

# HAVE WILD OATS IN CANTERBURY BECOME RESISTANT TO HERBICIDES?



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## INTRODUCTION:

- Overseas, wild oat (*Avena fatua*) is known to have developed resistance to fenoxaprop-P-ethyl, and occasionally to haloxyfop and flamprop-M-isopropyl (Heap 2014)
- There have been rumours of resistance existing in Canterbury too
- The objective of this work was to determine if herbicide resistance does exist in New Zealand populations of wild oats.

## MATERIALS AND METHODS:

- Seeds of wild oat were collected from eight arable farms (either one or two populations per farm) in Canterbury from which possible resistance to either fenoxaprop-P-ethyl or haloxyfop had been reported
- Seeds were also obtained from two properties where no resistance was thought to exist
- Seeds from these 14 populations underwent dormancy-breaking techniques (overnight in GA<sub>3</sub> then 5°C for 4 days) then were germinated at 20°C and established individually in pots within a glasshouse in October 2013
- When seedlings were 4 weeks old (15 November 2013), they were sprayed with the recommended rate of fenoxaprop-P-ethyl (750 ml/ha Foxtrot + 1 L/ha Uptake Spray Oil), haloxyfop (500 ml/ha Ignite) or flamprop-M-isopropyl (4 L/ha Stratos)
- Another treatment involved germinating seeds of one population 2 weeks earlier than the others, so they were sprayed as 6-week-old seedlings with fenoxaprop-P-ethyl (Fig 1)



Fig 1. Size of 4 week-old plants (purple tags) and 6-week-old plants (orange tags) at time of spraying.

- Plants were kept in a glasshouse and regularly irrigated; the maximum and minimum daily temperatures in the 2 weeks following application averaged 24.2°C and 16.0°C respectively
- All populations had untreated controls, and fresh weights of all above-ground parts of plants were measured 5 weeks after treatment then calculated as percentage of untreated plant weight
- A separate randomised block design with six replicates was used for each herbicide, and an analysis of variance detected significant differences in fresh weight data between populations.

## RESULTS AND DISCUSSION:

- One of the 14 populations was poorly controlled by all three herbicides, suggesting it has developed resistance (Figs 2 and 3)

