

Technical Information

Pyraflufen-ethyl

Herbicide/ Plant Growth Regulator



NIHON NOHYAKU CO., LTD.

Introduction

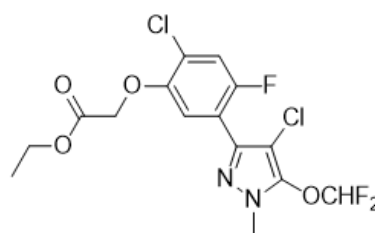
- Pyraflufen-ethyl is **contact herbicide** effectively working at low rates on **broad-leaved weeds**
- Pyraflufen-ethyl is a great tool for **defoliation** of cotton, **desiccation** of potatoes, **controlling suckers** in tree crops
- Pyraflufen-ethyl shows **quick action** in all crops
- Pyraflufen-ethyl is a good **mixing partner** to other herbicide actives
- Pyraflufen-ethyl is an inhibitor of protoporphyrinogen IX oxidase (**PPO Inhibitor**, HRAC - group E)

Chemical profile of active ingredient

IDENTITY

| | |
|-----------------------|--|
| Common name (ISO) | Pyraflufen-ethyl |
| Chemical name (IUPAC) | Ethyl 2-chloro-5-(4-chloro-5-difluoromethoxy-1-methylpyrazol-3-yl)-4-fluorophenoxyacetate |
| Empirical formula | C ₁₅ H ₁₃ Cl ₂ F ₃ N ₂ O ₄ |
| Molecular weight | 413.18 |
| CAS registry number | 129630-19-9 |

