

Plant Galls of the Netherlands, Belgium and Luxembourg

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Introduction

These keys are the first covering the identification of galls on plants, mosses and fungi for Belgium, the Netherlands and Luxembourg.

The study of plant galls and the keys to their identification have an almost century-long tradition in the Netherlands culminating in the 4th revised edition of Docters van Leeuwen's "*Gallenboek*" by the first author in 2009. That edition basically followed the format of earlier editions, and new data were mainly based on personal communications to the reviser, including his own records. It is worth mentioning that other publications by Roelof Jan Koops (2014) and Arnold Grosscurt (2017) have since enriched this tradition.

For Belgium and Luxembourg, literature on plant galls is more dispersed (Roskam & Carbonnelle, 2015). Besides several contributions to knowledge of plant galls in Belgium (with Marie-Thérèse Romain a.o.) and Luxembourg (with Nico Schneider a.o.), Jacques Lambinon conceived original keys in French for the identification of the most remarkable or widely distributed plant galls in Belgium. His "*Aide-mémoire de cécidologie: choix de zoocécidies de la Belgique*" (2008) was later revised and enhanced by the second author and Stéphane Claerebout (2015, 2017). They both also summarised national plant gall fauna in a permanently updated database (Carbonnelle & Claerebout, in prep.).

Furthermore, plant gall records have now significantly increased through national or regional biological data schemes. The records taken from a.o. www.waarneming.nl for the Netherlands, www.observations.be and www.offh.be for Belgium, and more widely with www.inaturalist.com, improve the knowledge about occurrence and abundance of species in the area.

The recent publication by the first author of "*Plant Galls of Europe*" (2019) also made a new advance in plant gall identification keys for Europe. This is a thorough revision of Buhr's keys (1964/65), with additions from Houard's (1908/13) and of many new records and descriptions gathered from the literature from 1960 onwards.

In the last 20 years, many websites have been dedicated to specific groups of insects. They provide helpful information about aphids,

flies, wasps, moths, etc. Among many other websites, Dr Willem Ellis' www.bladmineerders.nl allows contributors from all over Europe, and especially from the Benelux, to benefit from an acute validation of their discoveries. This also holds an impressive collection of pictures of plant mines and galls.

Because of all this, and reflecting the interest that cecidology recently gained among naturalists in the Benelux, we feel that a new approach is now necessary.

- Descriptions of galls, host records and references are mainly from J.C. Roskam "*Plant Galls of Europe*" (2019), with a few modifications (redescription of plant galls, taxonomic changes, etc.) or additions (in the case of discoveries of species new for the Continent or new to science). We mainly follow "*The Plant List*" (version 1.1, Sept 2013 - www.theplantlist.org) for host plant nomenclature. As for host plants, we also omit synonyms for gallers, but readers can refer to W.N. Ellis' "*Plant Parasites of Europe*" (www.bladmineerders.nl) for such information.
- Because several other handbooks on plant galls have recently been published, e.g. Redfern (2011), Grosscurt (2017), we omit introductory chapters on the various groups of gall-inducing organisms.
- This book does not include colour plates because good pictures (when available) are presented online by W.N. Ellis' "*Plant Parasites of Europe*" (www.bladmineerders.nl). However, we incorporated many figures in order to illustrate the characters used in the keys - these are taken from "*Gallenboek*" 4th edition (2009).
- We only present here species that have actually been recorded in Benelux. When a species has been reported, but in our estimation has not been sufficiently documented, we suggest that its occurrence in the area is still doubtful and/or needs confirmation. Nevertheless, with more than 1000 species confirmed in the area, we estimate that at least as many again potentially remain to be discovered. Furthermore, with climate change, new species originating from southern Europe are regularly reported from further north, and species originating from other biogeographical regions are sometimes also introduced. Readers can refer in this case to J.C. Roskam's "*Plant Galls of Europe*" (2019) or W.N. Ellis' "*Plant Parasites of Europe*" (www.bladmineerders.nl).
- Several polyphagous species (incl. bacteria or eelworms) may occur on unrelated plant genera, while oligophagous species often occur

