

The Director General

Maisons-Alfort, 24 May 2019

## **revised<sup>1</sup> OPINION of 23/01/2017 of the French Agency for Food, Environmental and Occupational Health & Safety**

on “the efficacy of the *Ophraella communa* beetle used as a biological control agent against common ragweed and assessment of the possible associated risks”

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*ANSES undertakes independent and pluralistic scientific expert assessments.*

*ANSES's public health mission involves ensuring environmental, occupational and food safety as well as assessing the potential health risks they may entail.*

*It also contributes to the protection of the health and welfare of animals, the protection of plant health and the evaluation of the nutritional characteristics of food.*

*It provides the competent authorities with the necessary information concerning these risks as well as the requisite expertise and technical support for drafting legislative and statutory provisions and implementing risk management strategies (Article L.1313-1 of the French Public Health Code).*

*Its opinions are made public.*

*This opinion is a translation of the original French version. In the event of any discrepancy or ambiguity the French language text dated 23 January 2017 shall prevail.*

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ANSES initially issued an internal request on 08 September 2014 to carry out an expert appraisal on assessment of the phytosanitary risks related to the accidental or deliberate introduction of *Ophraella communa*, a natural enemy of common ragweed, as a biological control agent<sup>2</sup>.

The Ministries of Health, Agriculture and the Environment then requested on 31 March 2015 that ANSES carry out an expert appraisal further to the first, entitled “The efficacy of the *Ophraella communa* beetle used as a biological control agent against common ragweed and assessment of the possible associated risks”.

### **1. BACKGROUND AND PURPOSE OF THE REQUEST**

#### **1.1. Background**

The genus *Ambrosia* includes several species with the main characteristic of being invasive exotic plants that release pollen that is highly allergenic to humans. In France, the most common species at this time is common ragweed (*Ambrosia artemisiifolia* L.), but other species can also be found in the country, including:

- a second annual species: giant ragweed (*Ambrosia trifida* L.);

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<sup>1</sup> Cf. Annexe (page 10 of the following opinion)

<sup>2</sup> Request No 2014-SA-0199

- and two perennial species: western ragweed (*Ambrosia psilostachya* DC.) and slimleaf bur ragweed (*Ambrosia tenuifolia* Spreng.).

In the Rhône-Alpes-Auvergne region, the part of France that currently has the greatest degree of invasion by common ragweed, the Regional Health Agency (ARS) reported that in 2013 nearly 200,000 people required treatment due to allergies caused by the plant's pollen (about 3% of the population of the former Rhône-Alpes region), representing a cost evaluated at 15 million euros for this year alone for reimbursements by the national healthcare system.

In the remainder of this document, the term “ragweed” will be used specifically for common ragweed – *Ambrosia artemisiifolia*. Originating in North America, ragweed was identified for the first time in France around 1860 in the Allier *département* (central France). However, the increase in the speed of its dissemination observed during the past few years appears to be related to the current agricultural context and specifically the development of spring crops (sunflower, maize, etc.) which are synchronous with its own germination period. As a result, in some parts of France such as the Rhône valley, this invasive species is found predominantly on cultivated fields where it can cause significant reductions in yield. Therefore, alongside the impact on public health, there are also costs associated with the negative impact on the agricultural sector. In a study carried out for the European Commission, it was estimated that at least 4% of agricultural land in France is infested with ragweed and that the presence of this plant in cultivated fields may cost about 170 million euros annually.

Moreover, this pioneer species is able to develop in other environments, mainly on bare soil and disrupted ground. In some regions of the country, ragweed is found particularly along artificial corridors (roadsides, etc.) or natural corridors (river banks, etc.), and in construction areas.

Mapping of ragweed presence from year to year shows extension of the invasion at the national level. Currently, ragweed has spread to almost all the regions of mainland France. In some sectors, late or insufficient control measures have led to invasion levels that appear to make eradication impossible, in view of the large number of seeds produced by each plant – up to several thousand – and the lifespan of these seeds in the soil – up to several years.