Chemical structure



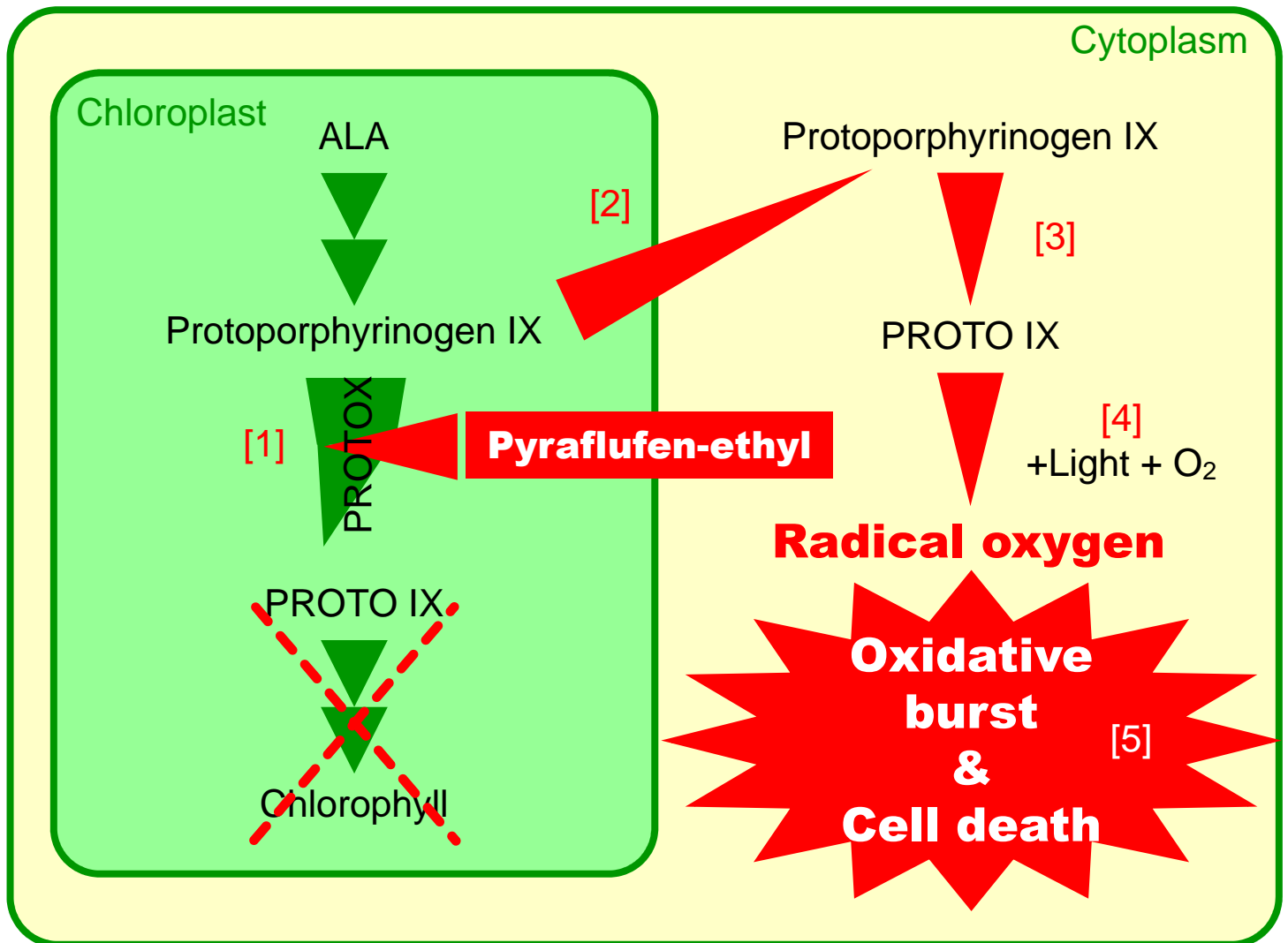
PHYSICO-CHEMICAL PROPERTIES

| | |
|-----------------------|--------------------------------|
| Appearance | White ~ cream color powder |
| Relative density | 1.57/24°C |
| Melting point | 126.4 ~ 127.2°C (pure sample) |
| Partition coefficient | log Po/w = 3.49 |
| Vapor pressure | 1.6x10 ⁻⁸ Pa (25°C) |

TOXICOLOGY

| | | |
|----------------------------|--|----------|
| Acute toxicity, Oral | Rat LD ₅₀ (mg/kg) male, female > 5000 | |
| Acute toxicity, Dermal | Rat LD ₅₀ (mg/kg) male, female > 2000 | |
| Acute toxicity, Inhalation | Rat LC ₅₀ (mg/L/4h) male, female > 5.03 | |
| Skin irritation | Rabbit Non irritant | |
| Eye irritation | Rabbit Slightly irritant | |
| Skin sensitization | Guinea pig Negative | |
| Germ cell mutagenicity | Bacterial reverse mutation test | Negative |
| | In vitro chromosome aberration test | Negative |
| | Micronucleus test in mice | Negative |

Mode of action/ PPO inhibitor



Abbreviation

| | |
|----------|-------------------------------|
| ALA | 5-aminolevulinic acid |
| PROTO IX | Protoporphyrin IX |
| PROTOX | Protoporphyrinogen IX oxidase |



Untreated



1 day after application

[1] Pyraflufen-ethyl inhibits oxidation of protoporphyrinogen IX, via inhibiting PROTOX.

[2] Accumulated protoporphyrinogen IX **overflows to cytoplasm.**

[3] Protoporphyrinogen IX in cytoplasm is oxidized to PROTO IX.

[4] PROTO IX + oxygen under light condition generates radical oxygen.

[5] **Radical oxygen** attacks cell membrane (oxidative burst).

Pyraflufen-ethyl targets

biosynthesis of chlorophyll in chloroplast.