on several related plant species or genera. Gallers on Brassicaceae, Apiaceae or Poaceae, for instance, have been recorded from many genera belonging to those families (because of the presence of attractant plant substances among the whole plant family: e.g. mustard oil glucosides in Brassicaceae or essential oils in Apiaceae). In order to avoid unnecessary repetition in the keys, we treat only these gallers on the commonest host genera, even though galls of species occurring in the area have not necessarily been observed on all of them. For the rest, we summarise other occurrences on rarer hosts in a table at the end of the keys.

- Last but not least, we decided to present the keys in English. In our area Dutch as well as French and even German are official languages. We feel that a bi- or trilingual approach is not realistic and English is in our area familiar among students, naturalists and scientists. Moreover these 'BeNeLux keys' become accessible for many readers from abroad.

Range, abundance

The known occurrence in the area is described for each species. Frequency classes have been determined either for the whole area, or following the detailed records from the Netherlands, Belgium or Luxembourg. Frequency classes are defined as follows:

very rarely recorded: only 1-2 records.

rarely recorded: < \pm 10 recent records (sometimes there may also exist several older records); we also added a comment when galls or species are particularly difficult to find which would explain the fact that they're only rarely recorded even though they may be widespread and/or "probably overlooked".

moderately frequent: < \pm 100; usually including "widespread" species in the area but also sometimes including species that have only a localised distribution within the area (because of host plant distribution, for example).

frequent: > \pm 100 records; following data available to date and our own field experience, we indicate whether we estimate the species as "frequent", "very frequent" or "most frequent". Usually, this frequency class is valid for the whole Benelux area.

- When we were not able to give such a detailed or experience based frequency, we only mention that the species is "known" in a specific country.

KEYS TO GALLS ON FUNGI

Agaricus – Agaricaceae

- 1a On cultivated mushrooms – 2
- 1b On wild species. Gills thickened, hard and eventually white powdered by the conidia of the parasite. Cap of mushroom with irregular malformations above the infected lamellae, 1– many cm across. The fungus is distinguished by circularly arranged elongate cells from which the conidia develop terminally on small teeth.

Ascomycete fungus – *Calcarisporium arbuscula* Preuss

Known from BE & NL. Also occurring on other fungi species but usually without inducing galls. DvL. p67; NM. 36.

- 2a Mushrooms are variously disfigured, thickened or very asymmetrically developed, the cap often remains closed. The infected mushrooms are penetrated by the parasite, which is distinguished by its circularly arranged cells with terminal conidia. Not exuding droplets. ‘Dry bubble’. *A. bisporus*.

Ascomycete fungus – *Lecanicillium fungicola* (Preuss) Zare & W. Gams

Known in the area. Also occurs on other fungi species but usually without inducing galls. NM. 38.

- 2b Similar malformation with distortions and thickening, gills stunted. The infected parts are white dusted in the beginning by the conidia of the parasite (*Verticillium*-stage) becoming brownish because of a second conidia stage. The latter conidia are much larger than the *Verticillium* spores and rugose. Exuding weeping amber droplets. ‘Wet bubble’. *A. bisporus*.

Ascomycete fungus – *Hypomyces perniciosus* Magnus

Known in the area. Sometimes harmful in mushroom cultivation. DvL. p68; NM. 39.

Ganoderma – Ganodermataceae

- 1a On the underside, exceptionally upperside, of the fruiting body many cylindrical to conical, 5–10 mm long, teat-shaped, woody tough protrusions. Inside a dense pseudo-parenchyma enclosed tunnel-shaped, up to 8 (10) mm long cavity leading apically into a 1–3 mm wide emergence hole; containing a single maggot. ‘Teat gall’ [S]. *G. applanatum*.

