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PP-167 [Bee Health]

Evaluating pesticide efficacy for the control of *Vespa velutina nigrithorax*: one more step to protect the bees

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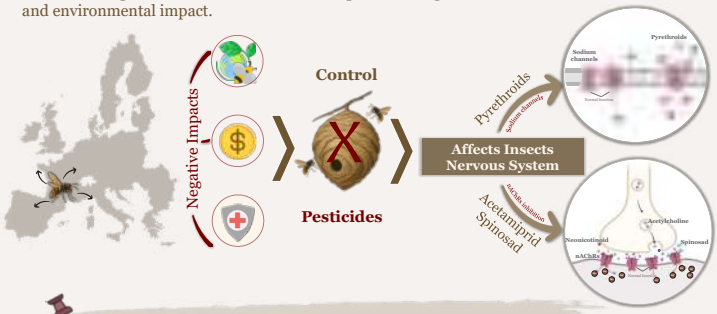
Introduction [1,2,3]

Vespa velutina nigrithorax (*Vvn*) is an invasive species rapidly spreading in Europe, with significant impacts on biodiversity, beekeeping, the economy, and human health. Current control methods rely mainly on pesticides, either injected into nests or used in baited traps. In Europe, the absence of standardized, scientifically tested protocols has led to improvised measures adapted from the control of other pests, raising concerns about their effectiveness and environmental impact.

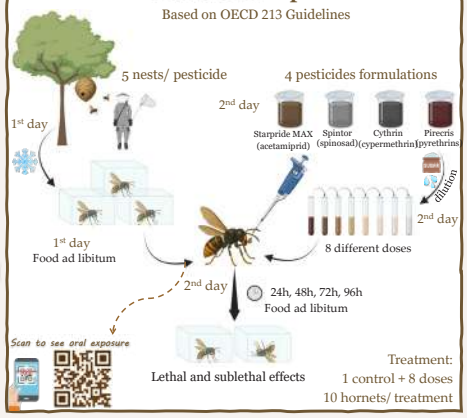


Objective Evaluate the efficacy of four pesticides formulations: Starpride MAX® (a.s. acetamiprid), Spintor® (a.s. spinosad), Cythrin® (a.s. cypermethrin) and Pirecris® (a.s. natural pyrethrins) against *Vvn* by oral exposure.

Methodology [4]

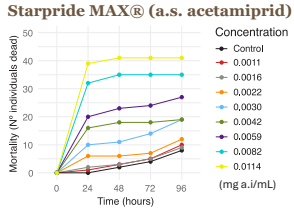
Acute Oral Exposure

Based on OECD 213 Guidelines



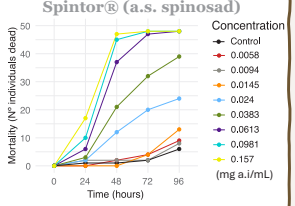
Results

Starpride MAX® (a.s. acetamiprid)



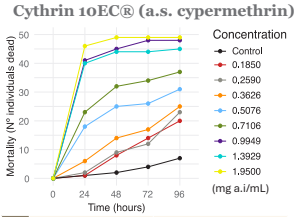
24h LC_{50}- 0.0063 mg a.i./mL LC_{90}- 0.0184 mg a.i./mL
48h LC_{50}- 0.0060 mg a.i./mL LC_{90}- 0.0155 mg a.i./mL

Spintor® (a.s. spinosad)



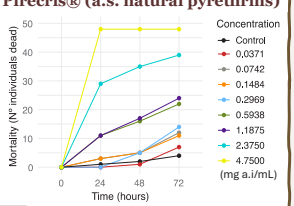
24h LC_{50}- 0.3040 mg a.i./mL LC_{90}- 1.5800 mg a.i./mL
48h LC_{50}- 0.0433 mg a.i./mL LC_{90}- 0.1090 mg a.i./mL

Cythrin 10EC® (a.s. cypermethrin)



24h LC_{50}- 0.7343 mg a.i./mL LC_{90}- 1.5900 mg a.i./mL
48h LC_{50}- 0.5224 mg a.i./mL LC_{90}- 1.3218 mg a.i./mL

Pirecris® (a.s. natural pyrethrins)



24h LC_{50}- 1.7024 mg a.i./mL LC_{90}- 7.3062 mg a.i./mL
48h LC_{50}- 1.2705 mg a.i./mL LC_{90}- 6.4458 mg a.i./mL

Conclusion [5,6]

	Starpride Max	Spintor	Cythrin 10EC	Pirecris
Effects	Rapid action; high mortality within 24h	Mortality increase over time Highest incidence of sublethal effects	High mortality; toxicity increased over time	High mortality and sublethal effects
Environment impact	Safer for pollinators Synthetic Rapid degradation	Biopesticide Rapid degradation on plant surfaces	Synthetic	More toxic to other insects (bees) Biopesticide
Limitations	-	More toxic to other pollinators (e.g. bumblebees) than *Vvn*	Strong repellency (>0.5076 mg a.i./mL)	Highest lethal doses
Promisor candidate?	✓	✓	✗	✗

- Formulations with acetamiprid and spinosad are the most promissors insecticides for the control of *Vvn*;
- Cythrin showed strong repellency effects over 0.0576 mg/mL which could reduce real-world efficacy;
- Pirecris presented the highest LD.

Acknowledgments

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References

PP-167 [Bee Health]
Evaluating pesticide efficacy for the control of Vespa velutina nigrithorax: one more step to protect the bees

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The yellow-legged hornet Vespa velutina nigrithorax is an invasive species in Europe that poses a significant threat to both economy and biodiversity. Its high adaptability and efficient reproductive capacity contribute to its rapid spread, while its predatory behavior for insects, particularly toward honey bees, severely impacts apiculture by increasing colony losses and raising maintenance costs for beekeepers. Consequently, developing effective control strategies to mitigate or eradicate this species has become a priority. Currently, control strategies for the yellow-legged hornet rely mainly on chemical control with pesticides, either by injecting them into nests for destruction or by using baited traps. However, the lack of a species-specific standardized protocol based on scientific methods, such as pre-tested pesticide concentrations to ensure efficacy at the European level, has led to the implementation of improvised control measures adapted from other pest species. Consequently, it raises concerns regarding both efficacy and environmental sustainability. This work aimed to evaluate the efficacy of four pesticides, namely, Starpride MAX (acetamiprid), Spintor (spinosad), Cythrin (cypermethrin) e Pirecris (natural pyrethrins) against Vespa velutina nigrithorax. Oral toxicity tests were conducted following an adapted version of OECD Guidelines for the Testing of Chemicals on honey bees. The results demonstrated that acetamiprid, even at low concentrations, affects the hornets within 24h, whereas spinosad, at higher concentrations, only showed effects at 48h. Cypermethrin also induced mortality within 24h, but requires substantially higher concentrations, even with avoidance behavior with a 3-hour fasting period. Pyrethrins yielded the least promising results. This study provides crucial data on the efficacy and ecological impact of these pesticides, contributing to the refinement of control practices for this invasive species. Additionally, it underscores the importance of integrated pest management strategies that balance efficiency with ecological sustainability, ultimately supporting the protection of honeybees and the apiculture industry.