

**Ecofriendly synergists for insecticide formulations (EcoSyn):
Improvements in the efficacy of pyrethroids in controlling
pyrethroid-resistant pollen beetles, *Meligethes aeneus*, in
spring oilseed rape**

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Introduction

- The pollen beetle, *Meligethes aeneus*, has developed widespread metabolic resistance to most pyrethroid insecticides (with the exception of tau-fluvalinate). Field studies were set up in 2014 and 2015 to explore the possibility that use of synergists in conjunction with susceptible pyrethroids could help overcome this resistance in pollen beetles in oilseed rape.

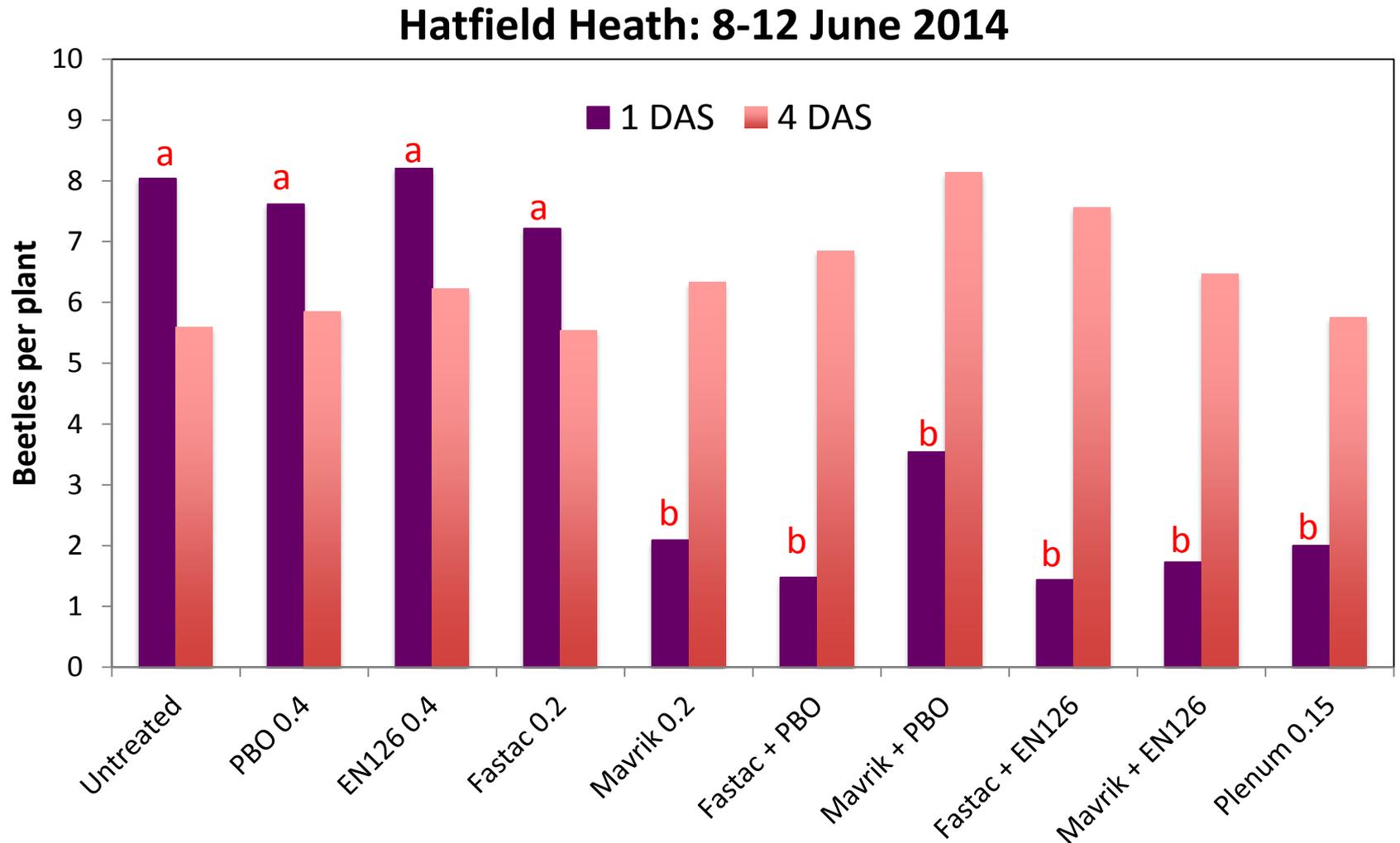
Materials and Methods

- Field trials were conducted in spring sown oilseed rape in 2014 and 2015 on a farm near Hatfield Heath, in Essex. Plots (6 x 6 m) were sprayed with treatments using a back pack sprayer delivering 200 L/ha through O2 nozzles at 2 bar pressure.
- Assessments of pollen beetle numbers were made 1, 3 and 6 days after application on 20 racemes (florets) per plot.
- In 2015 plots were harvested to determine effects of treatments on yield.