Flat-footed fly – *Agathomyia wankowiczii* (Schnabl)

Fig. 1. Frequent in the area. Fruiting bodies have been recorded with more than 500, even over 1000 of such galls, and can apparently be inhabited during several years. In many ways similar malformations may be induced by stimuli of grasses, remains of stems or other rigid plant parts. As in other Polyporaceae (e.g. see HB. 2252, remark), flat bulges to conical protrusions with crater- to pore-like depressions, occasionally with organic remains, form 'false galls' on *G. applanatum*. DA. p57; DvL. p68; RS (1st ed.). p334. HB. 2946.

Gymnopus – Marasmiaceae

- 1a Mushrooms have rotund galls on their caps and stalks, sometimes also on their gills. The galls are 2-10 mm across but may coalesce into larger complexes of irregular shape. The parasite develops conidia and basidia on the outside of the galls giving the galls a dusty appearance at maturity. *G. dryophilus*.

Collybia jelly – *Syzygospora mycetophila* (Peck) Ginns

Fig. 2. Known from BE & NL. DvL. p68. NM. 475.

Lactarius – Russulaceae

- 1a Conical chambered galls on the fruiting bodies, arched on both sides. *L. deliciosus*.

Fungus gnat – *Mycetophila blanda* Winnertz

Known from BE & NL. Facultative galler. DA. p57; RS. (1st ed.) p334. HB. 3581.

- 1b Presence of a white hard layer of hymenium (subiculum) covering the gills, with visible little dots usually amber or reddish (perithecia). ~

Sac fungi – *Hypomyces lateritius* (Fries) Tulasne & C. Tulasne

Rarely recorded from the area. Subiculum does not react to KOH, but perithecia become yellow or colourless. NM. 540.

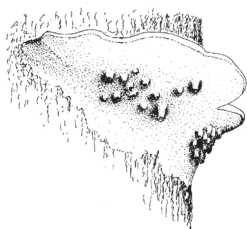


fig. 1

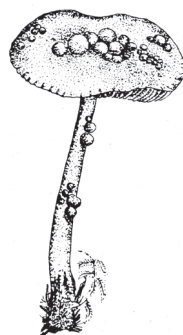


fig. 2

KEYS TO GALLS ON SEED PLANTS

Abies – Pinaceae

1a Malformations of vegetative parts – 2

1b Malformations of cones or seeds. Larvae develop gregariously (1-8 together) inside young seeds in cones of *A. alba*.

Gall midge – *Resseliella piceae* Seitner

Very rarely recorded, one record from NL. Not true galls. NM. 1.

2a On lignified younger or older stem parts – 3

2b Top of shoot slightly shortened. Needles of young shoots weakly swollen, ± tuft-like upwardly converging, exposing wax stripes on the underside; many white woolly aphids between the needles during Apr-June. *A. alba* and some foreign species.

Balsam twig aphid – *Mindarus abietinus* Koch

Fig. 9. Rarely recorded from NL. Aphid body 2 mm long, green, with brown transverse banding; larvae woolly white; antennae longer than half the body length. Siphunculi pore-shaped; cauda short, oblong. HB. 7; DA. p63; DvL. p72; RS. p19.

3a Witches' brooms with erect main shoots, abundantly branched, developing from globular to barrel-shaped, often conspicuous thickenings. Needles distinctly shortened, thickened, yellow-green, directed to all sides, falling in autumn. *A. alba* and several foreign species.

Rust fungus – *Melampsorella caryophyllacearum*
(de Candolle) J. Schröter O I

Fig. 10. Rarely recorded. Infection in may; first swellings in autumn, usually of side branches; witches' brooms in following spring, the needles from June, July onwards with spermogonia on upper side and aecia on underside; mycelium perennial, inducing multiple witches' brooms on consistently increasing malformations. II, III on many Caryophyllaceae-Alsineae which are also disfigured. Mycelium also perennial on these hosts. However, host alternation not obligatory. HB. 3; DA. p63; DvL. p72; RS. p18.