Pyraflufen-ethyl 2%SC

●USAGE

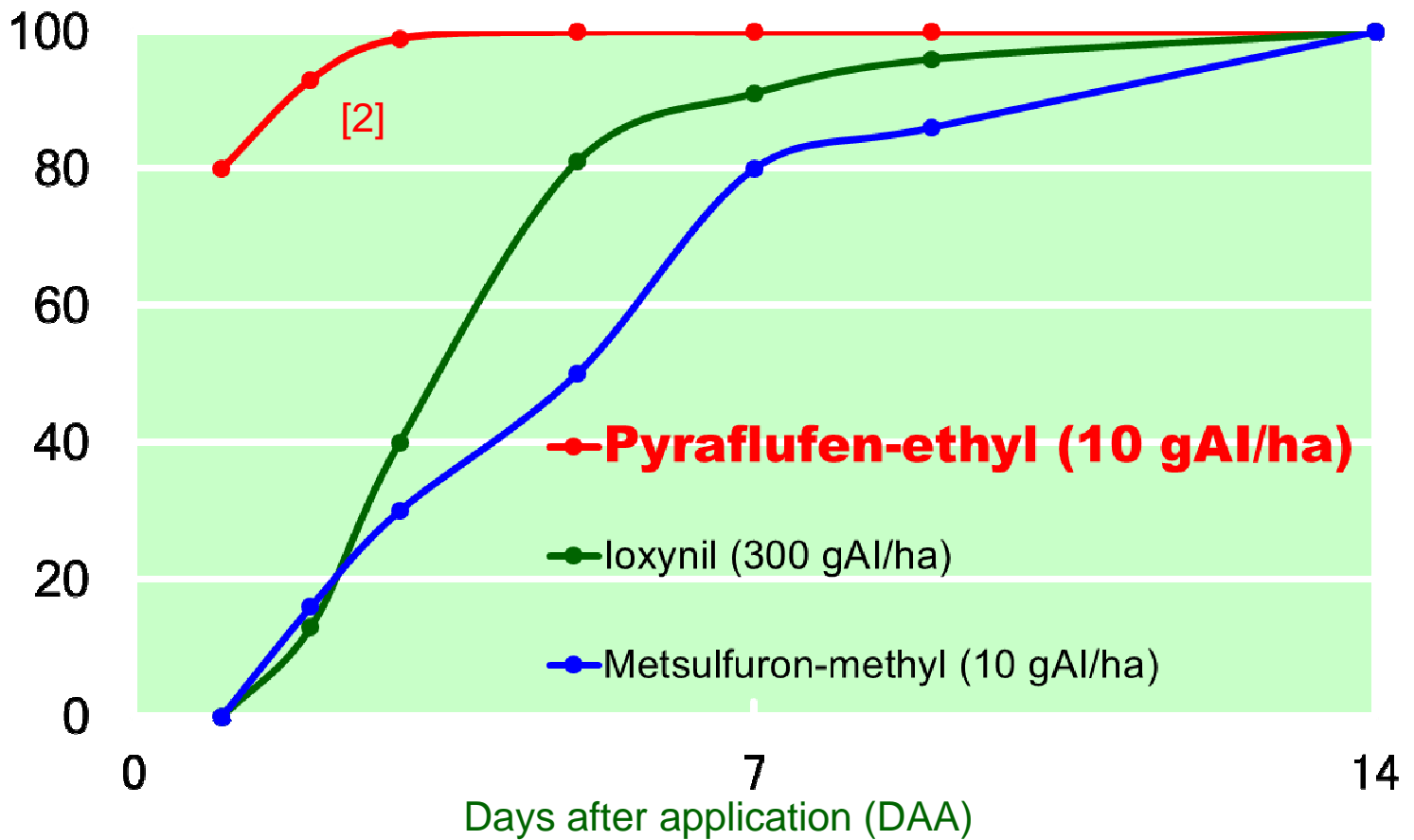
Cereal herbicide; wheat, barley, oats, triticale

Legume crop herbicide; faba beans, vetch, field peas, pastures (clovers, alfalfa)

●FAST ACTION

[1]

Efficacy(%*) of Pyraflufen-ethyl 2%SC on *Stellaria media* at 2 leaves



*100 X {1 - (No. of survived weeds in treated plot / No. of weeds before treatment in treated plot)}

[1] Application timing is at 2 leaves.

