FRAC Classification of Fungicides

FRAC FUNGICIDE RESISTANCE ACTION COMMITTEE

Fungal control agents by cross r… ode of action 2024 (www.frac.info)

2024/11/16更新

A. 核酸代謝 A: Nucleic Acids Metabolism

RNA聚合酶I A1: RNA polymerase I
4: PA-fungicides (PhenylAmides) 苯醯胺類
- 本達樂 苯霜靈 benalaxyl
- 滅達樂 甲霜靈 metalaxyl
- 呋霜灵 furalaxyl
- 右滅達樂 精甲霜靈 metalaxyl-M
- 精苯霜灵 benalaxyl-M
- acylalanines
- 乙氧呋霜靈 ofurace
- 歐殺斯 噁霜靈 oxadixyl
- butyrolactones
- oxazolidinones

Group 4

腺苷脫氨酶 A2: adenosine -deaminase
8: hydroxy (2-amino)-pyrimidines 嘧啶醇類
- 布瑞莫 乙嘧酚磺酸酯 bupirimate
- dimethirimol dimethirimol
- 依瑞莫 乙嘧酚 ethirimol

Group 8

DNA/RNA生合成 A3: DNA / RNA synthesis (prop.)
32: heteroaromatics
- 殺紋寧 噁黴靈 hymexazole
- isoxazoles
- 辛噻酮 octhilinone
- isothiazolones

Group 32

第II型DNA拓樸異構酶 A4: DNA topoisomerase type II (gyrase)
31: carboxylic acids
- 歐索林酸 喹菌酮 oxolinic acid (bactericide)

Group 31

A5: inhibition of dihydroorotate dehydrogenase within *de novo* pyrimidine biosynthesis
52: DHODHI-fungicides 二氫乳清酸脫氫酶
- ipflufenoquin ipflufenoquin
- phenyl-propanol
- quinofumelin quinofumelin
- dihydroisoquinoline

Group 52

B.細胞骨架與馬達蛋白 B: Cytoskeleton and Motor Proteins

B1: tubulin polymerization 微管聚合
1: MBC fungicides (= Methyl Benzimidazole Carbamates)
- 苯咪唑類 benzimidazoles
- 麥穗宁 fuberidazole
- 免賴得 苯菌靈 benomyl
- 腐絕 噻菌靈 thiabendazole
- 貝芬替 多菌靈 carbendazim
- 甲基多保淨 甲基硫菌靈 thiophanate-methyl
- 多保淨 硫菌靈 thiophanate
- thiophanates 硫脲甲酸類

Group 1

B2: tubulin polymerization*
10 N-phenyl carbamates 微管聚合
- 乙霉威 diethofencarb
- *negative cross-resistance to B1

Group 10

細胞分裂(未知部位) B4: cell division (unknown site)
20 phenylureas
- 賓克隆 戊菌隆 pencycuron
- phenylurea

Group 20

微管聚合 B3: tubulin polymerization
22 benzamides and thiazole carboxamides
- 座賽胺 苯醯菌胺 zoxamide
- toluamide 苯醯胺類
- ethaboxam 噻唑菌胺 ethaboxam
- ethylamino-thiazole carboxamide

Group 22

類血影蛋白之去定著化 B5: delocalisation of spectrin-like proteins
43 benzamides
- SDHI ?
- fluopimomide 氟醚菌酰胺 fluopimomide
- pyridinylmethyl benzamides
- 氟比來 氟吡菌胺 fluopicolide

Group 43

肌動蛋白/肌球蛋白/絲束蛋白功能 B6: actin/myosin/fimbrin function
47 cyanoacrylates
- phenamacril 氰烯菌酯 phenamacril
- aminocyanoacrylates

Group 47

50 aryl-phenyl-ketones
- pyriofenone pyriofenone
- benzoylpyridine
- 滅芬農 苯菌酮 metrafenone
- benzophenone

