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VKM Report 2020:12

Risk assessment of the biological control product Atheta-System with the organism *Atheta coriaria* Kraatz

Scientific Opinion of the Panel on Plant Health of the Norwegian Scientific Committee for Food and Environment

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Preparation of the opinion.

The Norwegian Scientific Committee for Food and Environment (Vitenskapskomiteen for mat og miljø, VKM) appointed a project group to draft the opinion. The project group consisted of two VKM members and a project manager from the VKM secretariat. Three referees commented on and reviewed the draft opinion. The Committee, by the Panel on Plant health assessed and approved the final opinion.

Authors of the opinion

The authors have contributed to the opinion in a way that fulfils the authorship principles of VKM (VKM, 2019). The principles reflect the collaborative nature of the work, and the authors have contributed as members of the project group and/or the VKM Panel on Plant health.

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Competence of VKM experts

Persons working for VKM, either as appointed members of the Committee or as external experts, do this by virtue of their scientific expertise, not as representatives for their employers or third party interests. The Civil Services Act instructions on legal competence apply for all work prepared by VKM.

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Summary

Atheta-System with the rove beetle *Atheta coriaria* (Kraatz 1856) as the active organism is sought to be used as a biocontrol agent for augmentation biological control in Norway. Atheta-System is intended for use against soil dwelling stages of fungus gnats (e.g. *Bradysia paupera*), shore flies (*Scatella stagnalis*), and thrips (e.g. *Frankliniella occidentallis*) in greenhouses, plastic tunnels, and other closed or controlled climate cultivations of horticultural crops, incl. soft-fruit crops, vegetables, ornamentals, and kitchen herbs.

VKM's conclusions are as follows

Distribution, especially if the organism is found naturally in Norway

Atheta coriaria is established (naturalized) in Norway since 1919 and has been reported numerous times from Agder in the South to Trøndelag in mid-Norway.

The potential of the organism for establishment and spread under Norwegian conditions specified for use in greenhouses and open field

The thermal thresholds of *A. coriaria* are not well-studied, but its current distribution in Southern and mid-Scandinavia shows that it tolerates relatively low winter temperatures, and that the Norwegian summer climate allows for successful reproduction. *A. coriaria* overwinters in the soil, which provides a relatively sheltered environment. Adults disperse rapidly by flying. All life stages can be vectored by humans – mainly by movement of soil and compost material. Thus, further spread northwards in Norway is predicted irrespective of additional introductions.

It is unknown if it can enter diapause under greenhouse conditions.

Any ambiguities regarding the taxonomy which hamper risk assessment

There are no major taxonomic challenges related to the assessment of *A. coriaria*.

Assessment of the product and the organism with regard to possible health risk

VKM is unaware of reports of harm inflicted to humans by *A. coriaria* itself. Atheta-System comes with the cosmopolitan cheese mite (*Tyrophagus putrescentiae*), serving as food for *A. coriaria*. As with most mites, *T. putrescentiae* may induce allergic reactions in sensitive persons handling the product.

Key words: VKM, risk assessment, Norwegian Scientific Committee for Food and Environment, Norwegian Food Safety Authority, biological control, rove beetle

Sammendrag på norsk

Athea-System, med kortvingen (rovbillen) *Atheta coriaria* (Kraatz 1856) som aktiv organisme har blitt søkt godkjent som plantevernmiddel i Norge. Athea-System ønskes brukt til å bekjempe jordlevende larver av hærmygg (*Bradysia paupera*), vannfluer og trips (for eksempel Amerikansk blomstertrips (*Frankliniella occidentallis*) i veksthus, plasttunneler og andre innendørsbeplantninger for frukt- og grønnsakdyrking, prydplanter og krydderurter.

VKM konkluderer følgende

Utbredelse, spesielt hvis organismen forekommer naturlig i Norge

Atheta coriaria ble ansett som etablerte i Norge i 1919 og har blitt observert gjentatte ganger fra Agder i sør til Trøndelag i Midt-Norge.

Organismens potensiale for å etablere og spre seg under norske forhold spesifisert for bruk i drivhus og på friland

Temperaturtoleransen til *A. coriaria* er ikke studert i detalj, men den dokumenterte utbredelsen i sør- og midt Skandinavia tyder på at den overlever relativt lave vintertemperaturer og at den kan reprodusere i et norsk sommerklima. Arten overvintrer i bakken og voksne individer kan fly og dermed spre seg raskt.