[2] Pyraflufen-ethyl reaches 80% of efficacy by 1DAA, and 100% by 4DAA.

Pyraflufen-ethyl delivers **fast control**.

Pyraflufen-ethyl 2%SC

● WIDE SPECTRUM

| Family | Species | Application timing (Leaves) | Dose (gAI/ha) | |
|-----------------|--------------------------------|--------------------------------|---------------|------|
| | | | 10 | 20 |
| Amaranthaceae | <i>Chenopodium album</i> | 2 | ★★★★ | ★★★★ |
| Asteraceae | <i>Senecio vulgaris</i> | 1-3 | ★★ | ★★★★ |
| Brassicaceae | <i>Capsella bursa-pastoris</i> | 2-4 | ★ | ★★ |
| | <i>Cardamine scutata</i> | 2-4 | ★ | ★★ |
| Caryophyllaceae | <i>Stellaria uliginosa</i> | 2-5 | ★ | ★★ |
| | <i>Stellaria media</i> | 1-6 | ★★ | ★★★★ |
| | <i>Cerastium glomeratum</i> | 1-10 | ★★ | ★★ |
| Lamiaceae | <i>Lamium amplexicaule</i> | 1-5 | ★★★★ | ★★★★ |
| Polygonaceae | | Cotyledon-4 | ★ | ★★ |
| Rubiaceae | <i>Galium aparine</i> | Cotyledon-6 | ★★★★ | ★★★★ |

Symbol

| | |
|------|--------------------|
| ★★★★ | ≥ 98% of efficacy |
| ★★ | 97-90% of efficacy |

| | |
|---|--------------------|
| ★ | 89-80% of efficacy |
|---|--------------------|

| | |
|---|---|
| 1 | Pyraflufen-ethyl works at lower dose of 10-20 gAI/ha. |
| 2 | Pyraflufen-ethyl works as post-emergence herbicide. |
| 3 | Pyraflufen-ethyl is effective on <i>Chenopodium album</i> , <i>Lamium amplexicaule</i> and <i>Galium aparine</i> . |
| 4 | Pyraflufen-ethyl can not control grass weeds. |

Pyraflufen-ethyl shows excellent efficacy
on **broad-leaved weeds** in cereal field.