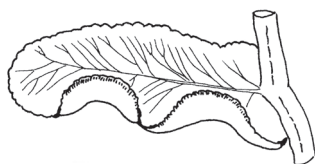


fig. 8

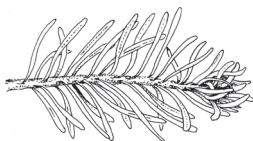


fig. 9



fig. 10

laterally, with wide, clearly contrasting brown head; initially between bark and sapwood, eventually feeding from pith. [G]. *S. alba*, x *fragilis*.

Sawfly - *Euura atra* (Jurine)

Fig. 496. Moderately frequent in BE & LUX; rarely recorded from NL. Galls often inconspicuous, with a usually distinct, soon brownish walled exit hole. The shoot parts are usually hardly stunted towards apex. Galls from May, June onwards, with mature larvae. Adults May-June (July); univoltine. *Euura* species have very been separated with limited host ranges, therefore galls recorded on various other *Salix* spp. (*Saurita*, *cinerea*, *dasyclados*, *purpurea*, *repens*, *viminalis*) are doubtful and may belong to ther species. HB. 6015; DvL. p249; RS. p290; DA. p100.

10c Similar gall, 10-15 mm long, glabrous. *S. aurita*, *cinerea*.

Sawfly - *Euura auritae* Kopelke

Moderately frequent in BE & NL. *Euura* species have very been separated with limited host ranges. Univoltine. NM. 964; DvL. p251.

11a Solitary galls spindle-shaped, gradually giving way to normal tissue. Often with several, mutually coalescing to complexes almost \pm humped on all sides. [G]. ~

Leaf miner - *Hexomyza simplicoides* (Hendel)

Fig. 497. Rarely recorded from the area. Especially especially on sallows (*S. aurita*, *caprea*, *cinerea*), conspicuous on leafless twigs. Records on poplars are doubtful, and probably refer to *H. schineri* (Giraud). Galls inhabited from July-May. Univoltine. HB. 6018; DvL p251; RS. p287; DA. p100.

11b Similar galls, but smaller and never more than 10 mm, on *S. aurita*, *caprea*, *cinerea*, *repens*, *viminalis* and hybrids. [G].

Leaf miner - *Hexomyza cecidogena* (Hering)

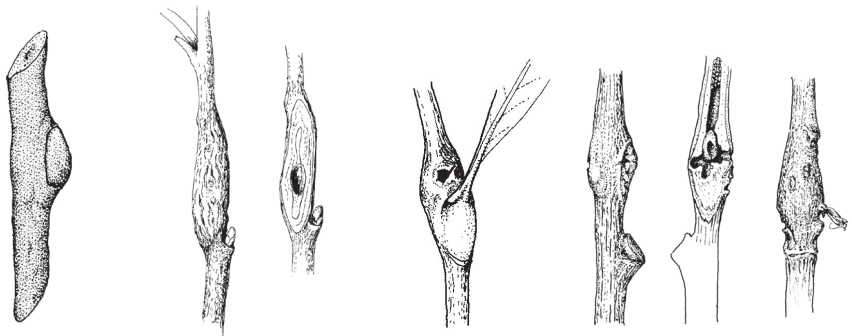


fig. 496

fig. 497

fig. 498

fig. 499

the root nodules, needs further study. Alates develop in leaf nests of *Acer*.
HB. 7304; DA. p139; RS. p338.

2a In vegetative plant parts - 3

2b In flower buds of *U. glabra*, *laevis* are many whitish, rarely yellow larvae.

Gall midge - *Coniophora autumnalis* (Mamaev)

Very rarely recorded from NL, maybe overlooked. Larvae drop to the ground when buds start to flower. Midges Sept-Oct. Larvae overwinter in not noticeably disfigured, sometimes \pm browned, buds. Maybe not true gall. HB. 7306.

