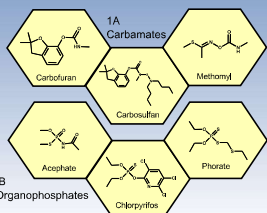


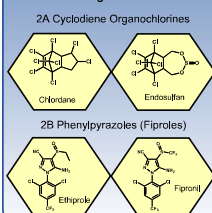
Key to Targeted Physiology



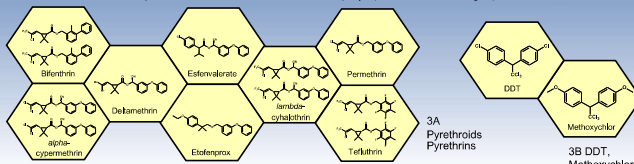
Group 1: Acetylcholinesterase (AChE) inhibitors (Only representatives actives of the groups are shown)



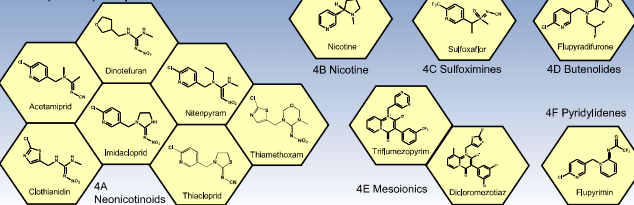
Group 2: GABA-gated chloride channel antagonists



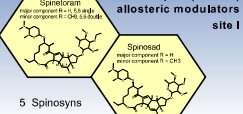
Group 3: Sodium channel modulators (Only representative actives of group 3A are shown)



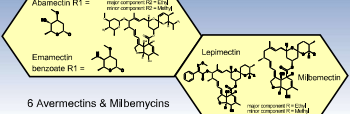
Group 4: Nicotinic acetylcholine receptor (nAChR) competitive modulators



Group 5: Nicotinic acetylcholine receptor (nAChR) allosteric modulators site I



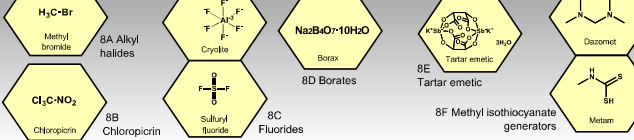
Group 6: Glutamate-gated chloride channel (GluCl) allosteric modulators



Group 7: Juvenile hormone mimics



Group 8: Miscellaneous non-specific (multi-site) inhibitors



Use of Groups:

- Alternations, sequences or rotations of compounds between MoA groups reduce selection for **target site resistance**.
- Applications are arranged into MoA spray windows defined by crop growth stage and pest biology. Several sprays of a compound may be possible within each spray window, but successive generations of a pest should not be treated with compounds from the same MoA group. Local expert advice on spray windows and timings should always be followed.
- Groups in the classification whose members do not act at a common target site are exempt from the prescription against rotation within the group (Group 8, 13 and all UN groups: UN, UNB, UNE, UNF, UNM, UNP & UNV).

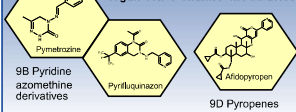
Use of Sub-Groups:

- Sub-groups represent distinct structural classes which are believed to have the same mode of action.
- Sub-groups provide differentiation between compounds that may bind at the same target site but are structurally different enough that risk of **metabolic cross-resistance** is lower than for close chemical analogs.
- Cross-resistance potential between sub-groups is higher than between groups, so rotation between sub-groups should be considered only when there are no alternatives, and only if cross-resistance does not exist, following consultation with local expert advice. These exceptions are not sustainable, and alternative options should be sought.

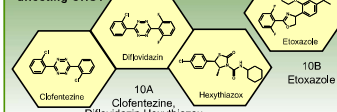


Insecticide Resistance Action Committee Mode of Action Classification

Group 9: Chordotonal organ TRPV channel modulators



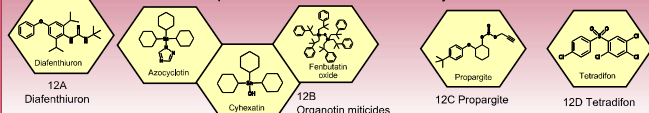
Group 10: Mite growth inhibitors affecting CHS1



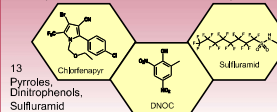
Group 11: Microbial disruptors of insect midgut membranes



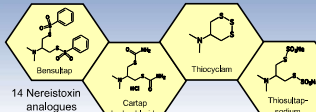
Group 12: Inhibitors of mitochondrial ATP synthase



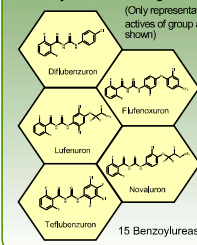
Group 13: Uncouplers of oxidative phosphorylation via disruption of proton gradient