## **1.2. Purpose of the request**

### **1.2.1. Subject and objectives of the expert appraisal**

In this context, there is hope that the North American beetle *Ophraella communa* may be effective when used as a biological control agent against ragweed. It was found in northern Italy that this insect destroyed massive numbers of ragweed plants following its accidental introduction in this region in 2013. However, several questions must be asked:

- what is the true long-term efficacy of use of this beetle in the control of ragweed?
- what are the possible indirect effects of this insect, particularly on wild plants or crops, especially those that are taxonomically similar to ragweed, such as the sunflower, Jerusalem artichoke, etc.?
- what are the potential effects of the presence of this new insect on indigenous French insect fauna (native beetles, etc.)?

### 1.2.2. Questions dealt with in the expert appraisal

ANSES was asked to:

- analyse the efficacy of *O. communa* used as a biological control agent against ragweed;
- assess all the possible risks, including those for human health, of its use as part of a biological control system and its possible development after introduction into these habitats;
- determine, following a cost-benefit assessment, whether it is possible to use this beetle to control ragweed, and if so, to indicate under which conditions and to propose application protocols to minimise the possible indirect effects.

## 2. ORGANISATION OF THE EXPERT APPRAISAL

The expert appraisal was carried out in accordance with French Standard NF X 50-110 “Quality in Expert Appraisals – General Requirements of Competence for Expert Appraisals (May 2003)”.

The expert appraisal falls within the area of expertise of the Expert Committee (CES) on “Biological risks for plant health”. ANSES tasked the “*Ophraella communa* 2” working group (WG) with the expert appraisal. The research findings were presented to the CES concerning both methodological and scientific aspects between 19 January 2016 and 8 November 2016. The conclusions were adopted by the CES on “Biological risks for plant health” during its meeting on 8 November 2016.

ANSES analyses the links of interest declared by the experts prior to their appointment and throughout the work, in order to avoid potential conflicts of interest with regard to the matters dealt with as part of the expert appraisal.

The experts’ declarations of interests are made public via the ANSES website ([www.anses.fr](http://www.anses.fr)).

## 3. ANALYSIS AND CONCLUSIONS OF THE CES

### 3.1. Introduction

This opinion relies mainly on the risk assessment criteria related to introduction into the environment of non-indigenous macro-organisms that are beneficial to plants, as indicated in the Order dated 28 June 2012, and on the conclusions of the pest risk analysis (PRA) carried out in 2015<sup>3</sup>. The geographical area examined as part of the pest risk analysis (PRA zone) and taken into account for this assessment of risks and benefits related to *O. communa* is mainland France, i.e. continental France and Corsica.

In order to define the scope of the risk analysis, certain definitions were clarified:

- indigenous status of an insect;
- plants of interest for the expert appraisal;
- and the methods of release of the insect.

<sup>3</sup> Opinion No 2014-SA-0199 regarding a plant health risk assessment related to *Ophraella communa*, a pest insect of annual ragweed

### **3.1.1. Definition of “indigenous insect” status (insect reported in the PRA zone/insect having completed several cycles in the PRA zone)**

Decree No. 2012-140 (30 January 2012) provides the following definition for a "non-indigenous" organism: an organism "that is not established in the geographic area of study by entry or introduction into the environment". During the preliminary discussions that took place within the CES on micro-organisms and macro-organisms that are beneficial to plants (opinion regarding request No. 2014-SA-0039<sup>4</sup>), to make a distinction between a macro-organism established for a long time and a settled exotic macro-organism, three statuses were defined:

- non-exotic (= indigenous within the meaning of Decree 2012-140);
- settled exotic (= indigenous within the meaning of Decree 2012-140);
- non-settled exotic (= non-indigenous within the meaning of Decree 2012-140).

The indigenous status, within the meaning of Decree 2012-140, thus includes the statuses of non-exotic and settled exotic. Once an insect is considered settled exotic, it will no longer be subject to an application for authorisation to introduce a macro-organism.

The risk represented by the insect will not be the same depending on whether the introduction is natural or involuntarily promoted by human activities (transport), or through a deliberate action within the framework of Decree 2012-140. In the PRA, the CES considered that the entry of *O. communa* is highly likely with a low level of uncertainty. Currently, *O. communa* is absent from the PRA zone. As soon as its presence is reported, it will be considered “non-settled exotic”, and possibly considered “settled exotic” if several generations of the insect are observed over at least a few years.

