



Monitoring of the UK's 2015/16 neonicotinoid derogation for oilseed rape

Dr Sacha White, Senior research entomologist, ADAS

www.adas.uk



Bayer CropScience

syngenta®



Background

- 24 May 2013: Restriction on the use of three neonicotinoids (NNI) adopted by the European Commission.
- Applied to clothianidin, thiamethoxam and imidacloprid on bee attractive plants and cereals
- Autumn 2014: First WOSR for which NNI seed treatments are unavailable. In 2011 and 2013 NNI seed treatments had been used on 98% and 91% of WOSR respectively².
- Winter 2014: Crop losses due to adult CSFB feeding estimated at 5% of national crop (>31,000 ha)¹.
- Spring 2015: NFU apply for a derogation for the use of NNI seed treatments in WOSR.
- 24 July 2015: CRD grant emergency authorisations for the use of Cruiser OSR (thiamethoxam) and Modesto (clothianidin).

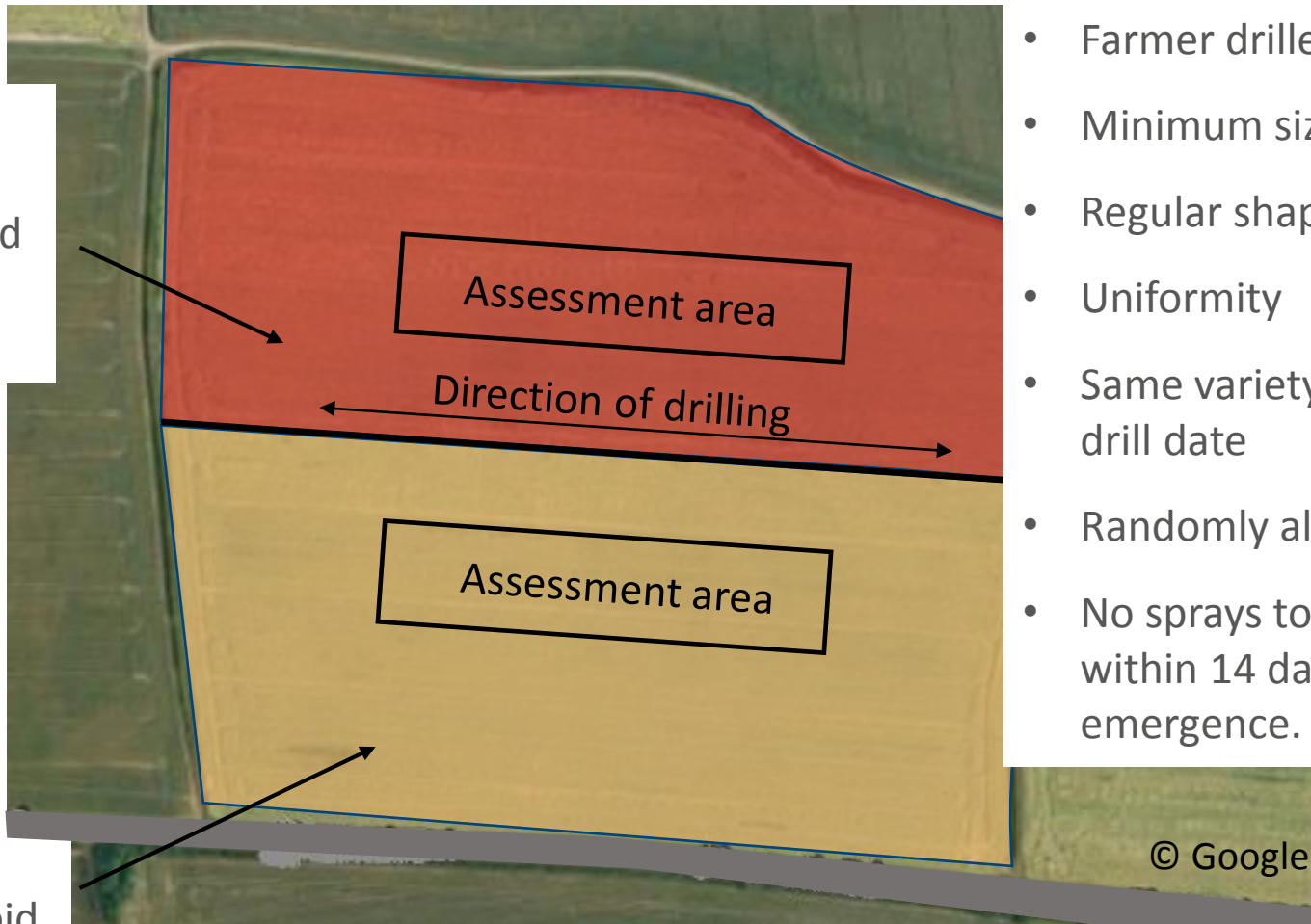
¹Nicholls, 2015; ²Dewar, 2016.