3a On leaves - 4

3b Bark of young shoot axial parts with blunt conical swellings, up to about 3 mm long, at first succulent, later tough-walled. Containing a yolk-yellow larva. [S]. *U. carpinifolia*, *glabra*, *laevis*, *minor*.

Gall midge - *Janetiella lemeei* (Kieffer)

Rarely recorded from BE & NL. Galls mainly on the veins and stalks of leaves (HB. 7316). HB. 7309; DA. p139; RS. p341; CH. p136.

4a Localised or extensive malformations of the leaf blades - 6

4b Galls on leaf veins or petioles - 5

5a Midrib, often at the base of the leaf blade, with a broadly attached swelling up to 15 mm long and 10 (15) mm wide, protruding on the upperside, distorting the leaf; gall wall thick, felt haired, pale sometimes reddened. Opening on underside but dark green aphids leave through a \pm star-shaped cleft hole in top of gall. *U. glabra*, *laevis*, *minor*.

Elm-mint leaf-base gall aphid - *Kaltenbachiella pallida*
(Haliday)

Fig. 615. Frequent in the area. Migrating to roots of Lamiaceae (*Mentha*, *Galeopsis*, *Origanum*, *Thymus*). HB. 7315; DA. p139; DvL. p292; RS. p340.

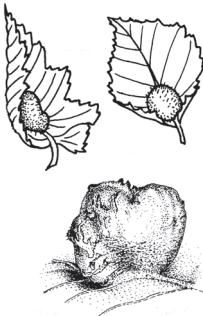


fig. 615



fig. 616



fig. 617

ADDENDUM 2 DUTCH NAMES OF GALLMAKERS

SCIENTIFIC NAME	DUTCH NAME		
<i>Acalitus brevitarsus</i>	Roestvilt elzenmijt	<i>Aceria plicator</i>	Klaverbloemmijt
<i>Acalitus calycophthirus</i>	Berkenknopmijt	<i>Aceria populi</i>	Peppelbloemkoolmijt
<i>Acalitus essigi</i>	Bramengalmijt	<i>Aceria pseudoplatani</i>	Gewone esdoornmijt
<i>Acalitus longisetosus</i>	Rode berkenbladmijt	<i>Aceria pterocaryae</i>	Kaukasische vleugelootmijt
<i>Acalitus phloeocoptes</i>	Pruimenschorsmijt	<i>Aceria rechingeri</i>	Streepzaadmijt
<i>Acalitus phyllereus</i>	Rossig vilt elzenmijt	<i>Aceria rosalia</i>	Zonneroosjesmijt
<i>Acalitus plicans</i>	Beukenbladplooiemijt	<i>Aceria salviae</i>	Saliemijt
<i>Acalitus prunispinosae</i>	Andere sleedoornmijt	<i>Aceria sanguisorbae</i>	Kleine pimpernelmijt
<i>Acalitus rudis</i>	Berkenviltmijt	<i>Aceria schlechtendali</i>	Reigersbekmijt
<i>Acalitus stenaspis</i>	Beukenbladrolmijt	<i>Aceria silenes</i>	Silenemijt
<i>Acanthophilus helianthi</i>	Centaurieboorvlieg	<i>Aceria silvicola</i>	Steenbraammijt
<i>Acanthococcus devoniensis</i>	Dopheideschilduis	<i>Aceria solida</i>	Andoornmijt
<i>Acaricalus trinotus</i>	Elzenbladmijt	<i>Aceria squalida</i>	Duifkruidmijt
<i>Aceria acericampetris</i>	Spaanse aakknobbelmijt	<i>Aceria tenella</i>	Haagbeuknerfhoekmijt