### **3.1.2. Definition of the plants of interest for the expert appraisal (crops/wild plants)**

According to the Glossary of phytosanitary terms (ISPM No. 5), plants are “Living plants and parts thereof, including seeds and germplasm”.

### **3.1.3. Methods of release of the insect**

Different methods of release of the insect were taken into consideration:

- by simple acclimatisation;
- multi-point acclimatisation;
- augmentative;
- and inundative.

Another contextual factor to consider from the outset is the methods of release of the insect: inundative release would be considered preferential at the colonisation front of ragweed, with the aim of rapidly controlling new populations of ragweed with optimum efficacy.

### **3.1.4. The health context of the request**

Common ragweed is an invasive species that has spread markedly in France over the last few years. The plant releases large amounts of highly allergenic pollen and, in the regions where the plant density is high, it causes significant allergies in the human population. The cost of

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<sup>4</sup> Opinion No 2012-SA-0221 of 2 April 2013 regarding a request for a simplified assessment of the phytosanitary and environmental risk in order to update the list of non-indigenous macro-organisms beneficial to plants

ragweed invasion in the PRA zone, in terms of public health and economics, was quantified in an interim report.

The French authorities are therefore faced with a major health concern. An understanding of the conditions of proliferation of ragweed and the specificities of the allergy to this plant species are a prerequisite to considering the implementation of control measures, specifically through the use of possible biological control agents such as *O. communa*.

### **3.2. Overall risk assessment**

#### **3.2.1. Conclusion on the probability of introduction of *Ophraella communa***

As part of the PRA on the introduction of *O. communa* in France, the presence of this leaf beetle in northern Italy near the French border led the CES to consider that the entry of the beetle is highly likely, with a low level of uncertainty. The overall probability of establishment of the insect was considered high, with a low level of uncertainty. Importantly, up to 2016 and to the knowledge of the CES, there are no reports of its presence in France. Recent modelling studies on the geographic distribution of habitats favourable for the settlement of ragweed and the beetle suggest that *O. communa* could cover a large portion of the ragweed development area in France.

#### **3.2.2. Conclusions on the risks related to *Ophraella communa***

On the basis of this PRA, the CES analysed the risk related to natural introduction of the insect for plant species, whether crops or wild plants. It concluded that the risk is minimal and would not need any specific management measures to limit the negative impact of *O. communa*, while drawing attention to the precautionary measures to adopt, as summarised below, if the insect were to be used as a biological control agent against ragweed. Specifically, the range of host plants could change in a context of inundative release, which could lead to *O. communa* attacking sunflower seedlings under certain conditions due to strong demographic pressure, given the insect's oligophagous nature.

However, the most recent observations from the Cost-SMARTER study showed that, in the presence of ragweed, the damage caused by the insect to young seedlings of sunflowers is limited and negligible. In addition, a supplementary study on the potential risks for non-crop plants showed that no adult insects were found on rare and endangered species belonging to other plant tribes. Similarly, specificity tests with multiple options show no larval development on species other than common ragweed. In addition, the fact that *O. communa* cannot complete its full lifecycle on the sunflower appears to indicate that it will not be necessary to plan for eradication of *O. communa* after regulation of ragweed.

No new data on the potential risk for non-target organisms other than plants have been identified. The CES considers overall that the risk of competition with or replacement of species in the environment, hybridisation with other species, and risks related to natural enemies of the insect in the PRA zone are negligible. Nonetheless, risks related to possible indirect negative interactions in the natural environment due to the increased density of generalist predators that may increase their predation pressure on other species present in the same habitat, cannot be ruled out. The same type of effect could occur in agroecosystems but with a potentially positive effect if the result were to be an increase in organisms beneficial to crops.

Lastly, the risk of entry of parasitoids related to the introduction of *O. communa* from Italy is considered low. However, this risk cannot be ruled out and should be studied in the context of

deliberate introduction of the insect as a biological control agent from the native zone or non-European areas in the framework of Decree 2012-140.