Emergency authorisations

- Modesto and Cruiser OSR to be used for approx. 5% of national crop (31,000 ha).
- Focussed on four high risk counties in East of England (Bedfordshire, Cambridgeshire, Hertfordshire and Suffolk).
- A condition of the approval was “to generate robust, detailed data on both treated and untreated crops” relating to “adult and larval numbers, crop establishment/damage and effects on crop yields, resistance occurrence and management”.
- ADAS asked to design and manage the study undertaken to fulfil this requirement.

Study design

Drilled with non-neonicotinoid treated seed (UTC)



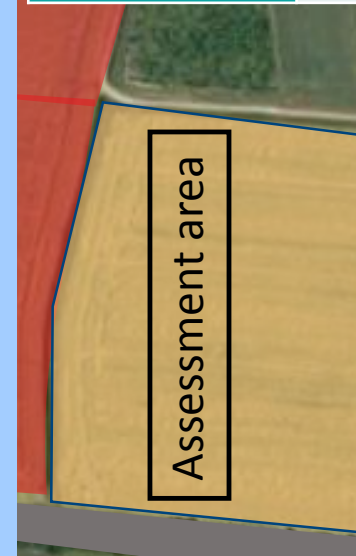
Drilled with neonicotinoid treated seed (NNI)

- Farmer drilled
- Minimum size
- Regular shape
- Uniformity
- Same variety and drill date
- Randomly allocated
- No sprays to NNI within 14 days of emergence.

Study design



| Type | Number |
|--------------|-----------|
| Split | 13 |
| Strip | 26 |
| Paired | 9 |
| Total | 48 |



