

Representation at stakeholder meetings

This document shows the organisations represented at the stakeholder meeting on 24 October 2018, arranged by Formas in collaboration with the County Administrative Board of Gävleborg, Sweden.

Organisation (Swedish name)	Organisation (English name)
Naturvårdsverket	Swedish Environmental Protection Agency
Länsstyrelsen Gävleborg	County administrative board of Gävleborg
Länsstyrelsen i Dalarnas län	County administrative board of Dalarna
Heby kommun	Municipality of Heby
Sandvikens kommun	Municipality of Sandviken
Västra Gästriklands samhällsbyggnadsförvaltning	Spatial planning office of western Gästrikland ¹⁾
Nedre Dalälvsamarbetet, NeDa	Nedre Dalälvs collaboration/Nedre Dalälvens Development Inc.
Lantbrukarnas Riksförbund (LRF)	The Federation of Swedish Farmers
Världsnaturfonden WWF	WWF
Föreningen för myggbekämpning	The Association for Mosquito Control ¹⁾
Biologisk Myggkontroll ²⁾	Biological Mosquito Control ²⁾

¹⁾Authors' translation (not an official English name)

²⁾Unable to attend on 24 October but participated in a separate meeting with Formas on 26 November 2018

Evaluation of search query

A broad search strategy not specifying any outcome words will be applied. We have developed a simple search string consisting of two blocks. The first block contains words related to target species and the second block contains words related to the biological control agent Bti. The blocks will be combined with the Boolean operator AND, whereas the words within each block will be combined with the operator OR.

We used Web of Science¹ to evaluate search words and optimise the query. The first query was

#1: (nematocera* OR midge* OR diptera* OR mosquito* OR vector* OR larv* OR “black fly” OR “black flies” OR biting OR chironom*) **AND** (bti OR israelensis OR vectobac* OR Introban* OR biorational* OR biopesticid* OR biolarvicid*)

In query #2 we added a range of common mosquito genera to the first block. Table 1 shows that the genera in query #2 result in a low number of extra search results compared to query #1. We conclude that adding even more genera to the first block will not result in a significantly larger number of relevant search results.

Next, we expanded block 2 with “bacillus thuringiensis”, pesticide, and insecticide in query #3, #4, and #5, respectively. These words are judged to be too general and generate an unmanageable number of irrelevant search results.

It cannot be ruled out that some studies focusing on ecosystem effects of Bti or direct effects on non-target species mention the non-target species rather than any of the words related to target species in block 1. To test this we used query #6, which was specifically designed to find such articles. Among the relevant search results, we only found studies that had investigated direct effects on single species in the laboratory [1-10], and such studies are not eligible in this systematic review. Thus, we believe it is unlikely that we lose any eligible studies by using block 1 containing words related to target species.

Table 1. Number of search results for evaluated search queries. Differences in queries compared to query #1 is marked by text in blue.

No.	Query	Search results
#1	(nematocera* OR midge* OR diptera* OR mosquito* OR vector* OR larv* OR “black fly” OR “black flies” OR biting OR chironom*) AND (bti OR israelensis OR vectobac* OR Introban* OR biorational* OR biopesticid* OR biolarvicid*)	3,906
#2	(nematocera* OR midge* OR diptera* OR mosquito* OR vector* OR larv* OR “black fly” OR “black flies” OR biting OR chironom* OR culicid* OR simuliid* OR anopheles OR aedes OR ochlerotatus OR culex OR culiseta OR limatus OR uranotaenia OR psorophora OR mansonina OR armigeres OR trichoprospon OR coquillettidia OR tripteroides) AND (bti OR israelensis OR vectobac* OR Introban* OR biorational* OR biopesticid* OR biolarvicid*)	3,922
#3	(nematocera* OR midge* OR diptera* OR mosquito* OR vector* OR larv* OR “black fly” OR “black flies” OR biting OR chironom*) AND (bti OR israelensis OR vectobac* OR Introban* OR biorational* OR biopesticid* OR biolarvicid* OR “bacillus thuringiensis”)	10,768

¹ Including Web of Science Core Collection, KCI-Korean Journal Database, MEDLINE®, Russian Science Citation Index, and SciELO Citation Index. Search date was 27 June 2019. Searched field = Topic.

No.	Query	Search results
#4	(nematocera* OR midge* OR diptera* OR mosquito* OR vector* OR larv* OR "black fly" OR "black flies" OR biting OR chironom*) AND (bti OR israelensis OR vectobac* OR Introban* OR biorational* OR biopesticid* OR biolarvicid* OR pesticide)	152,624
#5	(nematocera* OR midge* OR diptera* OR mosquito* OR vector* OR larv* OR "black fly" OR "black flies" OR biting OR chironom*) AND (bti OR israelensis OR vectobac* OR Introban* OR biorational* OR biopesticid* OR biolarvicid* OR insecticide)	49,425
#6	(effect OR impact) AND (bti OR israelensis OR vectobac* OR Introban*) NOT #1 Refined by: RESEARCH AREAS: (TOXICOLOGY OR ENVIRONMENTAL SCIENCES ECOLOGY OR BIODIVERSITY CONSERVATION)	168

References

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8. Mancebo A, Molier T, Gonzalez B, Lugo S, Riera L, Arteaga ME, Bada AM, Gonzalez Y, Pupo M, Hernandez Y *et al.*: **Acute oral, pulmonary and intravenous toxicity/pathogenicity testing of a new formulation of Bacillus thuringiensis var israelensis SH-14 in rats.** *Regulatory Toxicology and Pharmacology* 2011, **59**(1):184-190.
9. Oliveira-Filho EC, Ramos FR, Miranda BCG, Muniz DHF, Monnerat RG: **Evaluating the Elimination of Brazilian Entomopathogenic Bacillus by Non-target Aquatic Species: An Experimental Study.** *Bulletin of Environmental Contamination and Toxicology* 2014, **93**(4):461-464.
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Benchmark papers

This document lists papers and reports that the authors think should be captured in comprehensive searches. If any of the listed items is not found in the searches as outlined in the protocol, complementary searches may be conducted and reported in the systematic review.

- Allgeier, S., Kastel, A., Bruhl, C.A., 2019. Adverse effects of mosquito control using *Bacillus thuringiensis* var. *israelensis*: Reduced chironomid abundances in mesocosm, semi-field and field studies. *Ecotoxicology and Environmental Safety*, 169: 786-796.
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- and nontarget effects on invertebrates and fish. *Journal of the American Mosquito Control Association*, 5(3): 397-415.
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