Breaking the mold: Innovative and sustainable mildew control in strawberry cultivation

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Powdery Mildew – A Growing Challenge

- Persistent issue: Powdery mildew remains one of the toughest issues in strawberry and soft fruit production.
- Disease pressure is stronger in outdoor cultivation, but even greenhouse cultivations face outbreaks.
  - 2025 very high mildew pressure in the Netherlands (mainly in summer)
- Withdrawal of key chemical crop protection products.
- Susceptibility in some popular varieties.
- Grower dilemma: Maintain yield and quality while meeting sustainability targets.
- Delphy ISFC explores innovative strategies for resilient production.

Why the Challenge intensifies

- Pathogen profile: Podosphaera aphanis thrives in warm, humid conditions causing major economic losses.
- Impact: reduced fruit quality, shelf life, and yield.
- Drivers of increased risk:
  - Regulatory changes & stricter MRLs.
  - Climate extremes favor mildew development.
- Market/consumer demand for low-residue fruit accelerates pressure.
- Breeding fully resistant varieties remains difficult, despite progress.
- Current focus: Integrated Pest Management (IPM) combining biological and technological innovations.

ISFC Trials – Green Strategies for Mildew Control

- Goal: Evaluate mildew control strategies and integrate them into abeste system using only green products and biostimulants or in combination with less chemicals.
- Most recent trial:
  - Conducted on tabletops at Delphy ISFC during peak mildew pressure in the summer.
  - Focused on highly susceptible cultivar Elsanta.
  - Sprayings done after production period and cut back.
- Setup:
  - Weekly product applications.
  - Weekly mildew scoring on a 0–5 scale.
- Key findings:
  - Several strategies significantly reduced mildew incidence.
  - Improved plant resilience under high disease pressure.
  - Less chemical residues possible.
- Implication:
  - Confirms potential of IPM-based approaches as part of sustainable disease management

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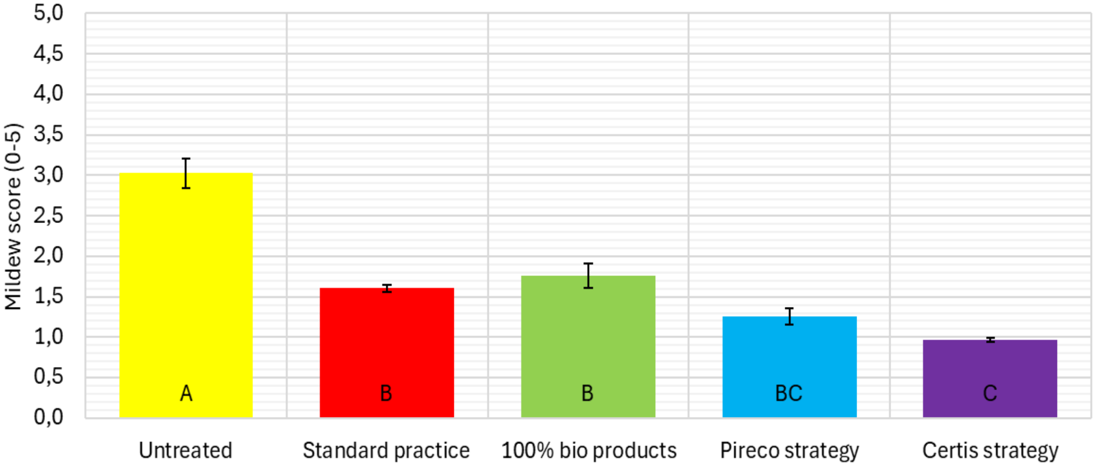
Strategies and results

1. Boscalid /Pyraclostrobin
2. Potassium Bicarbonate
3. Trisiloxaan
4. Bupirimaat
5. Difenoconazool/fluxapyroxad
6. COS-OGA
7. Bacillus amyloliquefaciens strain QST 713
8. Cyflufenamid
9. Bacillus amyloliquefaciens subsp. plantarum strain D7