© Google



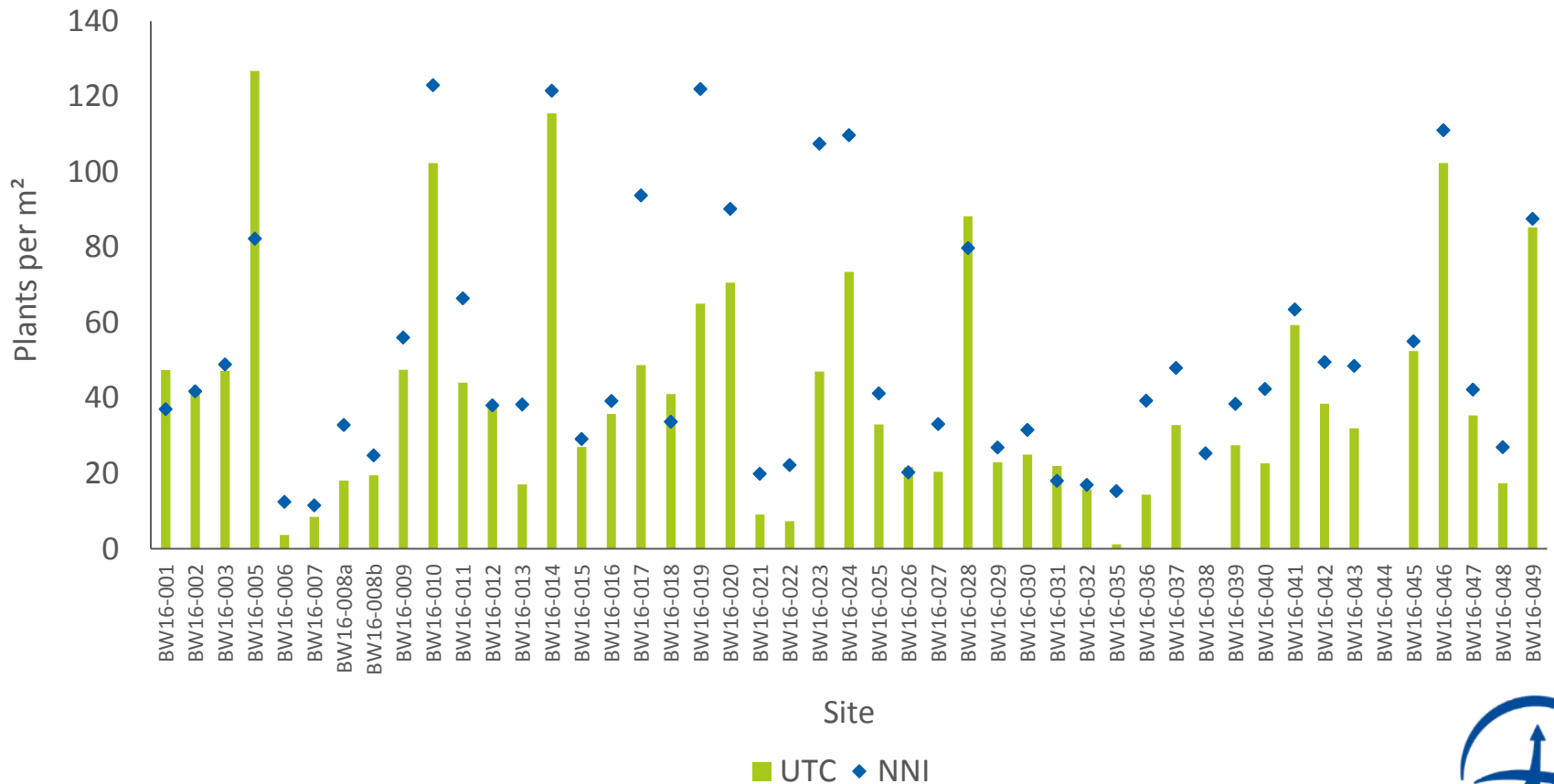
Assessments

- Plant populations
 - Foliar damage
 - Adult CSFB using yellow water traps
 - Larval numbers and damage
 - Yield at harvest
 - CSFB resistance
 - Cross-site analysis included a co-factor analysis to account for between site variation.
- Approx. cotyledon and 3-4 leaf stage



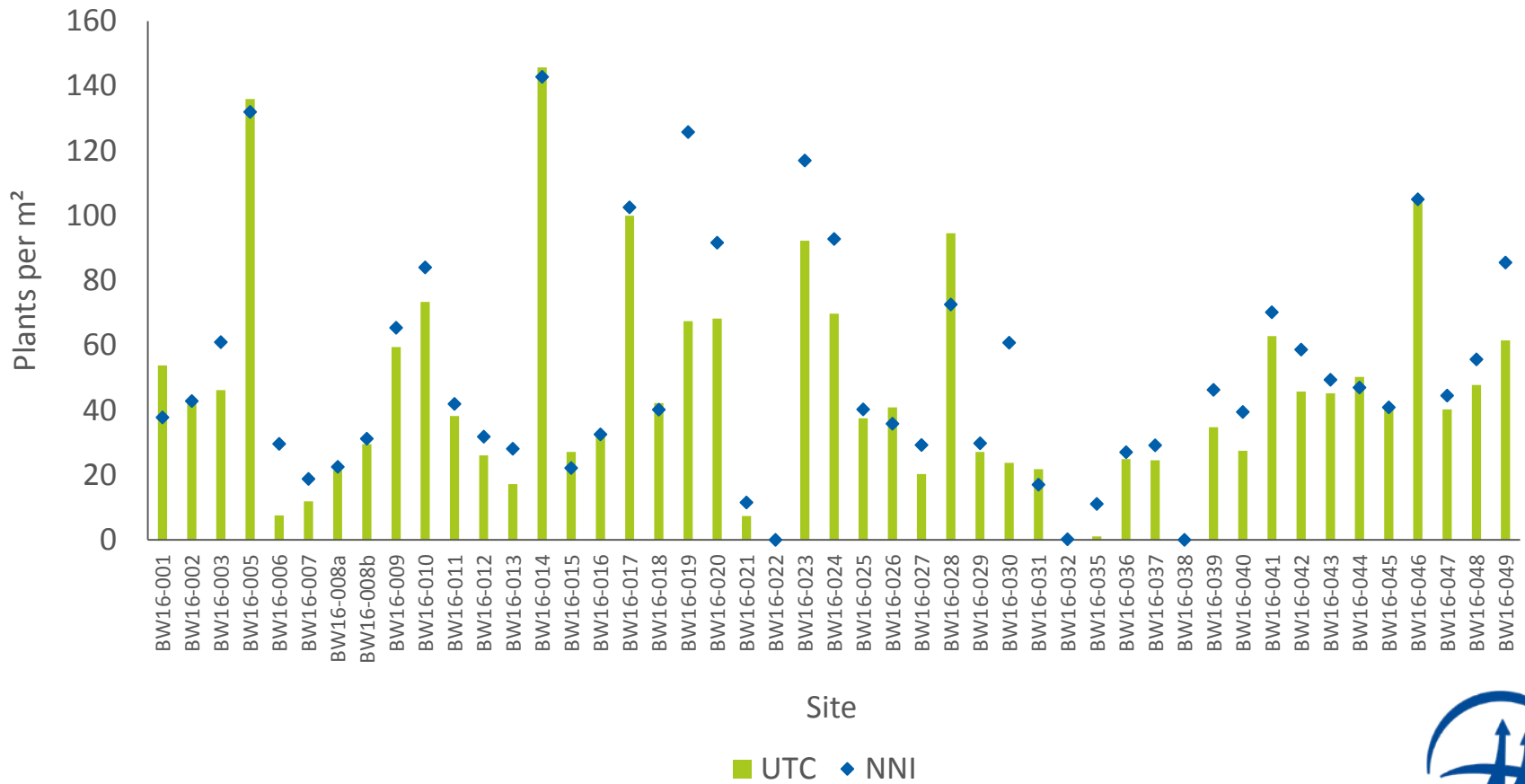
Plant populations (cotyledon – two leaf stage)

- Cross-site means: NNI = 51.4 per m². UTC = 40.7 per m².
- Significant increase in NNI (P < 0.001).