Det er uvisst om *A. coriaria* kan gå i diapause i veksthus.

Tvetydigheter relatert til taksonomi som påvirker risikovurderingen

Det er ingen store taksonomiske utfordringer relatert til vurderingen av *A. coriaria.*

Vurdering av produktet og organismen opp mot mulig helserisiko

VKM har ikke funnet rapporter som beskriver skade på mennesker fra *A. coriaria*. Athea-System kommer med ostemidd (*Tyrophagus putrescentiae*) som føde for *A. coriaria*. Som for andre midd kan *T. putrescentiae* utløse allergiske reaksjoner hos sensitive personer som håndterer produktet.

Nøkkelord: VKM, risikovurdering, Vitenskapskomiteen for mat og miljø, Mattilsynet, biologisk kontroll, kortvinge, rovbille

Terms of reference as provided by the Norwegian Food Safety Authority/ Norwegian Environment Agency

The rove beetle *Atheta coriara* (Kraatz 1856) is the biocontrol organism in Atheta-System. The intended use in Norway is for biological control of fungus gnats, shore flies, and thrips in protected cultivations of horticultural crops such as fruits, vegetables, ornamentals, and soft fruits.

In this regard, The Norwegian Food Safety Authority would like an assessment of the following:

- Distribution in nature, especially if the organism is found naturally in Norway.
- The potential of the organism for establishment and spread under Norwegian conditions specified for use in greenhouses and open fields.
- Any ambiguities regarding taxonomy that hamper risk assessment.
- An assessment of the product and the organism with regard to potential health risk for users.

Assessment

1 Introduction

1.1 Purpose and scope

This document presents a scientific opinion prepared by the Panel of Plant Health, in response to a request from the Norwegian Food Safety Authority. The opinion is an assessment of the biological control product Atheta-System (BioBest) with the rove beetle *Atheta coriaria* (Kraatz 1856) (Coleoptera: Staphylinidae). The assessment area for this opinion is Norway.

1.2 Product and trade name

The rove beetle *Atheta coriaria* is used as a biological control agent in Atheta-System (BioBestgroup.com 2020).

The product Atheta-System contains *A. coriaria* individuals in egg, larval, pupal and adult stages, and mixed with a carrier of peat or vermiculite and mites as food for the beetles (the cheese mite, *Tyrophagus putrescentiae* Schrank 1781).

Atheta coriaria is reportedly suited for use in horticultural crops grown in greenhouse and plastic tunnels. It thrives in warm and humid conditions. It is reportedly active between 12 and 35 °C. Low humidity can be detrimental for this beetle.

1.2.1 Associated organisms

The Atheta-System product contains the cosmopolitan cheese mite, *Tyrophagus putrescentiae*, which serves as a food source. *T. putrescentiae* is probably globally distributed and is found in a wide range of habitats. *Tyrophagus putrescentiae* is present in Norway.

1.2.2 Natural distribution of *Atheta coriaria*

The species has a very wide natural distribution. It is reportedly native to Central and Southern Europe, and has been found in North America, Australia, New Zealand, the Azores, and South Africa. It spread northwards in Europe and was established in all Scandinavian countries in the early 1900s. It is thus naturalized in Norway.

We do not know from where the parental individuals for Atheta-System were sampled. This piece of missing information could be important if *A. coriaria* consists of several ecotypes

that differ in their behaviour or climatic requirements. However, no published data suggest that there are different ecotypes within the species of A. coriaria.

1.3 Properties pertaining to its use as a plant protection product

Atheta coriaria is a generalist rove beetle that feed on many kinds of soil dwelling prey of suitable size. From a plant protection perspective, the most important prey organisms are fungus gnats (Echegaray et al., 2015), shore flies (Carney et al., 2002), and thrips (Li et al., 2019). Its generalist lifestyle enables it to survive during periods of prey scarcity, which is considered an advantage for biocontrol agents (Birken and Cloyd, 2007). Use of *A. coriaria* in European greenhouses and plastic tunnels is normally classified as augmentation or inoculation biological control (for definitions of classifications, see Eilenberg et al. (2001)).

1.3.1 Sensitivity to pesticides

Several studies have investigated the effects of pesticides on *A. coriaria*.