Group 50

微管動力學調節 B7: tubulin dynamics modulator
53 pyridazine
- pyridachlometyl pyridachlometyl
- pyridazine

Group 53

C. 呼吸作用 C: Respiration

電傳Com I C1: complex I NADH Oxido-reductase
39 pyrimidinamines, pyrazole-MET1, quinazoline
- 二氟林 二氟林 diflumetorim — pyrimidinamine
- 脫芬瑞 唑蟲醯胺 tolfenpyrad — pyrazole-5-carboxamide
- 芬殺蟎 喹蟎醚 fenazaquin — quinazoline

Group 39

電傳Com III C4: complex III cytochrome bc1(ubiquinone reductase) at Qi site QiI
21 QiI fungicides (Quinone inside Inhibitors)
- cyano-imidazole: 賽座滅 氰霜唑 cyazofamid
- sulfamoyl-triazole: 安美速 吲唑磺菌胺 amisulbrom
- picolinamide: fenpicoxamid fenpicoxamid; florypicoxamid florylpicoxamid

Group 21

C8: inhibition of complex III
cytochrome bc1 (ubiquinone reductase) at Qi and Qo sites (stigmatellin binding mode)
45 QoSI-fungicide (Quinone inside and outside inhibitor, stigmatellin binding mode) QoSI QoSI
- 滅脫定 苯唑嘧菌胺 ametoctradin
- triazolo-pyrimidylamine

Group 45

電傳Com II C2: complex II: succinate-dehydrogenase
7 SDHI (Succinate DeHydrogenase Inhibitors)
- 氟克殺 氟唑菌酰胺 fluxapyroxad
- pyrazole-4-carboxamides
- 福拉比 呋吡菌胺 furametpyr
- bixafen bixafen
- sedaxane sedaxane
- fluindapyr fluindapyr
- 平氟芬 氟唑菌苯胺 penflufen
- phenyl-oxo-ethyl thiophene amide
- 平硫瑞 吡噻菌胺 penthiopyrad
- 亞派占 isopyrazam
- inpyfluxam inpyrfluxam
- thiazole-carboxamides
- pyridinyl-ethyl-benzamides
- benzovindiflupyr benzovindiflupyr
- cyclobutrifluram cyclobutrifluram
- benodanil 麥銹灵 benodanil
- isofetamid 烯肟菌胺 isofetamid
- 氟派瑞 氟吡菌酰胺 fluopyram
- pyrazine carboxamides isoflucypram isoflucypram
- pyridineamide
- 賽氟滅 噻呋酰胺 thifluzamide
- N-cyclopropyl-N-benzyl-pyrazole-carboxamides
- 滅普寧 滅銹胺 mepronil
- 苯甲醯胺 phenyl-benzamides
- pyridine-carboxamides
- 嘉保信 氧化萎鏽靈 oxycarboxin
- pyraziflumid pyraziflumid
- 派滅芬 pydiflumetofen
- oxathiin carboxamides
- 萎銹灵 carboxin
- 白克列 啶醯菌胺 boscalid
- fenfuram fenfuram
- furan-carboxamides
- N-methoxy-(phenyl-ethyl)-pyrazole-carboxamides
- 福多寧 氟醯胺 flutolanil

Group 7

C5: uncouplers of oxidative Phosphorylation # 29 解偶聯劑
- 白粉克? 消蟎普 meptyl dinocap
- dinitrophenyl crotonates
- 百蟎克 樂殺蟎 binapacryl
- 扶吉胺 氟啶胺 fluazinam
- 2,6-dinitro-aniline

Group 29

C6: inhibitors of oxidative phosphorylation ATP合成酶 ATP synthase
30 organo tins 有機錫類
- 三苯醋錫 三苯基乙酸錫 fentin acetate
- fentin Cl fentin chloride
- 三苯羥錫 三苯基氫氧化錫 fentin hydroxide

Group 30

C7: ATP transport (proposed) ATP運送
38 thiophene-carboxamides
- silthiofam 硅噻菌胺 silthiofam