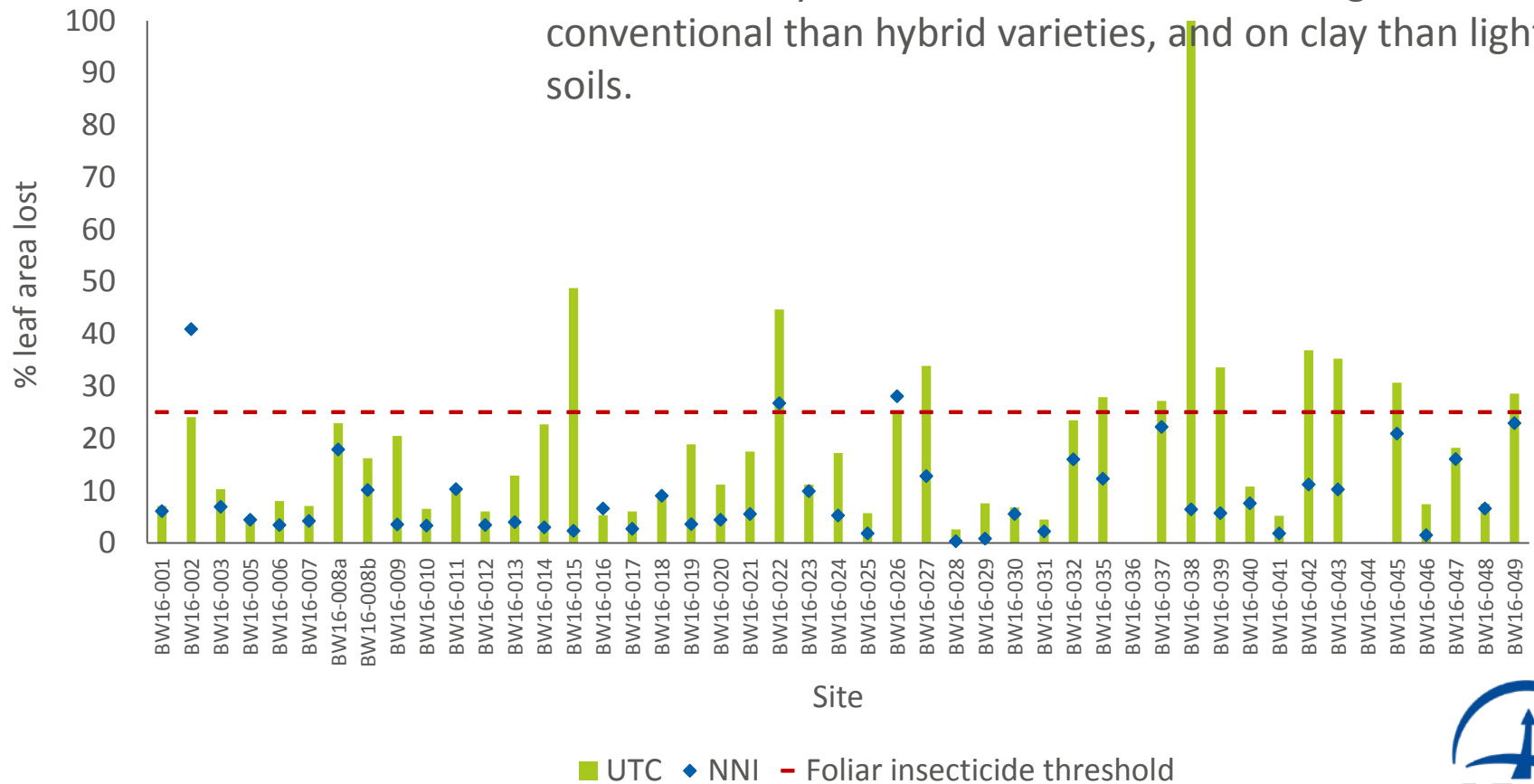
Plant populations (three – four leaf stage)

- Cross-site means: NNI = 51.1 per m². UTC = 44.6 per m²
- Significant increase in NNI (P = 0.001).



