

# **COST**

Domain Committee "Food and Agriculture"

## **COST Action (FA1203)**

**Start Date (19.11.2012)**

*Sustainable management of *Ambrosia artemisiifolia*  
in Europe (SMARTER)*

## **MONITORING PROGRESS REPORT**

***Reporting Period: from 19.11.2013 to 01.02.2014***

This Report is presented to the relevant Domain Committee.  
It contains three parts:

- I. Management Report prepared by the COST Office/Grant Holder***
- II. Scientific Report prepared by the Chair of the Management Committee of the Action***
- III. Previous versions of the Scientific Report; i.e., part II of past reporting periods***

The report is a "cumulative" report, i.e. it is updated annually and covers the entire period of the Action.

Confidentiality: the documents will be made available to the public via the COST Action web page except for chapter *II.D. Self evaluation*.

Based on the monitoring results, the COST Office will decide on the following year's budget allocation.

**Executive summary (max.250 words):**

This report of the COST Action SMARTER covers the first 14 months since the start of the Action, and the first 12 months of the first budget period, which commenced on 01.02.2013. The Action has had considerable success in enlarging the network to over 170 members by attracting new specialists and stakeholders of member countries, and new parties. Both Early Stage Researchers (ESR, 29% of the Action participants) and females (42% of the Action participants) are represented in the Core Group. The Action has established contacts with other COST Actions as well as with other established international networks. The Action has constructed a dedicated website and extranet for external and internal communication, respectively. Since the kick-off meeting, the second MC meeting along with WG meetings was carried out in the summer of 2013, and additional WG meetings, a Task Force meeting, and a stakeholder meeting were held in the autumn 2013 and beginning of 2014. This has led to new collaborations and the initiation of joint research projects and proposals. The Action has supported 6 STSM and its members have published a series of important publications in leading international journals, and the Action supported some of these to be published as open-access. Action members have acquired additional external funding from both European and national sources, where the latter is the dominant source. The Action capitalized on its interdisciplinary composition in pursuing its objectives and the focus is now on finding further funding for joint research programs.

## I. Management Report prepared by the COST Office/Grant Holder



### I.A. COST Action Fact Sheet

- **COST Action** FA1203 Sustainable management of *Ambrosia artemisiifolia* in Europe (SMARTER)
- **Domain** *Food and Agriculture*

- **Action details:**

**CSO Approval:** 07/06/2012

**End date:** 18/11/2016 (officially),  
31/01/2017 (4 years after start first budget period)

**Entry into force:** 25/06/2012

**Extension:** (day/month/year)not applicable

- **Objectives**

Common ragweed (*Ambrosia artemisiifolia*) is one of the most prominent invasive alien species (IAS) in Europe. Its pollen grains are noxious aeroallergens, it is an important agricultural weed and also occupies large non-crop areas with a range that is likely to accelerate under climate change. As a result, long-term and widely applicable options are required for its sustainable management, as well as the coordination of institutions involved in *Ambrosia* research and management throughout Europe. SMARTER will establish an interdisciplinary network including experts currently involved in the control of ragweed, Non-COST key-experts, health care professionals, aerobiologists, economists, and atmospheric and agricultural modellers. SMARTER will provide a forum for discussing long-term management and monitoring options and the development of new innovative management solutions, such as a synergy between biological, physical and chemical control measures and vegetation management, and assess their cost-effectiveness in mitigating the effects of IAS. SMARTER will act as a catalyst for long-term research, provide an information platform and develop best practice manuals for the integrated management of ragweed. It will also help to tackle other IAS, benefit all sectors affected by IAS, promote outstanding R&D, innovation in industry and provide support for policy-makers in the European Research Area (ERA).

- **Parties:** *list of countries and date of acceptance*

Austria (13/07/2012)	Greece (25/06/2012)	Poland (19/07/2012)
Belgium (12/11/2012)	Hungary (28/08/2012)	Portugal <i>No member</i>
Bulgaria <i>No member</i>	Iceland <i>No member</i>	Romania (24/07/2012)
Croatia (27/08/2012)	Ireland <i>No member</i>	Serbia (02/08/2012)
Cyprus <i>No member</i>	Israel (11/10/2012)	Slovakia (05/08/2012)
Czech Rep. (13/11/2012)	Italy (25/07/2012)	Slovenia (08/11/2012)
Denmark (04/07/2012)	Latvia <i>No member</i>	Spain (15/06/2012)
Estonia (20/06/2012)	Lithuania (03/10/2012)	Sweden (20/09/2012)
Finland (14/08/2012)	Luxembourg (20/09/2012)	Switzerland (16/07/2012)
FYR of Macedonia (25/06/2012)	Malta <i>No member</i>	Turkey (03/08/2012)
France (10/07/2012)	Netherlands (05/07/2012)	United Kingdom (13/06/2012)
Germany (27/07/2012)	Norway <i>No member</i>	Bosnia and Herzegovina (02/10/2012)