Group 38

史托比類 C3: complex III cytochrome bc1 (ubiquinol oxidase) at Qo site (*cyt b* gene) 電傳Com III QoI
11 QoI fungicides (Quinone outside Inhibitors)
- enoxastrobin 烯肟菌酯 enoxastrobin
- coumoxystrobin 氟菌蟎酯 coumoxystrobin
- picoxystrobin 啶氧菌酯 picoxystrobin
- methoxy-acrylates
- 亞托敏 嘧菌酯 azoxystrobin
- pyraoxystrobin 正唑菌酯 pyraoxystrobin
- flufenoxystrobin 丁香菌酯 flufenoxystrobin
- 克收欣 醚菌酯 kresoxim-methyl
- 三氟敏 肟菌酯 trifloxystrobin
- oximino-acetates
- fluoxastrobin 氟嘧菌酯 fluoxastrobin
- dihydro-dioxazines
- mandestrobin mandestrobin
- methoxy-acetamides
- 凡殺同 噁唑菌酮 famoxadone
- oxazolidine-diones
- fenamidone 咪唑菌酮 fenamidone
- imidazolinones
- oximino-acetamides: fenaminstrobin 烯肟菌胺 fenaminstrobin
- orysastrobin 肟醚菌胺 orysastrobin
- metominostrobin 苯氧菌胺 metominostrobin
- dimoxystrobin 甲氧菌平 dimoxystrobin
- 派本克 pyribencarb pyribencarb
- benzyl-carbamates
- methoxy-carbamates: pyrametostrobin 唑胺菌酯 pyrametostrobin
- triclopyricarb 氯啶菌酯 triclopyricarb
- 百克敏 吡唑醚菌酯 pyraclostrobin

Group 11

11A QoI/ A
11A QoI fungicides (Quinone outside Inhibitors); Subgroup A
- metyltetraprole metyltetraprole

Group 11A

D.氨基酸與蛋白質生合成 D: Amino Acid and Protein Synthesis

D1: methionine biosynthesis (cgs gene) (proposed)
9 Anilino-Pyrimidines (AP fungicides)
- 派美尼 嘧黴胺 pyrimethanil
- 賽普洛 嘧菌環胺 cyprodinil
- 滅派林 嘧菌胺 mepanipyrim

Group 9

D2: protein synthesis (ribosome, termination step) 抗生素類
23 enopyranuronic acid
- 保米黴素 灰瘟素 blasticidin-S

Group 23

D3: protein synthesis (ribosome, initiation step)
24 hexopyranosyl antibiotics
- 嘉賜黴素 春雷黴素 kasugamycin

Group 24

D4: protein synthesis (ribosome, initiation step)
25 glucopyranosyl antibiotics
- 鏈黴素 链霉素 streptomycin (bactericide)

Group 25

D5: protein synthesis (ribosome, elongation step)
41 tetracycline antibiotics
- 土黴素 土黴素 oxytetracycline (bactericide)

Group 41

D6: leucyl-tRNA synthetase (LeuRS)
54 benzoxaboroles
- tavaborole tavaborole

Group 54

E.信息傳導 E: Signal Transduction

信息傳導/未知機制 E1: signal transduction (mechanism unknown)
喹啉類 #13 azanaphthalenes
- aryloxyquinoline: 快諾芬 苯氧喹啉 quinoxyfen
- quinazolinone: 普克淨 丙氧喹啉 proquinazid

Group 13

滲調作用信息傳導 os-2 E2: osmotic signal transduction
▷ MAP / histidine- kinase (os-2, HOG1)
12 phenylpyrroles (PP- fungicides) 苯吡咯類
- fenpiclonil 拌种咯 fenpiclonil
- 護汰寧 咯菌腈 fludioxonil