Cloyd and Herrick (2018) found that *A. coraria* is susceptible (>50% mortality) to pyrethrins and to Spinosad, and somewhat susceptible (c. 40% mortality) to the spider venom toxin-based insecticide VST-006340LC and the systemic insecticide flupyradifurone (Cloyd and Herrick, 2018). They further found that application of the pyrazole insecticide tolfenpyrad, the the bio-insecticide Captiva and the entomopathogenic biocontrol fungus *Isaria fumosoroea* were not significantly harmful to *A. coriaria*. In another study Cloyd and Chiasson (2007) found that several neonicotinoids are directly harmful to *A. coriaria*, while fungicides were not.

A study pesticides and plant growth regulators Echegaray and Cloyd (2012) found that acetamiprid, lambda-cyhalothrin, and cyfluthrin were harmful to rove beetle adults, whereas *Beauveria bassiana* (Balsamo) Vuillemin, azadirachtin, organic oils, and plant growth regulators were nontoxic. The harmful pesticides were considerably less harmful when *A. coriaria* were released 24h after pesticide application.

These, and other studies with similar results, show that some plant protection products are harmful, while others are harmless, to *A. coriaria*. Thus, control strategies can be adapted to either combat *A. coriaria* itself or integrate it in an IPM approach with chemical and biological control to combat horticultural pests.

1.3.2 Target pests

The target pests for *A. coriara* are fungus gnats (e.g. *Bradysia paupera* Tuomikoski 1960), shore flies (*Scatella stagnalis* Fallen 1813), and thrips (e.g. *Frankliniella occidentallis* Pergande 1895). It can also consume plant-based food during periods of scarcity of pray.

1.3.3 Life cycle of target pests

Fungus gnats: Many fungus gnats in the family Sciaridae are pests of horticultural crops, especially under warm and humid greenhouse conditions. The Sciaridae have world-wide distribution and can be extremely common. The larvae feed on the roots and can cause substantial damage, wilting and death of potted plants. In particular, the sciarid species *Bradysia paupera* is a target prey of *A. coriaria*.

Bradysia paupera has small (2 mm long) free living black adult flies. The larvae dwell below-ground and are up to 10 mm long. The larvae damage the roots, and serve as vectors for several bacterial and fungal species (Leath and Newton, 1969). Under greenhouse conditions, *B. paupera* has several overlapping generations and is active year-round. Each female can lay up to 200 eggs, and the development time is 2-3 weeks in warm greenhouses.
Bradysia paupera is prone to evolve resistance against insecticides (White, 1981).

Shore flies: *Scatella stagnalis* (Diptera: Ephydridae) is naturally reproducing in Norway and is a common pest in humid greenhouse environments in Europe, Asia, and North America. It feeds on rotting plant material and algae. Although it does not damage the plants directly, it leaves faeces ("fly specks") on the plants which may reduce the economic value of ornamentals.

Female shore flies can lay up to 500 eggs which hatch after 2-3 days (Ugine et al., 2007; Vänninen, 2001). After hatching, the insect undergoes three larval instars and a pupal stage before becoming an adult. The adults live for up to 4 weeks. The species has overlapping generations; the highest net reproductive rate and intrinsic rate of natural increase are obtained at around 26-29 °C (Ugine et al., 2007; Vänninen, 2001).

The western flower thrips, *Frankliniella occidentalis* (Thysanoptera: Thripidae) is an important polyphagous pest in vegetables, fruits and ornamentals worldwide (Cloyd et al., 2009). This thrips species inbreeds, so population establishment and spread are not hindered by the necessity of finding mates and population growth is enhanced by offspring being heavily female-biased (Ding et al., 2018). It causes direct damage to the plants and is also an important vector of viruses such as *Orthotospovirus* (tospovirus) (Pappu et al., 2009)*Frankliniella occidentalis* prefers flowers, if available, but can oviposit wherever the thrips are located on the plant. At optimal temperatures (20 °C), a female can lay up to 40 eggs per clutch and can produce 350 eggs during its lifetime (up to 90 days). Eggs hatch after approx. 4 days and goes through two larval instars, prepupa and pupa to reach the adult stage. The development time is dependent on temperature (McDonald et al., 1998) and is about 12 days at 30 °C, and 20 days at 20°C. Adult females are active at least between 10 and 35 °C. The species can have up to five generations outdoors in the UK (McDonald et al., 1998) and considerably more generations in warmer areas. In greenhouses, they have multiple and overlapping

generations. The two first larval instars and the adults feed on plant tissues and causes damage (Plantevernleksikonet.no).