<i>Aceria anceps</i>	Ereprijsmijt	<i>Aceria tenuis</i>	Gewone grasaarmijt
<i>Aceria angustifoliae</i>	Wilgenroosjesmijt	<i>Aceria thomasi</i>	Tijnrozetmijt
<i>Aceria anthocoptes</i>	Distelhoofdjesmijt	<i>Aceria trifolii</i>	Klavermijt
<i>Aceria artemisiae</i>	Gewone bijvoetmijt	<i>Aceria tristriata</i>	Walnootpokmijt
<i>Aceria bistriata</i>	Tweestreepelzenviltmijt	<i>Aceria tuberculata</i>	Boerenwormkruidbladmijt
<i>Aceria brachytarsus</i>	Walnoothoortjesmijt	<i>Aceria ulmi</i>	Iepenvekmijt
<i>Aceria brevirostris</i>	Vleugeltjesbloemmijt	<i>Aceria unguiculata</i>	Buxustopmijt
<i>Aceria calathina</i>	Boerenwormkruidbloemmijt	<i>Aceria varia</i>	Populierenviltmijt
<i>Aceria campestricola</i>	Iepenknobbelmijt	<i>Aceria vermicularis</i>	Gewone esdoon knopmijt
<i>Aceria carinifex</i>	Esdoornbladmijt	<i>Aceria vitalbae</i>	Bosrankmijt
<i>Aceria centaureae</i>	Knoopkruidmijt	<i>Acericecis campestris</i>	Gewone esdoornalgalmug
<i>Aceria cephalonea</i>	Esdoornknobbelmijt	<i>Acericecis vitrina</i>	Gewone esdoornpokgalmug
<i>Aceria cerrea</i>	Moseikmijt	<i>Acleris notana</i>	Roestig berkenknoepje
<i>Aceria convolvuli</i>	Windemijt	<i>Acodiplosis pulicariae</i>	Boerenwormkruidlootgalmug
<i>Aceria cornuta</i>	Gehoornde grasaarmijt	<i>Aculops allotrichus</i>	Robiniemijt
<i>Aceria destructor</i>	Tripmadammijt	<i>Aculops lathyri</i>	Lathyrusmijt
<i>Aceria dispar</i>	Populierenrozetmijt	<i>Aculops macrotrichus</i>	Haagbeukromnerfijt
<i>Aceria drabae</i>	Hongerbloempjesmijt	<i>Aculops pedicularis</i>	Kartelbladmijt
<i>Aceria echii</i>	Slangenkruidmijt	<i>Aculus anthobius</i>	Walstrosponsjesmijt
<i>Aceria empetri</i>	Kraaiheidemijt	<i>Aculus convolvuli</i>	Heggewindemijt
<i>Aceria enantha</i>	Zandblauwtjesmijt	<i>Aculus craspedobius</i>	Grauwe wilgladrandmijt
<i>Aceria erinea</i>	Okkernootviltmijt	<i>Aculus epiphyllus</i>	Essenbladpokmijt
<i>Aceria euaspis</i>	Rolklavermijt	<i>Aculus fockei</i>	Pruimenroestmijt
<i>Aceria eupatorii</i>	Longkruidmijt	<i>Aculus fraxini</i>	Esenbladrolmijt
<i>Aceria euphrasiae</i>	Ogentroostmijt	<i>Aculus gemmarum</i>	Grauwe wilgscheutmijt
<i>Aceria exigua</i>	Struikheidemijt	<i>Aculus hippocastani</i>	Paardenkastanjemijt
<i>Aceria fraxinivora</i>	Essenbloesemmijt	<i>Aculus kernerii</i>	Gentiaantopmijt
<i>Aceria galiobla</i>	Walstroepertjesmijt	<i>Aculus laevis</i>	Grauwe wilgwratmijt
<i>Aceria genistae</i>	Brembolletjesmijt	<i>Aculus magnirostris</i>	Schietwilgladrandmijt