Group 12

滲調作用信息傳導 os-1 E3: osmotic signal transduction
▷ MAP / histidine kinase (os-1, Daf1)
2 dicarboximides 二羧醯亞胺類
- 依普同 異菌脲 iprodione
- 克氯得 乙菌利 chlozolinate
- 免克寧 乙烯菌核利 vinclozolin
- 撲滅寧 腐黴利 procymidone
- dimethachlone 菌核淨 dimethachlone
- 灰黴/菌核

Group 2

F.脂質生合成/運輸與膜完整性或功能 F: Lipid Synthesis or Transport / Membrane Integrity or Function

磷脂質生合成 甲基轉移酶 F2: phospholipid biosynthesis ▷ methyltransferase
6 phosphorothiolates & dithiolanes
- 白粉松 吡菌磷 pyrazophos
- 硫代磷酸酯類 phosphorothiolates
- 丙基喜樂松 異稻瘟淨 iprobenfos
- 護粒松 敵瘟磷 edifenphos
- 二硫戊環類 dithiolanes
- 亞賜圃 稻瘟靈 iso-prothiolane

Group 6

細胞過氧化 F3: cell peroxidation (prop.)
14 aromatic hydrocarbons & heteroaromatics 芳香烴類與芳香雜環類
- aromatic hydrocarbons
- 大克爛 氯硝胺 dicloran
- 四氯硝基苯 tecnazene (TCNB)
- 五氯硝苯 五氯硝基苯 quintozene (PCNB)
- 脫克松 甲基立枯磷 tolclofos-methyl
- 聯苯 biphenyl
- 二氯甲氧苯 氯苯甲醚 chloroneb
- 依得利 土菌靈 etridiazole
- 1,2,4-thiadiazole

Group 14

細胞膜通透性 F4: cell membrane permeability, fatty acids (prop.)
28 carbamates 氨基甲酸塩
- prothiocarb 硫菌威 prothiocarb
- 普拔克 霜黴威 propamocarb
- iodocarb iodocarb

Group 28

結合麥角固醇 F8: ergosterol binding
48 polyene
- 納他黴素 natamycin (pimaricin)

Group 48

結合膜脂質 F10: interaction with lipid fraction of cell membrane, with multiple effects on cell membrane integrity
51 protein fragment 多胜類
- Polypeptide ASFBIOF01-02
- polypeptide

Group 51

影響脂質體內動態平衡及轉移與儲存 F9: lipid homeostasis and transfer/storage
49 OSBPI Oxysterol binding protein homologue inhibition
- OSBP
- 歐西比 oxathiapiprolin oxathiapiprolin
- fluoxapiprolin fluoxapiproline
- Piperidinyl thiazole - isoxazoline

Group 49

I. 細胞壁黑色素生合成 I: Melanin Synthesis in Cell Wall

還原酶 I1: reductase in melanin biosynthesis
16.1 Melanin Biosynthesis Inhibitors: Reductase (MBI-R)
- isobenzo-furanone: 熱必斯 四氯苯酞 fthalide
- pyrrolo-quinolone: 百快隆 咯喹酮 pyroquilon
- triazolobenzo-thiazole: 三賽唑 三環唑 tricyclazole

Group 16.1

脫水酶 I2: dehydratase in melanin biosynthesis
16.2 Melanin Biosynthesis Inhibitors: Dehydratase (MBI-D)
- carboxamide: diclocymet 双氯氰菌胺 diclocymet
- cyclopropane carboxamide: 加普胺 環丙醯菌胺 carpropamid
- propionamide: 芬諾尼 稻瘟醯胺 fenoxanil

Group 16.2

聚酮合成酶 I3: polyketide synthase in melanin biosynthesis
16.3 Melanin Biosynthesis Inhibitors: Polyketide synthase (MBI-P)
- tolprocarb tolprocarb
- trifluoroethyl-carbamate