1.4 Status in Norway

Atheta coriaria has been present in Norway as naturalised, wild populations since at least 1919 (Ødegaard and Tømmerås, 2000). Thus, although it is not a native species, it has become an integrated species in the fauna of Norway.

Atheta coriaria is approved for greenhouse use in several European countries and is listed on the European and Mediterranean Plant Protection Organisation (EPPO) list of commercially used biological control agents (EPPO 2019; PM6/003(4)).

Although the species of *A. coriaria* is established and naturalized in Norway, it is likely that the genetic or trait composition of the individuals in Atheta-System is somewhat different from that of the present Norwegian population(s). We do not know from which population the original wild individuals used to establish Atheta-System were sampled.

2 Data collection and literature search

Literature searches were performed in Medline, ISI Web of Science, Scopus. These databases were chosen to ensure comprehensive study retrieval. The literature search was performed by senior librarians at the Norwegian Public Institute of Public Health on 26.06.2020.
The main searches resulted in a total of 27 records after duplicates were removed, both automatically and during primary screening of the Endnote bibliography. The full literature search is presented in Appendix I. In the primary screening, titles and abstracts of all publications retrieved were independently screened against the inclusion criteria.

2.1 Inclusion and exclusion criteria:

- Inclusion criteria:
  - Publication type – primary research studies, review papers, systematic reviews, editorials and meeting abstracts addressing crop protection, economic entomology or basic research with indirect applicability.
- Exclusion criteria:
  - Publications addressing other species or on species not relevant under the environmental conditions for Norway.

The screenings as well as quality assessment of papers were performed independently by each member of the project group. Potential disagreements were solved in the project group.

Articles that did not appear to meet the inclusion criteria were excluded from further analysis. In situations where it was unclear whether the publication was of relevance to the study, it was retained for further screening. Full text articles that passed the primary screening were retrieved and compared against the inclusion criteria and assessed for relevance and quality.

In order to strengthen the data basis of the opinion, additional manual searches for papers and relevant grey literature were also performed. Manual searches included snow-balling, i.e. articles that were referred to in papers found in the main literature, searches via Google, Google Scholar, and PubMed via EndNote. The manual searches resulted in 15 relevant papers and documents, which were included in the opinion (Figure 1.)