<i>Aceria geranii</i>	Ooievaarsbekmijt	<i>Aculus minor</i>	Tijnbezemmijt
<i>Aceria gymnoprocta</i>	Kaasjeskruidmijt	<i>Aculus minutus</i>	Walstrobloesemmijt
<i>Aceria heteronyx</i>	Noorse esdoornmijt	<i>Aculus retiolatus</i>	Vogelwikkemijt
<i>Aceria hippochaena</i>	Olijfwilgmijt	<i>Aculus rigidus</i>	Paardenbloem
<i>Aceria horrida</i>	Ruwe bijvoetmijt	<i>Aculus rigidus</i>	Paardenbloemmijt
<i>Aceria hypochoerina</i>	Biggenkruidmijt	<i>Aculus schlechtendali</i>	Appelroestmijt
<i>Aceria iteina</i>	Gesteelde wilgwratmijt	<i>Aculus schmardae</i>	Klokjesmijt
<i>Aceria labiatiflorae</i>	Marjoleinmijt	<i>Aculus scutellariae</i>	Glidkruidmijt
<i>Aceria laticincta</i>	Wederikmijt	<i>Aculus tetranothrix</i>	Schietwilgwratmijt
<i>Aceria leioprocta</i>	Kruiskruidmijt	<i>Aculus truncatus</i>	Boswilgwratmijt
<i>Aceria linosyrina</i>	Astermijt	<i>Aculus xylostei</i>	Kamperfoeliemijt
<i>Aceria loewi</i>	Vliermijt	<i>Acyrtosiphon ignotum</i>	Spireakoekoeksmijt
<i>Aceria lycopersici</i>	Tomatenmijt	<i>Adaina microdactyla</i>	Koniginnekruidvedermot
<i>Aceria macrochela</i>	Esdoornnerfhoekmijt	<i>Adelges laricis</i>	Lorkluis
<i>Aceria macrocheluserinea</i>	Gewone noorse esdoornmijt	<i>Adelges tardus</i>	Late sparrenluis
<i>Aceria macrorhyncha</i>	Esdoornhoornmijt	<i>Aeasomatium annulatus</i>	Sporkehoutviltmijt
<i>Aceria macrotuberculata</i>	Valeriaanmijt	<i>Agathomyia wankowiczii</i>	Tonderzwambreedvoetvlieg
<i>Aceria marginemvolvans</i>	Bijvoetbladrolmijt	<i>Agrobacterium tumefaciens</i>	Kroongalziekte
<i>Aceria megacera</i>	Watermuntbloesemmijt	<i>Agromyza erythrocephala</i>	Wikkemineervlieg
<i>Aceria mentharia</i>	Akkermuntbloesemmijt	<i>Aizobius sedi</i>	Vetkruidsnuitkever
<i>Aceria myriadeum</i>	Gewone spaanse aakmijt	<i>Albugo candida</i>	Witte roest
<i>Aceria nervisequa</i>	Beukenbladviltmijt	<i>Albugo hohenheimia</i>	Veldkersroest
<i>Aceria obiones</i>	Zoutmeldeemijt	<i>Albugo laibachii</i>	Zandraketroest
<i>Aceria ononidis</i>	Stalkruidmijt	<i>Alucita grammodactyla</i>	Duifkruidbloesemmot
<i>Aceria oxalidis</i>	Klaverzuringmijt	<i>Alucita hexadactyla</i>	Kamperfoeliebloesemmot
<i>Aceria peucedani</i>	Melkeppemijt	<i>Ametrodiplosis crassinerva</i>	Andoornbloemgalmug
<i>Aceria pilosellae</i>	Muizenootjesmijt	<i>Ametrodiplosis duclosii</i>	Hoornbloemknopgalmug
<i>Aceria platanoidea</i>	Noorse esdoornviltmijt	<i>Ametrodiplosis thalictrocola</i>	Ruitzaadgalmug
		<i>Anabremia viciae</i>	Wikkbloemgalmug