Group 16.3

G. 固醇類生合成 G: Sterol Biosynthesis in Membranes

去甲基酶 G1: C14-demethylase in sterol biosynthesis (*erg11/cyp51*)
3 DMI-fungicides (DeMethylation Inhibitors) (SBI : Class I) DMI
三唑類 triazoles
- etaconazole 乙环唑 etaconazole
- azaconazole 氧环唑 azaconazole
- 依普座 氟環唑 epoxiconazole
- 達克利 烯唑醇 diniconazole
- ipconazole 种菌唑 ipconazole
- 易胺座 亞胺唑 imibenconazole
- 芬克座 腈苯唑 fenbuconazole
- 得克利 戊唑醇 tebuconazole
- 菲克利 己唑醇 hexaconazole
- 比多農 聯苯三唑醇 bitertanol
- 滅特座 葉菌唑 metconazole
- simeconazole 硅氟唑 simeconazole
- fluquinconazole 氟喹唑 fluquinconazole
- 四克利 四氟醚唑 tetraconazole
- 溴克座 糠菌唑 bromuconazole
- 護矽得 氟矽唑 flusilazole
- 邁克尼 腈菌唑 myclobutanil
- 滅芬座 mefentrifluconazole
- 三泰芬 三唑酮 triadimefon
- 環克座 環丙唑醇 cyproconazole
- 平克座 戊菌唑 penconazole
- 護汰芬 粉唑醇 flutriafol
- 三泰隆 三唑醇 triadimenol
- 待克利 苯醚甲環唑 difenoconazole
- 普克利 丙環唑 propiconazole
- triticonazole triticonazole
- prothioconazole 丙硫菌唑 prothioconazole
- triazolinthione

哌嗪類 piperazines
- 賽福寧 嗪氨靈 triforine

吡啶類 pyridines
- 比芬諾 啶斑肟 pyrifenox
- pyrisoxazole 啶菌噁唑 pyrisoxazole

嘧啶類 pyrimidines
- 尼瑞莫 氟苯嘧啶醇 nuarimol
- 芬瑞莫 氯苯嘧啶醇 fenarimol

咪唑類 imidazoles
- 依滅列 抑黴唑 imazalil
- 賽福座 氟菌唑 triflumizole
- 披扶座 稻瘟酯 pefurazoate
- oxpoconazole 噁咪唑 oxpoconazole
- 撲克拉 咪鮮胺 prochloraz

Group 3

Global Resistance Management App — Get the FRAC / HRAC / IRAC Posters to Go!

還原酶/異構酶 G2: Δ[14]-reductase and Δ[8]→Δ[7]-isomerase in sterol biosynthesis (*erg2, erg 24*)
5 Amines("Morpholines") (SBI : Class II)
哌啶類 piperidines
- fenpropidin 苯锈定 fenpropidin
- piperalin piperalin
- spiroketal-amines: spiroxamine 螺环菌胺 spiroxamine

嗎啉類 morpholines
- aldimorph aldimorph
- 芬普福 丁苯嗎啉 fenpropimorph
- 三得芬 十三嗎啉 tridemorph
- dodemorph 十二环吗啉 dodemorph

Group 5

3-酮還原酶 G3: 3-keto reductase in C4-de-methylation (*erg27*)
17 (KRI fungicides KetoReductase Inhibitors) (SBI : Class III)
- hydroxyanilides 灰黴: fenhexamid *环酰菌胺 fenhexamid
- amino-pyrazolinones: fenpyrazamine fenpyrazamine

Group 17

角鯊烯環氧化酶 G4: squalene epoxidase in sterol biosynthesis (*erg1*)
18 (SBI : Class IV) 醫學用
- terbinafine 療黴舒 terbinafine
- naftifine naftifine
- allylamines
- pyributicarb 稗草畏 pyributicarb (herbicide) HRAC Z
- thiocarbamates

Group 18

H.細胞壁生合成 H: Cell Wall Biosynthesis

幾丁質合成酶 H4: chitin synthase
19 Polyoxins
- Peptidyl Pyrimidine nucleoside
- 保粒黴素 多抗黴素 Polyoxin 抗生素類