Week	Standard practice	100% bioproducts	Pireco	Certis
1	Signum[1] + Vitisan[2]	Fado[2,6] + Serenade[7] + Hi-Wett[3]	Herfomyc-Horti + Karma[2]	Karma[2]
2	Signum[1] + Vitisan[2]	Fado[2,6] + Serenade[7] + Vitisan + Hi-Wett[3]	Herfomyc-Horti + Fado[2,6] + EVR	Takumi[8] + Karma[2]
3	Nimrod[4]	Fado[2,6] + Serenade[7] + Vitisan[2] + Hi-Wett[3]	Herfomyc-Horti + Karma[2] + Takumi[8]	Takumi[8] + Karma[2]
4	Bifasto[5] + Karma[2]	Serenade[7] + Karma[2]	Herfomyc-Horti + Fado[2,6] + EVR	Amylo- X[9] + Karma[2]
5	Bifasto[5] + Karma[2]	Fado[2,6] + Serenade[7] + Karma[2]	Herfomyc-Horti + Karma[2] + (Takumi[8])	Amylo- X[9] + Karma[2]

Mildew score average over whole trial (0=0% infection of leaf, 5=>50% infection of leave)



Towards a Sustainable Unlit Strawberry Cultivation

- At Delphy, we aim to lead the way in this area and provide tools for growers.
- Goal: Develop a system that is
  - 100% green (chemical-free)
  - Fossil-free & emission-free
- Scope: Broader than mildew, but mildew reduction is a key component.
- Approach:
  - Exclusive use of green products
  - Biological pest control
  - Innovative tools:
    - UV-C robots
    - Optimized sulphur burners combined with biological strategies
- Vision: Make strawberry cultivation viable & sustainable for the future.

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Towards a Sustainable Unlit Strawberry Cultivation

- Spraying, root application, sulphur burners and UV-C
- Mildew pressure was controllable → 100% green approach is possible
- However, needs more finetuning further due to:
  - More sprayings in general
  - More sprayings makes the crop wet more often → increased chances of mildew
  - Fruit quality is affected by the frequent spraying

Type	Why/what	Product	Mode of action	Week
Sulphur burners		Every other night 4 hours		34 t/m 50
UV-C		UV-C robot (3x/week)		34 t/m 50
Plant resilientness	Plant resilientness	SalicylPuur	💧	36 t/m 41 +45 t/m 47
	Silicon and silver	ArgicinPlus	💧	42 t/m 44
	Fruit coloring	Silica Power	💧	45 t/m 50
	Chitosan	Haifa stim Kir	💧	35,42,48
	Trichoderma	Trianum P	💧	37,46
	Fruit set	Vidi Terrum	🌿	37,42
	Root length	Vidi Parva	💧	37,42
	Algea	Vidi Fortum	🌿	39 t/m 41 +43 t/m 45, 47
Bio Fungicides (Mildew)		Vitisan	🌿	39 t/m 41
		Vitisan	🌿	43,44,45,47
		Serenade	💧	35,41,45,50
		Serenade + HiWett	🌿	37 t/m 39
		Vacciplant + Hiwett	🌿	36,37,42

🌿 = Spraying 💧 = Root application

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Innovation & Alternative Tools

- Industry shift: Withdrawal of chemical crop protection → fast adoption of alternatives.
- Emerging technologies:
  - UV-C treatment (robots & overhead lighting)
  - Air purification systems to reduce airborne spores
  - Mildew eating beneficials
- Status:
  - UV-C robots increasingly common in greenhouses & outdoor set-ups, but are still being improved and optimized
  - Overhead UV-C & air purification still early-stage adoption
- Key insight: Technology alone is not enough—cultivation practices remain critical

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Cultivation Practices & Plant Resilience

- Maintain optimal humidity, prevent drafts, apply precise irrigation.
- Variety choice: Less susceptible cultivars strengthen IPM strategies.
- Balanced fertilization:
  - Lower nitrogen (especially nitrate) can suppress mildew.
  - Too low → poor growth & yield; too little nitrate → higher mildew risk.
- Bottom line: Achieve the right balance for sustainable mildew management.

Looking ahead

- Powdery mildew challenge continues—withdrawal of chemical products raises the stakes.
- Positive side: Accelerated innovation and new tools for disease management.
- Fully green cultivation requires more than technology:
  – Shift in application timing and integration of multiple strategies.
- Complexity increases:
  – Interactions between variety choice, irrigation, climate control, and fertilization.
- Key message:
  – Mildew management is challenging, but achievable with the right choices.
  – Collaboration across the sector + embracing innovation = resilient, sustainable systems.
- Goal: Keep strawberry production viable for the future.

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Thank you for your attention!

Feel free to contact me for questions
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