Results (2014)

- In 2014, there were 8 pollen beetles per raceme 1DAA.
- PBO (at 0.4 L/ha), a novel synergist EN126 (at 0.4 L/ha) and alpha-cypermethrin (applied as Fastac at 0.2 L/ha) had no effect on beetle numbers (Fig. 1).
- Tau-fluvalinate (applied as Mavrik at 0.2 L/ha and pymetrozine (applied as Plenum at 0.15 kg/ha) gave significant reductions (74-75%).
- The addition of PBO and EN126 to Fastac gave significant improvement in control, to the level of Plenum.
- 4 DAA the crop was fully flowering, resulting in rapid re-infestation of plots; there were no effects of any treatment on beetle numbers

Fig. 1 Effect of pyrethroids with or without synergists on pollen beetles in spring oilseed rape 2014

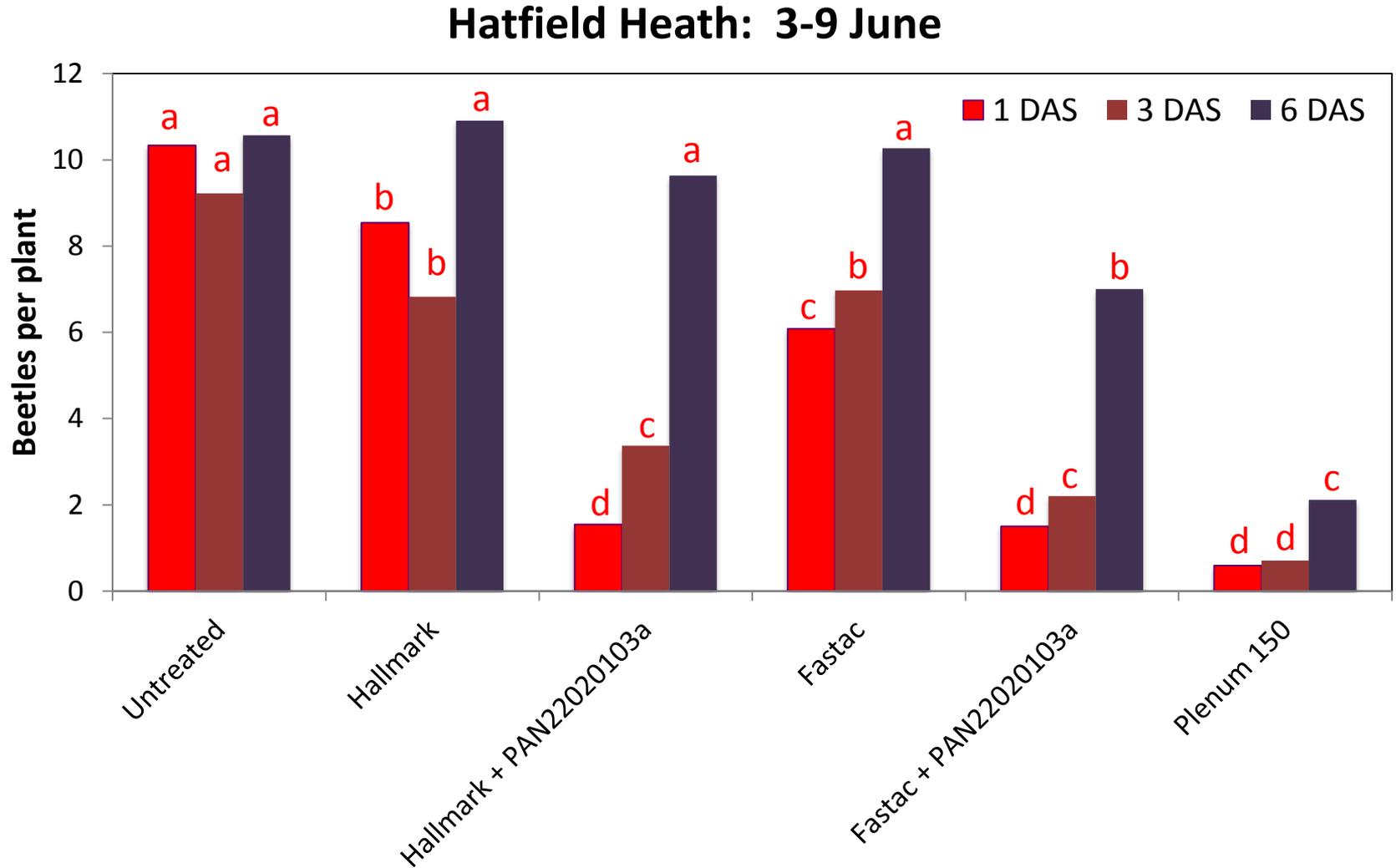


On 1 DAS, columns with different letters are significantly different from each other at $P < 0.05$
There were no significant differences 4 DAS

Results (2015)

- In 2015, there were 10 pollen beetles per raceme in untreated plots 1DAS.
- Lambda-cyhalothrin (applied as Hallmark Zeon at 0.075 L/ha) and alpha-cypermethrin (applied as Fastac at 0.2 L/ha) gave poor (17-41%) but significant control of pollen beetles 1 and 3 DAS, but not 6 DAS (Fig 2).
- The addition of synergist PAN22020103a to both pyrethroids improved control significantly 1 and 3 DAS, but only Fastac was enhanced 6 DAS.
- Pymetrozine (applied as Plenum at 0.15 kg/ha) excellent control (94-80%) throughout the assessment period.
- There was a substantial effect of the better treatments on the duration of flowering within the plots, and subsequent development of seed pods (Photo 1).
- This is likely to have had a significant effect on yield at harvest.

Fig. 2 Effect of pyrethroids with or without a synergist on pollen beetles in spring oilseed rape 2015



On the same date, columns with different letters are significantly different from each other at $P < 0.05$

Effects of pollen beetles on flowering of oilseed rape: pollen beetles feeding on oilseed rape buds



Effects of pollen beetles on flowering of oilseed rape: blind stalks on oilseed rape flower due to pollen beetle attack



Effects of pollen beetles on flowering of oilseed rape:
Hatfield Heath 2015

The yellow plots were best control of pollen beetles was recorded



Discussion

- Addition of synergists to the pyrethroids alpha-cypermethrin and lambda-cyhalothrin can overcome the resistance of pollen beetles to these insecticides.
- The persistence of the effect does not last long for this pest (<6 days), but it is long enough for the crop to produce a viable yield.