### **3.3. Conclusions on the expected benefits of biological control with *Ophraella communa***

The studies carried out as part of the Cost-SMARTER programme have shown that: i) the incidence of attacks on ragweed populations in northern Italy is between 90% and 100%, ii) defoliation of the attacked plants can be complete at the end of the season and be accompanied by a decrease in the production of pollen and seeds, leading to iii) a lower density of the ragweed population that is variable between observed sites.

The benefits that may be expected from introduction of *O. communa* both for human health and for the associated costs are illustrated by an extrapolation study on the observed effects in the region of Milan, where the release of pollen dropped by 80%. The same reduction factor in the pollen rate applied to the former Rhône-Alpes region could lead to a reduction of more than 50% in the allergic risk and a decrease of 75 to 85% in associated health costs.

The CES thus considered these results to be evidence in favour of the efficacy of *O. communa* as a biological control agent against ragweed. The implementation of this type of control programme (by simple acclimatisation, multi-point acclimatisation, or by inundative release) represents a significant development cost. However, this cost should be considered in conjunction with the negative impacts of ragweed related to the costs of allergy treatments, the costs of managing infestation for farmers, local authorities or motorway companies, the environmental cost with the management of river banks, and the social and tourism cost for areas invaded by ragweed. Biological control of ragweed would also involve the creation of an economic and professional production and marketing sector for biological control agents. This could be considered a societal benefit.

### **3.4. Recommendations on the use of *Ophraella communa***

Three strategies could be considered.

**Conventional biological control by simple acclimatisation** involves placing populations of *O. communa* in zones with high ragweed infestation so that these populations rapidly and sustainably settle in then spread naturally over the entire infested area. The intended aim is to reduce the growth of ragweed populations, which would result in a decrease in the atmospheric pollen count, preventing an increase in the number of sensitive people. This approach would lead to control of the production of seeds, which is an important objective to guarantee the sustainability of control of *A. artemisiifolia*.

**Conventional biological control by multi-point acclimatisation** on the colonisation fronts aims primarily to halt the ragweed colonisation front or fronts to prevent an increase in the affected surface area, and thereby to prevent an increase in the number of people sensitive to ragweed pollen allergies.

**Biological control by inundative or augmentative release** should be considered in regions where the climate enables the invasive development of ragweed (medium altitude or northern areas with a longer cold spring) but where it does not enable the development of a sufficiently large *O. communa* population to have a regulating effect on the invasive plant. The WG

put forward a certain number of recommendations for the implementation of these various options for biological control.

### **3.5. Recommendations on geographic monitoring and research project proposals**

The CES recommends that before any deliberate introduction of *O. communa* in the PRA zone (mainland France and Corsica) and/or its use as a biological control agent against ragweed, food specificity tests should be carried out concerning the following indigenous plant species: alpine *Inula montana*, two species of the *Artemisia* genus with a status of concern, i.e. *Artemisia insipida* Vill. and *Artemisia molinieri* Quézel, M. Barbero, R.J. Loisel.

The CES also recommends that supplementary specificity tests be performed before any decision is made on deliberate introduction or use of *O. communa*.

Lastly, as part of an implementation programme for biological control of ragweed with *O. communa*, the CES recommends further studies on: i) the causal link between *O. communa* and the decrease in pollen emissions in the control programme area, ii) the dynamics of *O. communa* populations based on climate conditions, and iii) the correlation between the decreased pollen production by *O. communa* and the prevalence of allergies on the one hand, and the healthcare costs of these allergies, on the other.

In the research field, to better take into account the potential risk that *O. communa* could complete its lifecycle on the sunflower, it may be useful to study possible genetic adaptations of *O. communa* to the sunflower and phenomena such as susceptibility by association (supplementation of diet on other non-target host plants), which could increase the damage to sunflowers. This phenomenon, described in the literature, is non-adaptive and expresses the plasticity of a species in modifying its diet if needed. Post-introduction monitoring of *O. communa* is therefore essential in view of these two questions.