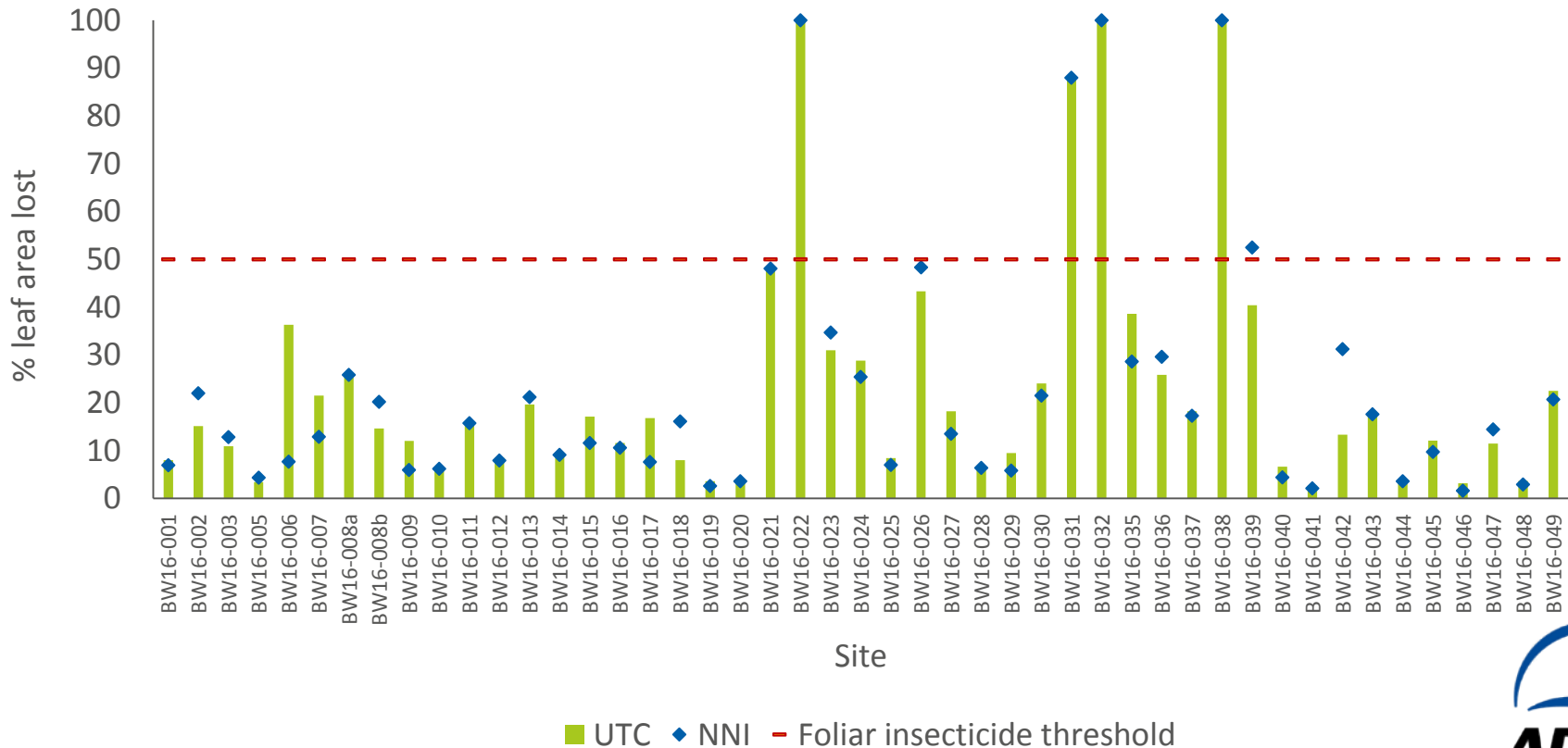
Foliar damage (cotyledon – two leaf stage)

- Cross-site means: NNI damage = 9%. UTC damage = 19%.
- Significant % reduction in leaf area loss in NNI ($P < 0.001$).
- Co-factor analysis: Reduction in leaf area lost greater in conventional than hybrid varieties, and on clay than lighter soils.



