WEED Shifts with Intensive Cropping.

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Australian farmers are world leaders in understanding herbicide resistance.
Australia is also a world leader in developing and adopting IPM tactics.

Have we thought about how to manage our IPM tools for resistance?
Is ryegrass shifting its phenology to management intensity?
Is ryegrass shifting its phenology to management intensity?
Can we manage a shift in seed dormancy in intensive farming systems??

Tactic #1: Rotate your seeding order. Whatever you seed first – start seeding last.

Tactic #2: Outcompete late emerging weeds. Place them at an ecological disadvantage.
How about HWSC? What is the potential for evasion??
Like herbicides, HWSC is a highly effective tool.
How much can wild radish adapt flowering time in response to selection?

Early flowering date selection:
- Base Population (WARR 7)
- S1, S2, S3, S4, S5
- C1, C2, C3, C4, C5
- Unselected control generations

Late flowering date selection:
- Base Population (WARR 7)
- S1, S2, S3
- C1, C2, C3
- Unselected control generations
Final testing of all lines.
No flowering date shift in unselected populations.
Emergence to Flowering (days)

Cumulative Flowering (% of population)

Flowering date shifts to early FD selection

FD$_{50}$ = 59 days
Flowering date shifts to early FD selection

Emergence to Flowering (days)

Cumulative Flowering (% of population)

FD_{50} = 56 days

FD_{50} = 59 days
Flowering date shifts to early FD selection

Emergence to Flowering (days)
Cumulative Flowering (% of population)

FD<sub>50</sub> = 51 days
FD<sub>50</sub> = 59 days
Flowering date shifts to early FD selection

Emergence to Flowering (days)

Cumulative Flowering (% of population)

$FD_{50} = 45$ days

$FD_{50} = 59$ days
Flowering date shifts to early FD selection

Emergence to Flowering (days)

Cumulative Flowering (% of population)

$FD_{50} = 37$ days

$FD_{50} = 59$ days
Flowering date shifts to early FD selection

$FD_{50} = 29$ days

$FD_{50} = 59$ days
Flowering date shifts to long FD selection?

Emergence to Flowering (days)

Cumulative Flowering (% of population)

$FD_{50} = 59$ days
Flowering date shifts to long FD selection?

Emergence to Flowering (days)

Cumulative Flowering (% of population)

$FD_{50} = 59$ days

$FD_{50} = 79$ days
Flowering date shifts to long FD selection?

Emergence to Flowering (days)

Cumulative Flowering (% of population)

$FD_{50} = 59$ days

$FD_{50} = 81$ days
Flowering date shifts to long FD selection?

Emergence to Flowering (days)

Cumulative Flowering (% of population)

FD_{50} = 59 days

FD_{50} = 114 days
Impact of flowering time on biomass at flowering?

1. Lack of structural support
2. Reduced competitiveness
3. Strong reproductive gradient with flowering time
Can we manage any flowering time shifts resulting from HWSC??

**Tactic#1**: Give HWSC control a rest

Earlier flowering individuals will have a reduced seed production (less fit) likely resulting in a rapid correction in flowering time to an ecological optimum.

Should we do that??
HWSC is required to reduce weed populations to very low levels.

Focus paddocks - surviving ryegrass in spring
Plus HWSC - 12 growers using HWSC in 38% of crops
Minus HWSC - 13 growers using HWSC in only 11% of crops

Keep using HWSC!!
Can we manage flowering time shifts resulting in HWSC evasion??

**Tactic#2**: Combine HWSC with techniques which makes earlier flowering an ecological disadvantage.

i.e. smaller weeds are disadvantaged in a competitive crop.

Combine the use of HWSC with competitive crops.
1. Even diversity needs diversity.
2. Rotate your farming practice like you rotate your herbicides.
3. When designing an IWM system, make sure any evolutionary advantage is matched by an ecological disadvantage.
4. Continually monitor and adapt your IWM strategies to cater for change.

Finish the race strong!!
THANKYOU

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