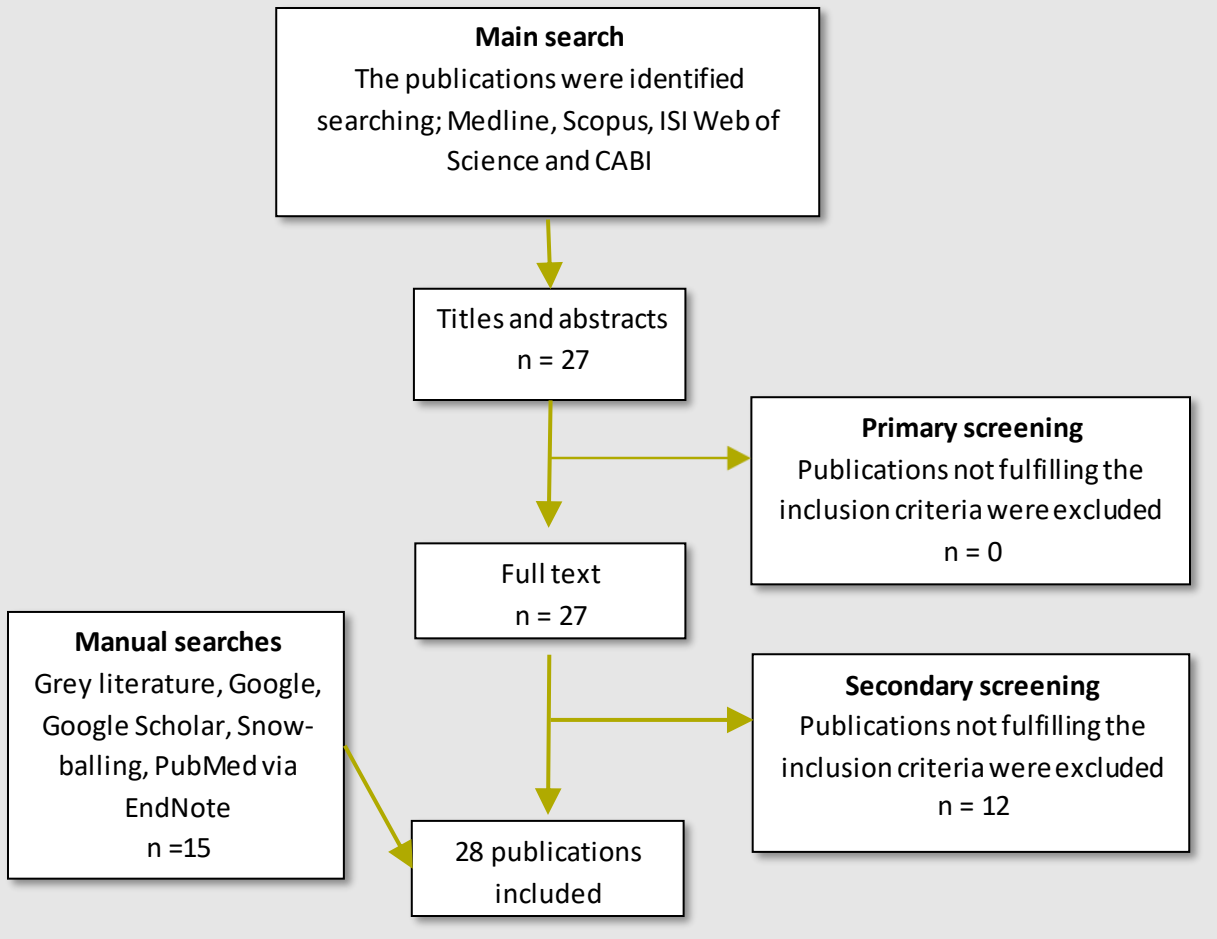

Figure 1. Flowchart for the literature search on *A. coriaria*

3 Risk characterisation

3.1 Occurrence and distribution in Norway

Atheta coriaria is not native to Norway, but was reported for the first time 1919 (Ødegaard and Tømmerås, 2000). According to Ødegaard and Tømmerås (2000) it was most likely introduced by long-distance human transport from middle or central Europe to Norway. In more recent years it has been reported numerous times from Agder in the South to Trøndelag in mid-Norway (artsdatabanken.no 2020; GBIF.org 2020). The many recent reports suggest that the populations of *A. coriaria* in Norway are large, widespread, and viable, and that efforts to eradicate it would be meaningless. Thus, it should be considered as naturalized in Norway from an ecological point of view.

One may add that reports of *A. coriaria* are very frequent from all of Sweden too. Most likely, the Scandinavian populations of *A. coriaria* should be considered as one single meta-population, with natural migration between the countries being as common as migration within countries.

3.2 Potential for establishment and dispersal

3.2.1 Climatic limitations

No areas of Norway stand out as obviously unsuitable for *A. coriaria*. It is already well established in the southeastern part of Norway, and recent reports suggest that is has established natural populations all the way up to Trøndelag (artsdatabanken.no; GBIF 2020). However, we did not find any experimental studies dealing with the climatic limitations (temperature or humidity) of *A. coriaria*. It is thus difficult to predict how far north this species can establish. However, in Sweden it has been reported from very cold areas, including Kiruna, suggesting that it can cope with harsh Nordic climate. Thus, climate conditions alone are not likely to prevent further spread (natural or via inoculative releases) to the Northern parts of Norway where it is currently not established. Ødegaard et al. (2018) predicted that the current naturalized populations of *A. coriaria* may spread to all parts of Norway within 50 years. However, the competitive ability of insects typically declines close to the borders of their climatic tolerance levels. Although *A. coriaria* is likely capable of spreading and establishing itself northwards in Norway, they are unlikely to reach high population densities there. Available reports from Sweden indeed suggest that although *A. coriaria* occasionally is found in the north, the population densities there are lower (GBIF 2020).

One may add that insect lines reared under laboratory conditions for many generations may lose some abilities kept by wild relatives. Thus, we do not exclude the possibility that *A.*

coriaria individuals in Atheta-System have lower climatic tolerance as compared to the existing naturalized wild populations in Norway.

3.2.2 Other factors affecting survival

As with most arthropods, *A. coriaria* has many natural enemies, including other arthropods, as well as pathogenic microorganisms and nematodes (Jandricic et al., 2008; Jandricic et al., 2006). Top-down control by natural enemies may occasionally be an important factor for controlling the population growth of insects, including *A. coriaria*.

Considering that *A. coraria* is a generalist predator that can eat most prey of suitable size, we do not expect survival to be limited by food shortage in wild habitats in any part of Norway.