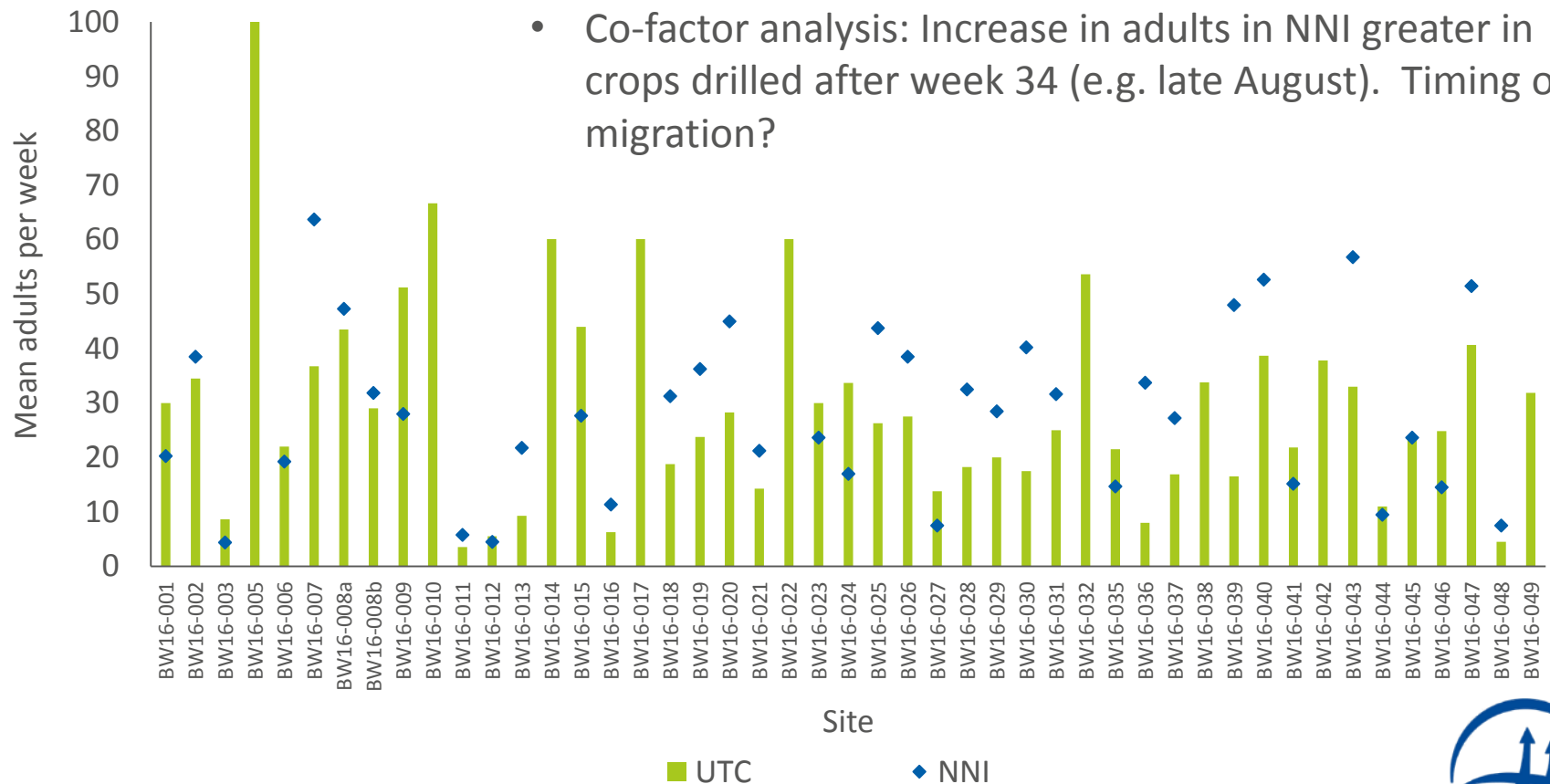
Foliar damage (three – four leaf stage)

- Cross-site means: NNI damage = 23%. UTC damage = 23%.
- No significant difference between treatments.
- Co-factor analysis: Reduction in leaf area lost greater where >1 foliar insecticide applied.

