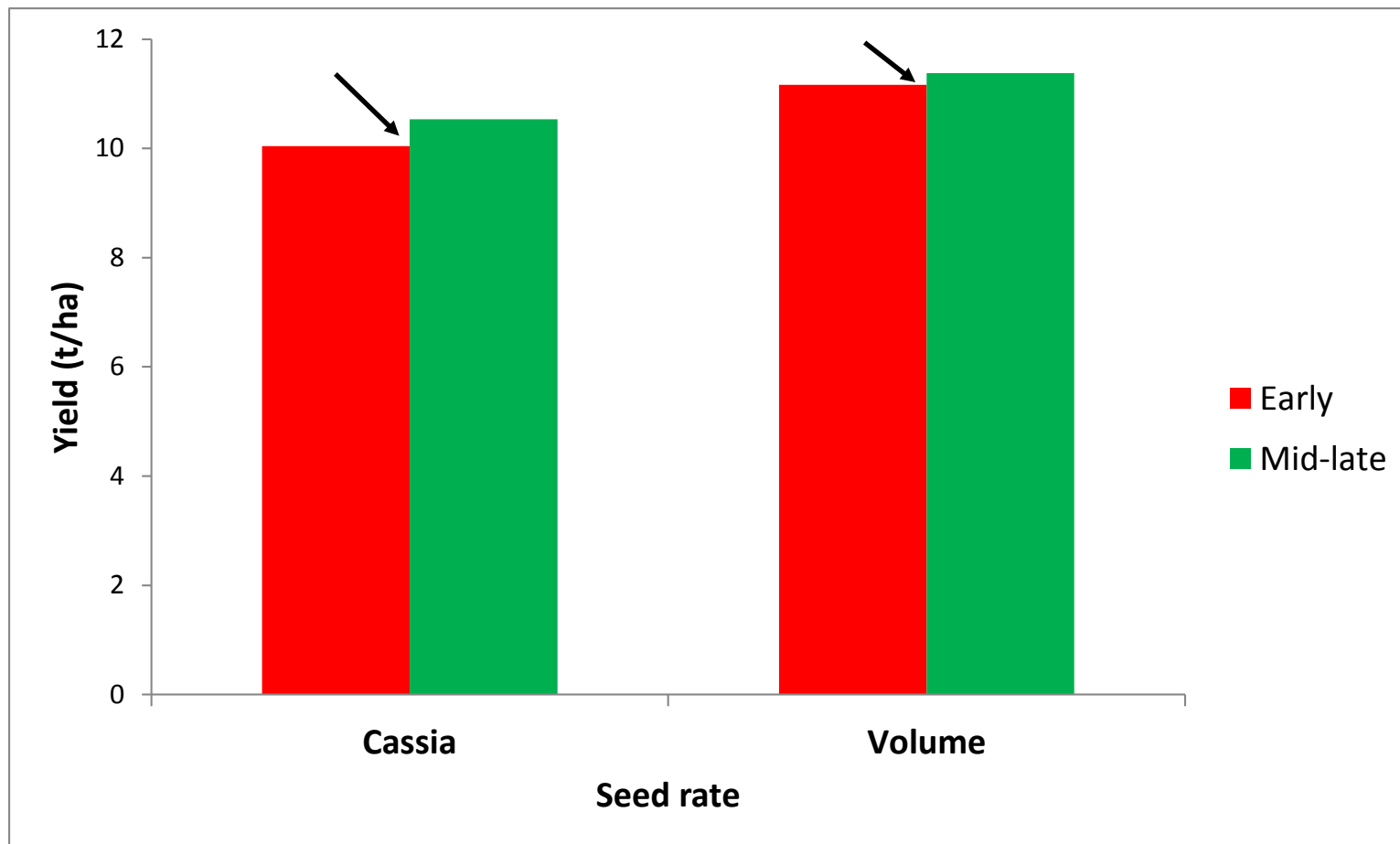
3 seasons 2014, 2015, 2016

## Earlier N not beneficial at any seed rate



Averaged over 2 varieties and 3 years

## Small differences between varieties in response to N timing



Averaged over 3 seed rates and 3 years



## Conclusions

- No yield advantage to earlier N but generally no big disadvantage either
  - Growers don't have to apply early if soil conditions are unsuitable
- Risk of yield reduction as proportion of total in first split increased
  - No advantage to more than about 30% of total
- Earlier N was not beneficial for yield at low seed rates
  - Possibility that 'thinned out' crops may be different
- Only small yield differences between variety types in terms of N timing
- Hectolitre weight largely unaffected by N timing
- Limited yield benefit of third split – reduces risk of loss, useful for precision N

## Conclusions

- Where soil P is adequate or P has already been applied
  - Apply first N (just) before GS 30
  - Apply max of approx. 30% of total in first split
  - Third split often not beneficial but can reduce risk of loss
- Where soil P is low and P is being applied with N
  - Apply as early as ground conditions allow to ensure early application of P