3.2.3 Reproduction

Few studies investigated the life history characteristics of *A. coriaria*. However, a study by Echegaray and Cloyd (2013) showed that *A. coraria* females lay 90 eggs during their lifetime, and the survival of these eggs to adulthood is >75% under laboratory conditions (26 ± 3°C and 50 to 60% RH). The development time from egg to adult was 17.0 days. Male and female adult longevity was 60.3 and 47.8 days, respectively.

The combination of high reproduction and rapid development indicates strong potential for local population growth under greenhouse conditions. However, the outdoor climate in Norway is considerably harsher, and wild populations would not be expected to have very high per capita growth rate.

3.2.4 Means of dispersal

The adult beetles have wings and can disperse actively and naturally by flying (Bennison et al., 2008). We are not aware of any catch-release experiments testing the capacity of natural spread, but estimate that individuals can fly at least several kilometers. In any case, natural dispersal by flying is possible from open greenhouses and tunnels to wild habitats.

In addition to natural spread, all life stages of *A. coriaria* can also be vectored by human activities, for example compost transportation, which probably was the principal mode of introduction leading to the establishment of naturalized Norwegian populations in the 1900s (Ødegaard and Tømmerås, 2000). Soil from cultivations where *A. coriaria* has been used may constitute a source of infection during transport and disposal. Passive wind-assisted dispersal may be possible.

3.2.5 Preventive measures

As far as we know, preventive measures to reduce the spread of *A. coriaria* have not been applied elsewhere in Europe as this beetle is considered native to this continent. However, should there be a wish to limit the spread of a specific ecotype in Norway, this could be

achieved by installing fine-meshed insect nets in greenhouses and tunnels where inoculative releases of *A. coriaria* are planned. Furthermore, waste from the production site, including plant parts and substrate etc., could be managed to limit spread in Norway.

It is unknown how long time *A. coriaria* individuals can survive in greenhouses after the horticultural plants and their pests have been removed. As shown in section 1.3.1 in this report, *A. coriaria* is sensitive to some pesticides, and chemical treatments of greenhouses can probably speed up the eradication of this species if needed.

3.3 Taxonomic challenges

We do not see any major taxonomic difficulties with *A. coriaria* although Athetini indeed is a complex tribe.

Gusarov (2003) moved *A. coriaria* to the genus *Dalotia*, but both synonyms are widely used today. In this report we use *Atheta* rather than *Dalotia*, following the practice of Mattilsynet and BioBest.

Guides to identification of *A. coriaria* using morphological characters have been published by e.g. Klimaszewski and Peck (1998) and Klimaszewski et al. (2007). However, species identification of rove beetles can be difficult for lay people.

VKM has not been informed about the location from where the original *A. coriaria* specimens used to establish the culture for Atheta-Systems were sampled. This lack of information may be important if different ecotypes (or even cryptic species) are available within the geographic range of *A. coriaria*. However, no published data suggest that different ecotypes of *A. coriaria* exist, although this may reflect a lack of studies addressing this issue.

Based on current knowledge, we consider *A. coriaria* to be one genetically homogenous species. However, fylogenetic revisions in the future cannot be excluded.

3.4 Health hazards

3.4.1 Human health

VKM is unaware of reports of harm inflicted to humans by *A. coriaria* itself.

Atheta-System comes with the cosmopolitan cheese mite *Tyrophagus putrescentiae*, serving as food for *A. coriaria*. As with most mites, *T. putrescentiae* may induce allergic reactions in sensitive persons handling the product (Sánchez-Borges et al., 2015).

There is no evidence suggesting that *T. putrescentiae* is more allergenic than other mite species.

3.4.2 Animal health

Atheta coriaria is a generalist predator and is known to feed on a wide range of arthropod prey of suitable size. A list of known prey species is available in Meihls and Hibbard (2009).

From a plant protection perspective, one may notice that *A. coriaria* can engage in intraguild predation, thus feeding on other predators, and itself being a prey of others (Pochubay and Grieshop, 2012). However, most previous studies have concluded that intraguild predation, involving *A. coriaria*, is not substantial enough to threaten strategies of integrated pest management (IPM) involving several predators intended to combat a shared pest species (Pochubay et al., 2015; Pochubay and Grieshop, 2012).

3.4.3 Potential for damage to plants

A. coriaria is capable of consuming certain plant-based food items, but there are no reports of it causing substantial damage to plants.