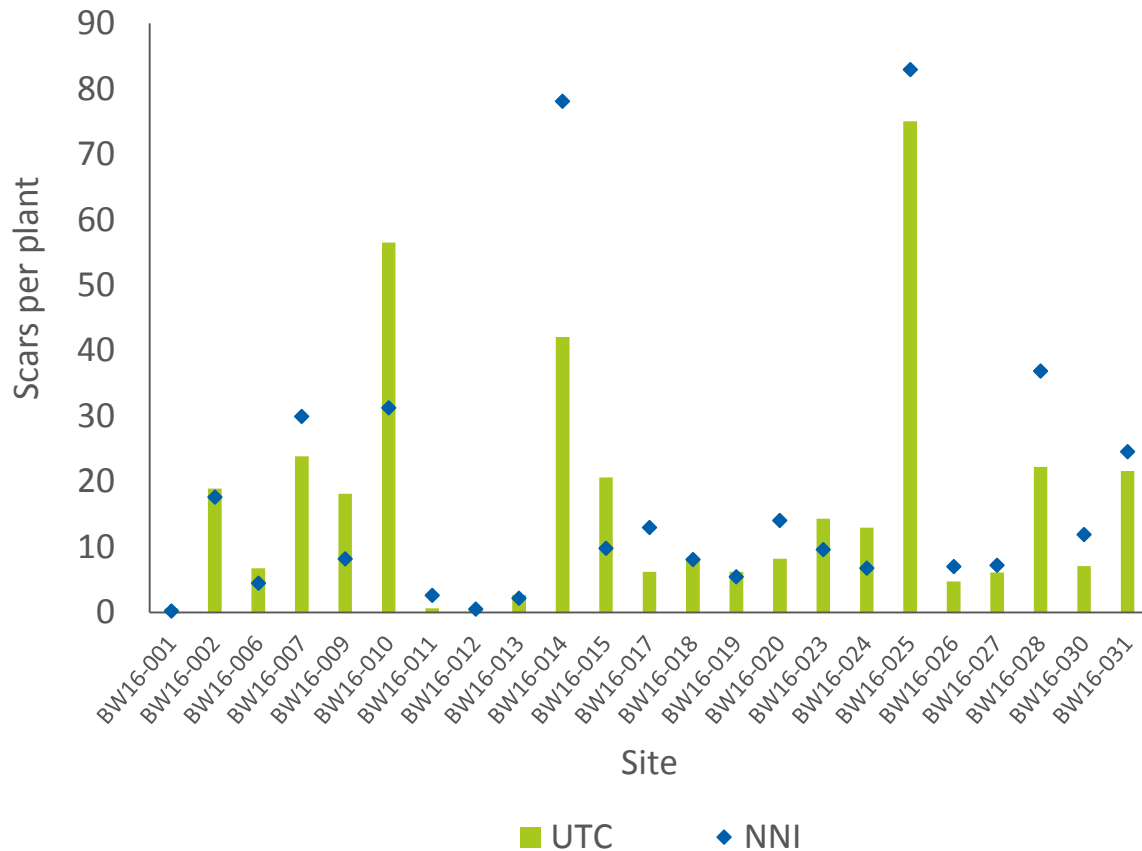


Adult CSFB populations

- Cross-site means: NNI = 40 per week. UTC = 30 per week.
- Significant % increase in adults in NNI ($P < 0.001$). NNI crops more attractive?
- Co-factor analysis: Increase in adults in NNI greater in crops drilled after week 34 (e.g. late August). Timing of migration?

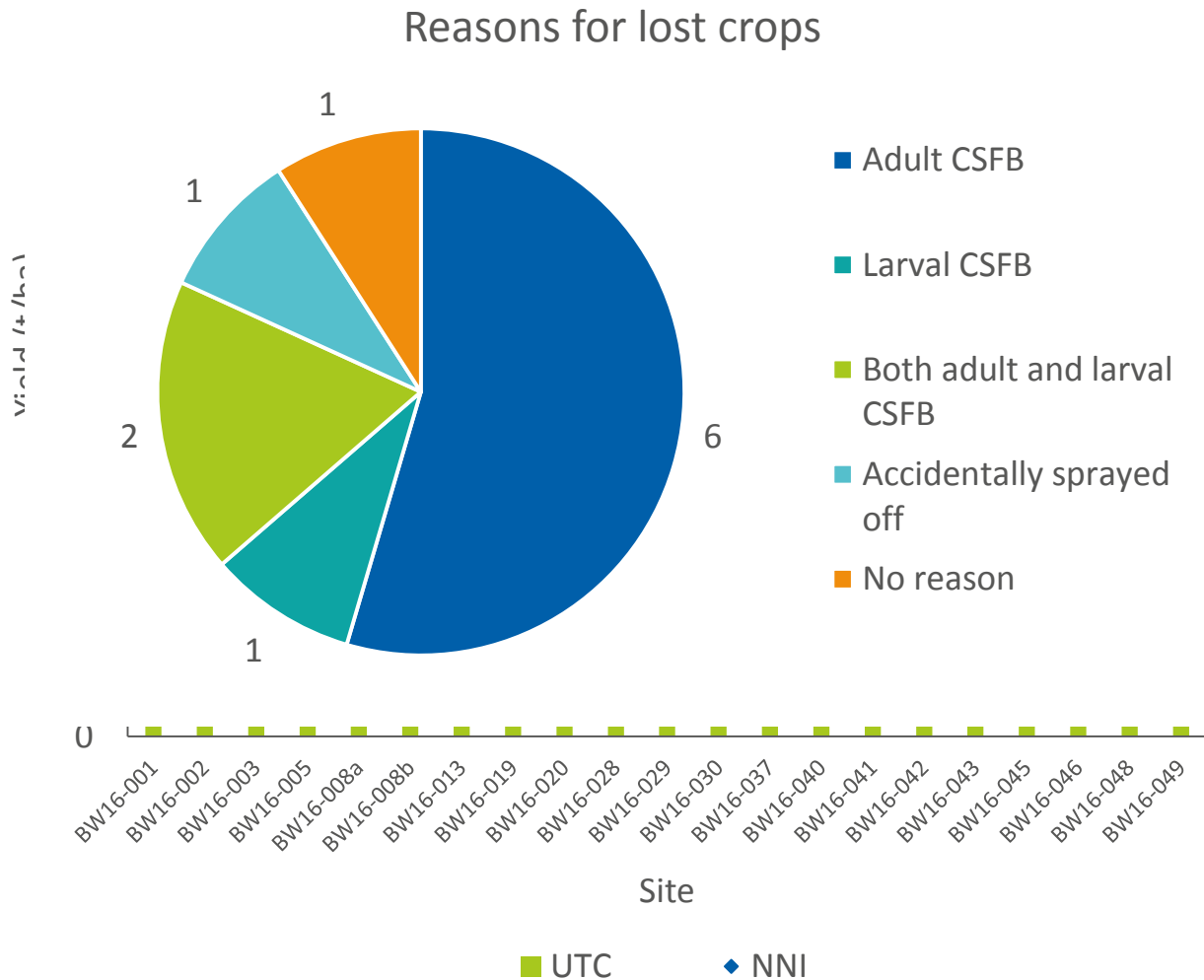


Larval CSFB damage and numbers



- NNI mean = 18 per plant.
- UTC mean = 17 per plant.
- Significant difference between NNI and UTC (P = 0.22).
- Consequence of more adults in NNI?