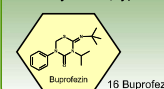
Group 14: Nicotinic acetylcholine receptor (nAChR) channel blockers



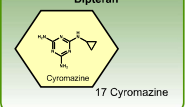
Group 15: Inhibitors of chitin biosynthesis affecting CHS1 (Only representative actives of group are shown)



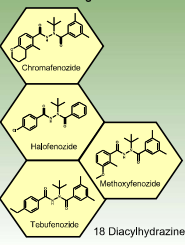
Group 16: Inhibitors of chitin biosynthesis, type 1



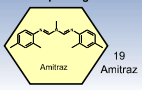
Group 17: Moulting disruptors, Dipteran



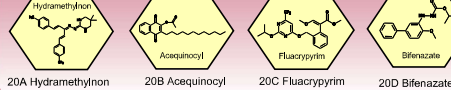
Group 18: Ecdysone receptor agonists



Group 19: Octopamine receptor agonists

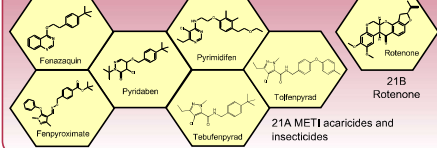


Group 20: Mitochondrial complex III electron transport inhibitors – Qo site

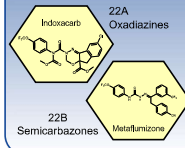


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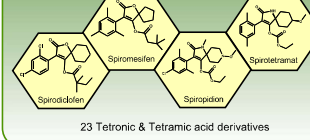
Group 21: Mitochondrial complex I electron transport inhibitors



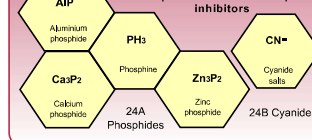
Group 22: Voltage-dependent sodium channel blockers



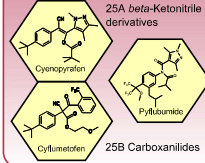
Group 23: Inhibitors of acetyl CoA carboxylase



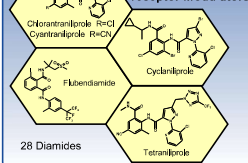
Group 24: Mitochondrial complex IV electron transport inhibitors



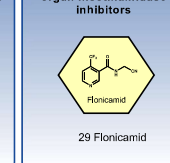
Group 25: Mitochondrial complex II electron transport inhibitors



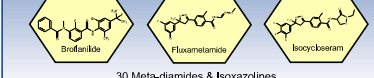
Group 28: Ryanodine receptor modulators



Group 29: Chordotonal organ nicotinamide inhibitors



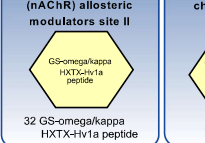
Group 30: GABA-gated chloride channel allosteric modulators



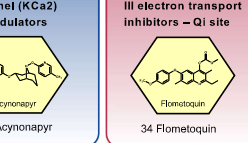
Group 31: Baculoviruses



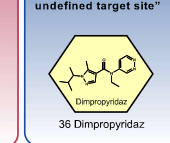
Group 32: Nicotinic acetylcholine receptor (nAChR) allosteric modulators site II



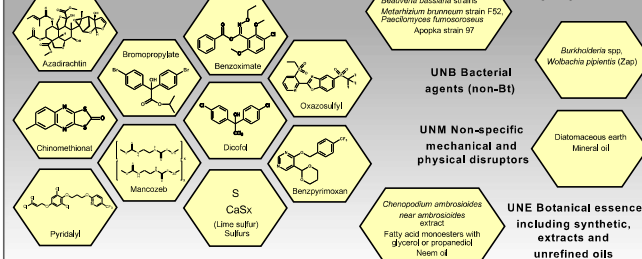
Group 33: Calcium-activated potassium channel (KCa2) modulators



Group 34: Mitochondrial complex III electron transport inhibitors – Qi site



UN: Unknown or uncertain mode of action



Poster Notes:

- Sub-group 3B: DDT is no longer used in agriculture and therefore this is only applicable for the control of insect vectors of human disease, such as mosquitoes, because of a lack of alternatives.
- Sub-group 10A: Hexythiazox is grouped with Clotefentazine because they exhibit cross-resistance even though they are structurally distinct. Diflovidazin has been added to this group because it is a close analogue of Clotefentazine and is expected to have the same mode of action.
- Group 20: While there is strong evidence that Bifenazate acts on the Qo site of Mitochondrial Complex III and some Bifenazate resistance mutations confer cross-resistance to Acequinol, the sites of action of Flucyprym and Hydramethylnon have not been determined.
- Groups 26, 27 and 35 are unassigned.
- In some cases, only representative actives are shown.
- Please visit www.irac-online.org for the complete IRAC classification.



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