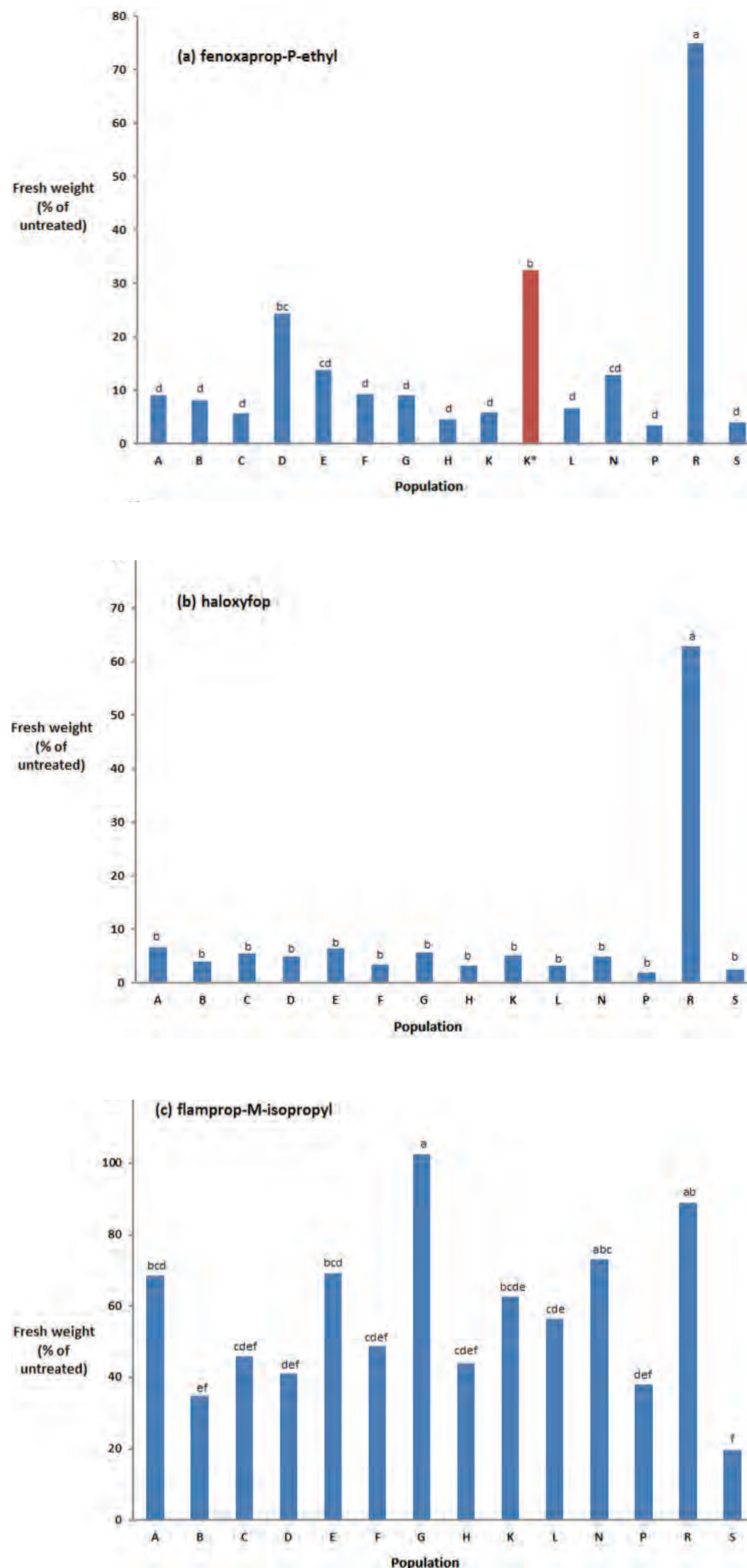


Fig 2. The effect on fresh weight of wild oat plants (expressed as percentage of untreated control) from 14 different Canterbury populations (A to S) 5 weeks after treatment with (a) fenoxaprop-P-ethyl, (b) haloxyfop or (c) flamprop-M-isopropyl applied to 4-week-old seedlings (red bar (K\*) was to 6-week-old plants).