Yield at harvest

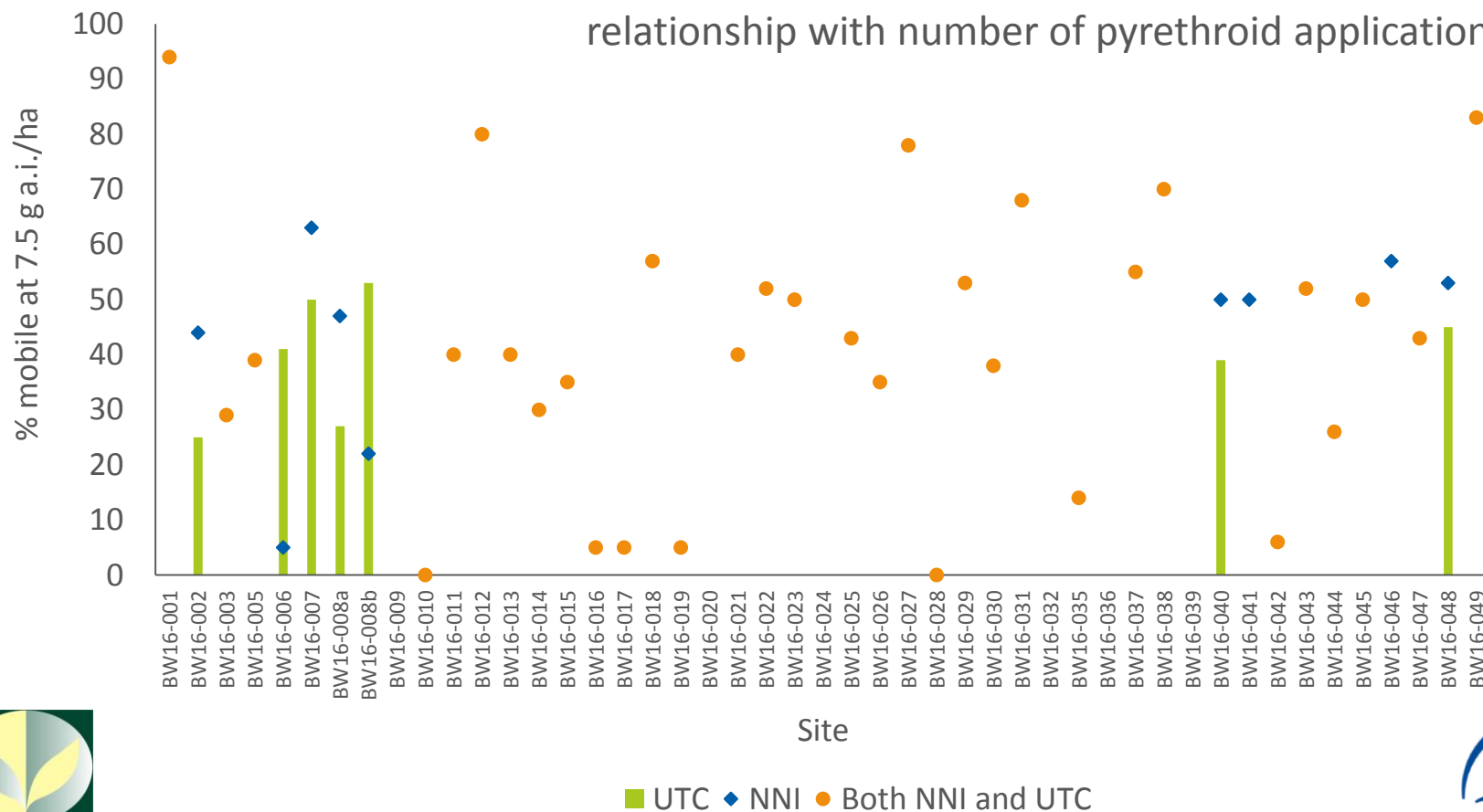


- NNI mean = 3.4 t/ha.
- UTC mean = 3.5 t/ha.
- No significant difference between treatments.
- No within site replication.
- Co-factor analysis: Yield reductions in NNI greater where migration occurred before cotyledon stage.
- Mean 2016 yield for E and SE England = 3.6 t/ha¹.
- 11 crops lost.

¹Defra, 2016

Pyrethroid resistance

- Resistance detected at 95% of sites.
- No significant difference between treatments or relationship with number of pyrethroid applications.



Conclusions

- Largest independent study of NNI seed treatment efficacy.
- Provided good protection against early CSFB damage.
- Significant increases in plant population and reductions in foliar damage.
- Protection during crop emergence. No thresholds and difficult to predict/monitor.
- No effect on yield.
- Unexpected increases in adult and larval numbers in NNI crops.
- Growers with highest CSFB pressure have highest incidence of pyrethroid resistance (though with some variation) so no effective control options.

Thank you for listening.

Thanks to:



Bayer CropScience

syngenta®

Alan Dewar (Dewar Crop Protection)

Chris Dyer (ADAS statistician)

ADAS technical staff

Host farmers

Steve Foster (Rothamsted Research)