Finally, modelling studies on the potential impact of *O. communa* on the ragweed colonisation front based on the spatial distribution of the plant are under way. Preliminary results show that the insect may invade the entire PRA zone in a short period of time and rapidly become established in ragweed development zones.

With a view to Europe-wide ragweed control, the use of *O. communa* as a biological control agent, coupled with use of a second control agent, *Tarachidia candefacta* (Lepidoptera: Noctuidae; insect introduced in the 1960s to control ragweed in Russia), would need to be studied to increase the impact of these two insects on ragweed population densities in broader climate zones.

## **4. CONCLUSIONS AND RECOMMENDATIONS OF THE AGENCY**

The French Agency for Food, Environmental and Occupational Health & Safety considers that introduction of the insect is highly likely in the PRA zone, even though no reports were recorded in mainland France in 2016.

The Agency considers that the risk related to *O. communa* for sunflower (*Helianthus annuus* L.) and Jerusalem artichoke (*Helianthus tuberosus* L.) crops, and more widely for the environment, does not require specific management measures to limit its negative impact. The most recent findings from the Cost-SMARTER study show that, in the presence of ragweed, the damage

caused by the insect to young sunflower seedlings is limited and negligible. In addition, specificity tests with multiple options (tests in the presence of several plant species including ragweed), show no larval development on species other than common ragweed. The fact that *O. communa* cannot complete its full lifecycle on the sunflower suggests that it will not be necessary to plan for eradication of *O. communa* after regulation of ragweed. It must be stressed that *O. communa* could complete its full lifecycle on the sunflower in certain cases where pressure from the beetle population is high (3<sup>rd</sup> or 4<sup>th</sup> generation of adults) and where ragweed densities are too low to feed the beetles present. If sunflowers have been sown later in the year, the damage to the plants would be significant but would affect only the leaves, particularly for ornamental sunflower crops.

Lastly, supplementary studies on the possible risks for non-crop plants showed no adult insects on rare or endangered species belonging to tribes other than *Heliantheae*.

ANSES also considers that the benefits that may be expected from introduction of *O. communa*, both for human health and in terms of associated costs, are potentially significant. Applying the pollen level reduction factor observed in the region of Milan to the former Rhône-Alpes region of France, it could be possible to forecast a reduction of more than 50% in the allergic risk and a decrease of 75 to 85% in associated health costs.

With a view to the use of *O. communa* as a biological control agent against ragweed, the Agency recommends that before any deliberate introduction of *O. communa* in the PRA zone (mainland France and Corsica), additional specificity tests should be performed regarding crop plants or indigenous plant species with a status of concern.

Within the framework of implementation of a biological control programme with *O. communa* against ragweed, the Agency recommends further studies on: i) the causal link between *O. communa* and the decrease in pollen emissions in the control programme area, ii) the dynamics of *O. communa* populations based on climate conditions, and iii) the correlation between the decreased pollen production by *O. communa* and the prevalence of allergies on the one hand, and the healthcare costs of these allergies, on the other.

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## KEY WORDS

*Ophraella communa*, coléoptère, ambrosie, *Ambrosia artemisiifolia*, agent de lutte biologique, efficacité, risques phytosanitaire et sanitaire, France métropolitaine.

*Ophraella communa*, beetle, ragweed, *Ambrosia artemisiifolia*, biological control agent, efficacy, phytosanitary and health risks, mainland France.

**ANNEXE: LIST OF AMENDMENTS TO THE OPINION**

<b>Date</b>	<b>Version</b>	<b>Page</b>	<b>Description of the amendment</b>
23/01/2017	01		Version 1
08/12/2017	02		Amendment: addition to part 4 "Conclusions and recommendations of the Agency" (page 8, end of the 2 <sup>nd</sup> paragraph): "It must be stressed that <i>O. communa</i> could complete its full lifecycle on the sunflower in certain cases where pressure from the beetle population is high (3 <sup>rd</sup> or 4 <sup>th</sup> generation of adults) and where ragweed densities are too low to feed the beetles present. If sunflowers have been sown later in the year, the damage to the plants would be significant but would affect only the leaves, particularly for ornamental sunflower crops."