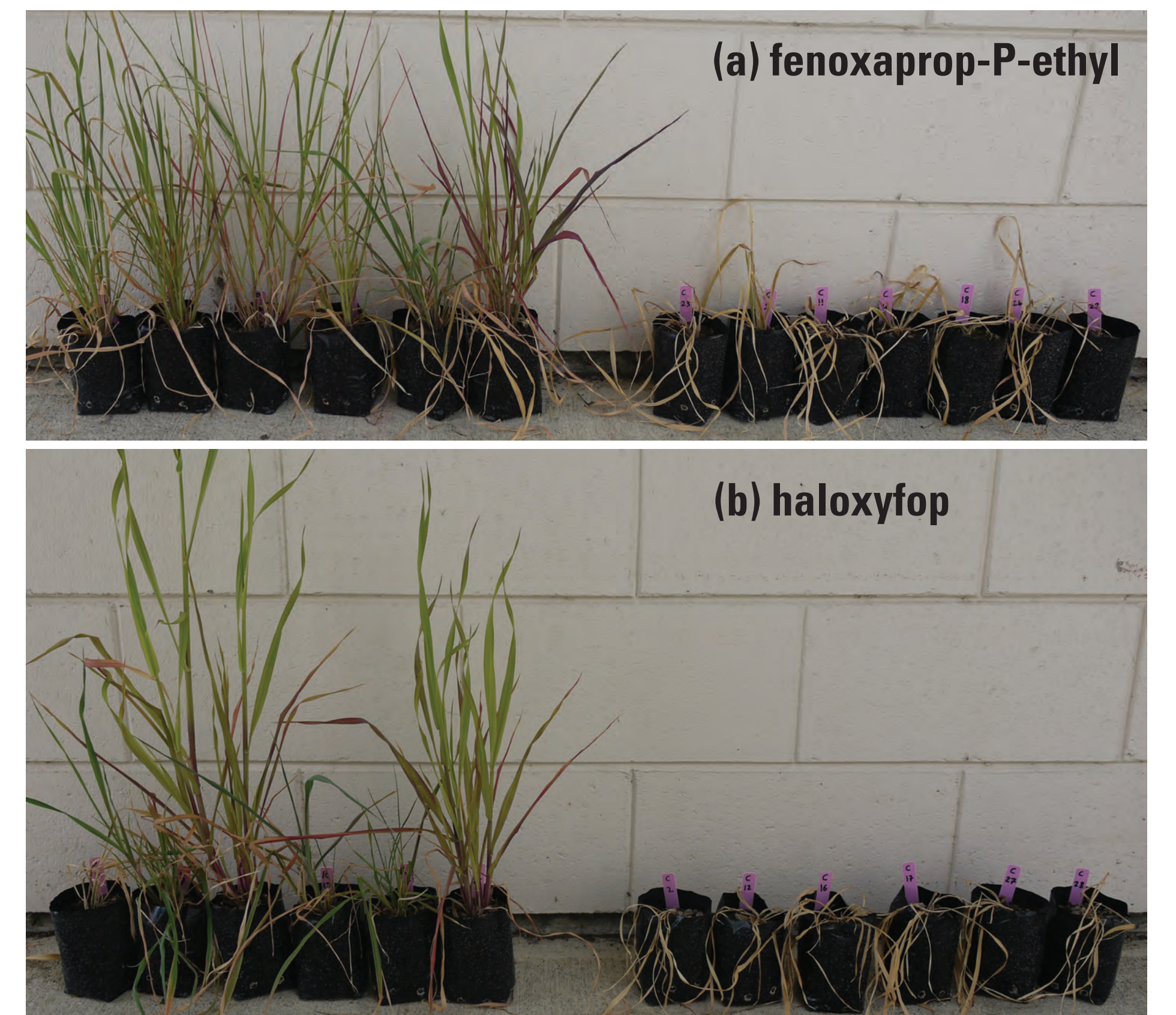


Fig 3. Wild oat plants from Population R (left) and Population C (right) 5 weeks after being treated with (a) fenoxaprop-P-ethyl or (b) haloxyfop.

- The remaining populations were adequately controlled by fenoxaprop-P-ethyl and haloxyfop when treated at 4 weeks of age
- However, seedlings of one of these susceptible populations (Pop K) were poorly controlled by fenoxaprop-P-ethyl when treated as 6-week-old seedlings, showing the importance of applying this herbicide early enough while seedlings are still susceptible (Figs 2 and 4)



Fig 4. Population K wild oat plants 5 weeks after being treated with fenoxaprop-P-ethyl as 4-week-old plants (on the right) or 6-week-old plants (left).

- None of the populations were controlled well by flamprop-M-isopropyl because insufficient competition was exerted on the seedlings following application as recommended to make this herbicide work well and so the application rate was a bit too low to compensate. Variability did exist however (Fig 2c).

## REFERENCE:

Heap I. 2014. International survey of herbicide resistant weeds. <http://www.weedscience.com> (accessed 15 July 2014)

## CONCLUSIONS:

- Resistance to both fenoxaprop-P-ethyl and haloxyfop has been found in one wild oat population in Canterbury, so resistance management strategies need developing to stop the problem increasing
- Some wild oat infestations probably survive spraying due to insufficient crop competition or spraying plants too late.

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