

The key management practices to avoid resistance

For farmers who have not yet reached this stage of herbicide resistance it is imperative that alternative control practices to herbicides (especially Group A and B herbicides) are put into practice.

1. Green manuring or hay - growing a legume such as vetch for green manuring or hay can effectively reduce or stop seed set and provide direct income from hay and indirect benefit from nitrogen fixation.
2. Delay sowing - delay sowing of crops until there has been at least one germination of ryegrass following the break in the season. This ryegrass can then be controlled by cultivation or with a knockdown herbicide. Delayed sowing of conventional wheat varieties can reduce yield. Sowing shorter season varieties such as Silverstar wheat could be a good option if delayed sowing is considered. Continued use of knockdown herbicides can eventually result in resistance developing to these herbicides.
3. Vigorous crop establishment - establish healthy vigorous crops which can compete with weeds. Sow at optimum depth, treat seed if needed with products known to have minimal impact on crop vigour and use starter N fertiliser.
4. Crop type competition - some crops and varieties are better competitors compared to others.
5. Competitive crops - increase the competitiveness of crops. Increased sowing rate and reduced row spacings help to increase crop competition.
6. Crop topping - topping some pulse crops with paraquat can be very effective in controlling seed set of ryegrass.
7. Autumn cultivation or tickling - an autumn tickle or light cultivation will increase germination of ryegrass which can then be controlled with a knockdown spray or another cultivation prior to sowing.
8. Burning - The occasional hot burn in a cereal stubble may be a good management practice to reduce overall weed populations.
9. Use chemicals from a different group - if the resistance in ryegrass is primarily to Group A herbicides then herbicides from different groups may still work. However, cross resistance can develop quite rapidly. If a weed has become resistant to one group of chemicals this can make it more readily resistant to another group of chemicals. Have seed tested to know the resistant status of ryegrass on your farm. Know the status of the ryegrass in your paddock by having seed tested. This is essential for herbicide management.
10. Biomass control of weeds, leaving heavy stubbles between sowing rows can inhibit weed seed germination. This technique requires minimal disturbance (including sheep) and may work for some operators.
11. Seed collection at harvest - trailer bins can be used to collect chaff (with the ryegrass seed). This can then be moved out of the paddock, burnt or fed to livestock (but do not spread seed around other paddocks by wandering sheep). Seed collection can be difficult with high yielding crops.
12. Pastures and pasture topping - spray topping with RoundUp or Gramoxone in pastures is an excellent way to reduce grass weed seed set.
13. Summer crops such as safflower and sorghum provide an opportunity to control weeds over winter and still grow a crop.

Resistance Management: Herbicide modes of Action

Chemical Class	Mode of action	Trade names
Group A	Inhibitors of acetyl coenzyme A carboxylase	Hoegrass, Topik, Puma, Fusilade, Verdict, Correct, Targa, Falcon, Select, Sertin, Achieve
Group B	Inhibitors of acetolactate synthase	Londax, glean, Sempra, Ally, HarmonyM, Logran, Spinnaker, Arsenal, Flame, Broadstrike, Eclipse, Staple
Group C	Inhibitors of photosynthesis at photosystem II	Ametryn, Atrazine, Bladex, Gesaguard, Gesatop, Igran, Metribuzin, Diuron, Cotoran, Afalon, Tribunil, Jaguar, Buctril, Oxtril, Barrel, Totril, Actril DS
Group D	Inhibitors of tubulin formation	Surflan, Stomp, Treflan, Dacthal,
Group E	Inhibitors of mitosis	Eptam, Ordram, Tillam, Avadex
Group F	Inhibitors of carotenoid biosynthesis	Brodal, Jaguar, Tigrex, Zoliar, Amitrole
Group G	Inhibitors of protoporphyrinogen oxidase	Blazer, Goal
Group H	Inhibitors of protein synthesis	Saturn
Group I	Disruptors of cell growth	2,4D, 2,4DB, MCPA, Banvel, Lontrel, Starane, Tordon, Garlon
Group J	Inhibitors of fat synthesis	2,2DPA, Frenock
Group K	Herbicides with diverse modes of action	Dual, Ramrod, Daconate, Asulox, Mataven
Group L	Inhibitors of photosynthesis of photosystem I	Reglone, Sprayseed
Group M	Inhibitors of EPSP synthesis	Roundup
Group N	Inhibitors of glutamine synthesis	Basta