Pyraflufen-ethyl 2.5%EC

●USAGE

Sucker control of fruit trees

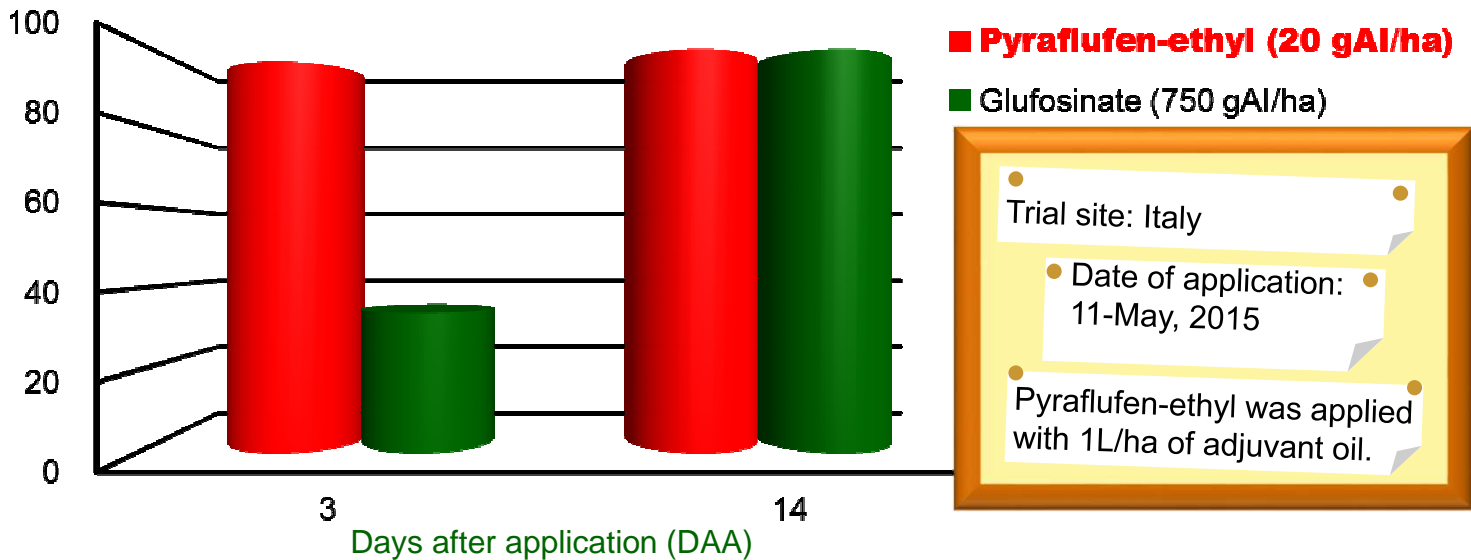
Cotton defoliant

Potato desiccant

Burndown herbicide (Mixing application)

2.5%EC for sucker control

●Efficacy(%) on suckers of kiwifruit (*Actinidia deliciosa*)



●Efficacy on suckers of apple (*Malus pumila*)



1st shot
21.2 gAI/ha Pyraflufen-ethyl
0.5 L/ha adjuvant oil

2nd shot
21.2 gAI/ha Pyraflufen-ethyl
0.5 L/ha adjuvant oil



Untreated

Pyraflufen-ethyl shows **fast control**.

1

Pyraflufen-ethyl can control **suckers of fruit trees** (pome fruit, stone fruit, vine, kiwifruit, olive, hazelnut, and so on)

2

Pyraflufen-ethyl works at **20 gAI/ha**.

3

Pyraflufen-ethyl is recommended to be applied

[a] with **0.5-1.0% of Crop Oil Concentrate (COC) adjuvant**.

[b] to **15- 20 cm of suckers**.

2.5%EC as cotton defoliant



1.0 gAI/ha



2.0 gAI/ha



Untreated

Pyraflufen-ethyl

Pyraflufen-ethyl works as **excellent cotton defoliant.**

- 1 Pyraflufen-ethyl is strong tool for high quality of cotton harvests. Machine can harvest **without leaves contaminant.**
- 2 Dose ranges **2.75 – 5 gAI/ha.**
- 3 Optimum application timing is **≥ 60% open boll stage.**
- 4 Pyraflufen-ethyl must be applied with **Ethephon**, for opening boll, and **0.5-1.0% of COC adjuvant** for spreading.

2.5%EC as potato desiccant



Before application



1st shot
26.5 gAI/ha Pyraflufen-ethyl
2.0 L/ha adjuvant oil

2nd shot
26.5 gAI/ha Pyraflufen-ethyl
2.0 L/ha adjuvant oil

Pyraflufen-ethyl works as **excellent potato desiccant.**

- 1 Pyraflufen-ethyl is strong tool for **ease of harvest of tubers, prevention of oversized tubers** and **pest control.**
- 2 [Dose in EU] **21.2 – 26.5 gAI/ha with 2 L/ha of adjuvant oil.**
[Dose in US] **5-10 gAI/ha with Diquat or Glyphosate.**
- 3 Optimum application timings are,
[Seed production] when the canopy of potatoes is still **green and vigorous.**
Application times are 2 or 3.
[Ware and starch production] when plants start to become **senescent**, color changes from green to yellow. Application times are 1 or 2.



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