4 Uncertainties

4.1 Summary of uncertainties

First, the climatic tolerance thresholds of *A. coriaria* have not been experimentally defined. This makes it difficult to predict how far north this species can establish. However, as *A. coriaria* is already established throughout southern and central Norway and in northern Sweden, we consider this knowledge gap to be unimportant.

A second uncertainty relates to the genetic relationship between the individuals used in Atheta-System and naturalized Norwegian populations. Although they belong to the same species, the introduced individuals may potentially belong to a separate ecotype with a slightly different niche and way of living. However, we do not consider it likely that such potential differences could influence the risk to non-target animal organisms, humans or plants.

5 Conclusions (with answers to the terms of reference)

5.1 Distribution, especially if the organism is found naturally in Norway

Although native to Central and Southern Europe, *A. coriaria* has spread and become an almost cosmopolitan species. It was first reported from Norway in 1919 and is now common in southern and central Norway. We consider it to be naturalized in Norway.

5.2 The potential for establishment and spread in Norway under the conditions specified for use in greenhouses and open fields

Atheta coriaria is reportedly active between 12-35 °C, but its upper and lower thermal tolerance thresholds have not been experimentally assessed. Thus, it is not possible to predict how far north it could establish itself. However, this species is present in other cold parts of Scandinavia (e.g., Kiruna, Sweden), indicating that most parts of Norway would be suitable for establishment. It enters diapause during the cold part of the year.

Atheta coriaria is a relatively good flyer and disperses naturally by flying. There are no barriers stopping it from reaching suitable habitats further north in Norway. In the past, *A. coriaria* has also dispersed through human-assisted transport in Norway. Thus, both natural spread and human-assisted spread are important modes of spread.

The ability of *A. coriaria* to disperse from protected cultivations to wild habitats will depend on how the greenhouses/tunnels are equipped. Nets could minimize dispersal from protected cultivations (greenhouses and tunnels) as well as appropriate waste management methods.

5.3 Ambiguities regarding taxonomy that hamper risk assessment

There are no major taxonomic challenges related to the risk assessment of *A. coriaria*.

5.4 Assessment of the product and the organism with regard to possible health risk.

VKM is unaware of reports where harm to humans by A. coriaria itself or associated pathogenic organisms have been observed. Cheese mites (included in Arthea-System as food

for A. coraria) may, however, produce allergic reactions in sensitive individuals handling the product and plant material with a high number of individuals.

6 Data gaps

Data is lacking concerning climatic tolerance thresholds that limit the survival, reproduction, and population growth of *A. coriaria*. These gaps do not affect the conclusions in this report.

There is also lack of data concerning the potential existence of different ecotypes within the species *A. coriaria*, and if the individuals used in Atheta-System might belong to another ecotype than the naturalized individuals already established in Norway.

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Plantevernleksikonet.no

Appendix I

Risk assessment of the biological control product Atheta-System with the organism *Atheta coriaria* Kraatz

Kontaktperson:	Micael Wendell/FHI/VKM
Søk:	Ragnhild Agathe Tornes
Dublettsjekk i EndNote:	Før dublettkontroll: 58 Etter dublettkontroll: 27

Database: Ovid MEDLINE(R) and Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Daily and Versions(R) 1946 to June 25, 2020

Dato: 26.06.2020

Antall treff: 9

1	"Atheta coriaria".tw,kf.	9

Database: Embase 1974 to 2020 June 25

Dato: 26.06.2020

Antall treff: 8

1	"Atheta coriaria".tw,kw.	8

Database: Web of Science

Dato: 26.06.2020

Antall treff: 24

# 1	24	TOPIC: ("Atheta coriaria")

Database: **Scopus**

Dato: 26.06.2020

Antall treff: 17

1	TITLE-ABS-KEY ("Atheta coriaria")	**17 document results**

Database: **Cinahl**

Dato: 26.06.2020

Antall treff: 0

S1	TI ("Atheta coriaria") OR AB ("Atheta coriaria")	0

Database: **Cochrane Database of Systematic Reviews Issue 6 of 12, June 2020, Cochrane Central Register of Controlled Trials Issue 6 of 12, June 2020**

Dato: 26.06.2020

Antall treff: 0

#1	"Atheta coriaria": ti,ab	0

Database: **Epistemonikos**

Dato: 26.06.2020

Antall treff: 0

"Atheta coriaria"