Group 19

纖維素合成酶 H5: cellulose synthase
40 Carboxylic Acid Amides (CAA fungicides)
- cinnamic acid amides: 達滅芬 烯醯嗎啉 dimethomorph
- flumorph 氟吗啉 flumorph
- pyrimorph 丁吡嗎啉 pyrimorph
- valinamide carbamates: benthiavalicarb 苯噻菌胺 benthiavalicarb
- Iprovalicarb 缬霉威 iprovalicarb
- 倍芬利 霜黴滅 valifenalate
- mandelic acid amides: 曼普胺 雙炔醯菌胺 mandipropamid

Group 40

P. 防衛反應誘發 P: Host Plant Defence Induction

水楊酸有關 P01: salicylate related
#P01 benzothiodiazole BTH 苯併噻二唑
- acibenzolar acibenzolar-S-methyl

Group P01

水楊酸有關 P02: salicylate related
#P02 benzothiazole 苯併異噻唑
- 撲殺熱 烯丙苯噻唑 probenazole

Group P02

水楊酸有關 P03: salicylate related
#P03 thiadiazole carboxamide 噻唑醯胺
- 亞汰尼 異噻菌胺 isotianil
- tiadinil 噻酰菌胺 tiadinil

系統性抗病誘導

Group P03

多糖誘發物 P04: polysaccharide elicitors
- laminarin 海帶多糖 laminarin
- #P04 natural compound

Group P04

蒽醌誘發物 P05: anthraquinone elicitors
- 虎杖萃取物 *Reynoutria sachalinensis* (Giant Knotweed Extract)
- #P05 plant extract

Group P05

微生物誘發物 P06: microbial elicitors
#P06 microbial
- 蕈狀芽孢 *Bacillus mycoides* (isolate J) — Bacterial *Bacillus* spp.
- 酵母細胞壁 Cell walls of *Saccharomyces cerevisiae* Strain LAS117 — Fungal *Saccharomyces* spp.

Group P06

亞磷酸 P07: phosphonates
#P07 phosphonates
- ethyl-phosphonates: 福賽得 三乙膦酸鋁 fosetyl-al
- Phosphorous acid: H_3PO_3 亞磷酸 phosphorous acid

Group P07

水楊酸有關 P08: salicylate related
#P08 isothiazole
- dichlobentiazox dichlobentiazox

Group P08

U 未知機制 Unknown Mode of Action
•Temporary status; information on mode of action and / or resistance risk is still uncertain

- 克絕 霜脲氰 cymoxanil — Group 27 — cyanoacetamide-oxime
- 克枯爛 葉枯酞 tecloftalam — Group 34 — phthalamic acid
- triazoxide triazoxide — Group 35 — benzotriazines
- 氟硫滅 磺菌胺 flusulfamide — Group 36 — benzene-sulfonamides
- 達滅淨 噠菌酮 diclomezine — Group 37 — pyridazinones
- 賽芬胺 環氟菌胺 cyflufenamid — Group U6 — phenyl acetamides
- flutianil flutianil — Group U13 — cyano-…
- 富米綜 嘧菌腙 ferimzone — Group U14 — pyrimidinone-hydrazones
- tebufloquin tebufloquin — Group U16
- picarbutrazox picarbutrazox — Group U17 — tetrazolyloxime
- 維利黴素 井岡黴素 validamycin — Group U18 — glucopyranosyl…
- 多寧 多果定 dodine — Group U12 — guanidines

BM 生物性多重機制 BM: Biologicals with Multiple Modes of Action

B01 植物萃取物 BM 01 : plant extract
- 多胜類(凝集素) Polypeptide (lectin) (BLAD)
- 酚/倍半萜烯/三萜/香豆素等 Phenols, Sesquiterpenes, Triterpenoids, Coumarins (菲律賓木枯萃取物)
- 萜烴/萜醇/萜酚 Terpene Hydrocarbons, Terpene alcohols and Terpene phenols (茶樹精油)

Group BM01

B02 微生物活體/代謝物 BM 02 : microbial (strains of living microbes or extract, metabolites)
- 真菌木黴 Fungal *Trichoderma* spp.
- Fungal *Clonostachys* spp. 真菌粉紅粘帚黴
- 真菌盾殼黴 Fungal *Coniothyrium* spp.
- Fungal *Hanseniaspora* spp. 真菌有孢漢遜酵母
- 真菌酵母 Fungal *Saccharomyces* spp.
- Fungal *Talaromyces* spp. 真菌籃狀菌
- (枯草桿菌) Bacterial *Bacillus* spp. 細菌/桿菌
- Bacterial *Erwinia* spp. (peptide) 細菌/歐文氏菌
- Bacterial *Pseudomonas* spp. 細菌假單胞
- Bacterial *Gluconobacter* spp. 細菌/葡糖桿菌
- Bacterial *Streptomyces* spp. 細菌鏈黴

Group BM02

B03 微生物/植物萃取物 BM 03 : purified metabolites from plant or microbial sources or synthetic versions of these metabolites
- 肉桂醛 cinnamaldehyde (cinnamaldehyde)

Group BM03

M. 多點作用 M: Chemicals with Multi-Site Activity

- 快得寧 喹啉銅 銅劑Cu copper preparations — Group M01 — inorganic (electrophiles)
- 硫磺S Sulphur — Group M02 — inorganic (electrophiles)
- 四氯異苯腈 百菌清 chlorothalonil — Group M05 — chloronitriles (unspecified mechanism)
- anilazine anilazine — Group M08 — triazines (unspecified mechanism)
- 腈硫醌 二氰蒽醌 dithianon — Group M09 — anthraquinones (electrophiles)
- 二硫代氨基甲酸塩 amobam amobam; 滅速克 磺菌威 methasulfocarb — Group M12 — thiocarbamates (electrophiles)
- 鋅錳乃浦 代森錳鋅 mancozeb; 富爾邦 福美鐵 ferbam; 故菌灵 zinc thiazole; 甲基鋅乃浦 丙森鋅 propineb; 免得爛 代森聯 metiram; 錳乃浦 代森錳 maneb; 鋅乃浦 代森鋅 zineb; 得恩地 福美雙 thiram; 益穗成分 ziram — Group M03 — dithiocarbamates & relatives (electrophiles)
- 蓋普丹 克菌丹 captan; 四氯丹 敵菌丹 captafol; 福爾培 滅菌丹 folpet — Group M04 — phthalimides (electrophiles) 酞醯亞胺類
- 益發靈 苯氟磺胺 dichlofluanid; 甲基益發靈 甲苯氟磺胺 tolylfluanid — Group M06 — sulphamides (electrophiles) 磺醯胺類
- 蟎離丹 灭螨猛 chinomethionat — Group M10 — quinoxalines (electrophiles)
- 氟咪酰 唑呋草 fluoroimide — Group M11 — maleimides (electrophiles)
- 克熱淨 雙胍辛胺 iminoctadine; mixture of iminoctadine and other polyamines guazatine — Group M07 — bis-guanidines (membrane disruptors, detergents) 双胍辛盐

NC 未歸類 NC : Not Specified
礦物油等、有機油脂、重碳酸鉀、生物原材料
- Mineral oils, organic oils, inorganic salts, material of biological origin

Mode of action of fungicides based on the FRAC fungicide list (FRAC Code List ©, published at www.frac.info/publications)

The groupings can change when new results become known. Colour coded boxes with same …

… content of this presentation, in particular with regard to its correctness and completeness.

Legend:
- C: Respiration — Mode of Action Group
- C8: inhibition of complex III — Target site
- ametoctradin — triazolo-pyrimidylamine — Group 45 — Chemical or biological group

劇毒性　輕毒性　中等毒性　低毒性

財團法人植物保護科技基金會 Plant Protection Science And Technology Foundation
CropLife 作物永續發展協會 台灣分會