- **Intentions to accept:** *list of countries and date*

- **Other participants:**

*(Institution Name, Country, Town)*

Ilia State University, Georgia, Tbilisi

Russian Academy of Sciences, Russian Federation, St. Petersburg

National Academy of Sciences of Armenia, Armenia, Yerevan

Chinese Academy of Agricultural Sciences, China, Beijing

Chinese Academy of Sciences, Wuhan Botanical Garden, China, Wuhan

**Chair:** *(name, institution, address, phone, e-mail)*

Prof. Heinz MULLER-SCHARER

Universit de Fribourg, Departement de Biologie, Ecologie & Evolution

Chemin du Musee 10, 1700 Fribourg, Switzerland

heinz.mueller@unifr.ch

**DC Rapporteur:** *(name, institution, address, phone, e-mail)*

Prof. Jens C. STREIBIG

University of Copenhagen, Dept. Agriculture and Ecology

Hoejbakkegaard Alle 13DK-2630 Taastrup, Denmark

jcs@life.ku.dk

**Science Officer:** *(name, e-mail)*

Ioanna Stavridou

<Ioanna.Stavridou@cost.eu>

**Administrative Officer:** *(name, e-mail)*

Christophe Peeters

<Christophe.Peeters@cost.eu>

- **Action Web site:**

[http://www.cost.eu/domains\\_actions/fa/Actions/FA1203](http://www.cost.eu/domains_actions/fa/Actions/FA1203) (COST)

<http://www.ragweed.eu> (own website)

- **Grant Holder Representative** *(name, e-mail)*

Prof. Guido Vergauwen

guido.vergauwen@unifr.ch

- **Working Groups** *(list of WGs and names and affiliations of participants)*

WG 1 – Population dynamics and biological control (34 members)

WG 2 – Vegetation management (47 members)

WG 3 – Integration of management options (21 members)

WG 4 – Management evaluation (39 members)

We defined a SMARTER participant as follows: a person whose work relates to the Action, and who has submitted the completed SMARTER-participant questionnaire and CV to SMARTER. The procedure is outlined on, and documents are available on [ragweed.eu/wanna-join](http://ragweed.eu/wanna-join). A list of participants by Working Group is given in Annex 1.

## I.B. Management Committee member list

Firstname	Lastname	CTRY	Email
Gerhard	Karrer	AT	gerhard.karrer@boku.ac.at
Matt	Smith	AT	aeromattsmith@gmail.com
Vojislav	Trkulja	BA	vtrkulja@blic.net
Arnaud	Monty	BE	arnaud.monty@ulg.ac.be
Christian	Bohren	CH	christian.bohren@acw.admin.ch
Urs	Schaffner	CH	u.schaffner@cabi.org
Pavel	Formánek	CZ	pavel.formanek@gmail.com;
Hana	Skalova	CZ	hana.skalova@ibot.cas.cz
Uwe	Starfinger	DE	uwe.starfinger@jki.bund.de
Arnd	Verschwele	DE	arnd.verschwele@jki.bund.de
Per	Kudsk	DK	per.kudsk@agrsci.dk
Hans Peter	Ravn	DK	hpr@life.ku.dk
Ülle	Reier	EE	ulle.reier@ut.ee
Martin	Zobel	EE	martin.zobel@ut.ee
Garifalia	Economou	EL	economou@aua.gr
Despoina	Vokou	EL	vokou@bio.auth.gr
Jordina	Belmonte	ES	jordina.belmonte@uab.cat
Diego	Rubiales	ES	diego.rubiales@ias.csic.es
Kimmo	Saarinen	FI	Kimmo.Saarinen@allergia.fi
Mikhail	Sofiev	FI	mikhail.sofiev@fmi.fi
Bruno	Chauvel	FR	bruno.chauvel@dijon.inra.fr
Michel	Thibaudon	FR	michel.thibaudon@wanadoo.fr
Ivana	Hrga	HR	ivana.hrga@stampar.hr
Barbara	Stjepanovic	HR	barbara.stjepanovic@stampar.hr
Donát	Magyar	HU	magyar.donat@gmail.com
Janos	Taller	HU	taller@georgikon.hu
Baruch	Rubin	IL	rubin@mail.huji.ac.il
Tuvia	Yaacoby	IL	tobyy@moag.gov.il
Maira	Bonini	IT	maira.bonini@aslmi1.mi.it
Maurizio	Vurro	IT	maurizio.vurro@ispa.cnr.it
Ingrida	Sauliene	LT	ingrida.sauliene@su.lt
Christian	Ries	LU	CRIES@mnhn.lu
Elena	Kolevska	MK	ecka_kolevska@hotmail.com
Snezana	Milkovska	MK	milkovska_s@yahoo.com
Letty	de Weger	NL	l.a.de_weger@lumc.nl
Johan	Van Valkenburg	NL	j.l.c.h.van.valkenburg@minlnv.nl
Idalia	Kasprzyk	PL	idalia@univ.rzeszow.pl
Dorota	Myszkowska	PL	dorota.myszkowska@uj.edu.pl
Nicoleta	Ianovici	RO	nicole_ianovici@yahoo.com
Poliana	Leru	RO	polianaleru@yahoo.com
Branko	Šikoparija	RS	sikoparijabranko@yahoo.co.uk
Sava	Vrbnicanin	RS	sava@agrif.bg.ac.rs
Lars	Andersson	SE	lars.andersson@slu.se
Åslög	Dahl	SE	aslog.dahl@bioenv.gu.se
Robert	Leskovšek	SI	robert.leskovsek@kis.si
Andrej	Simončič	SI	andrej.Simoncic@kis.si
Peter	Tóth	SK	petery@nexta.sk
Sevcan	Celenk	TR	sevancelenk@hotmail.com;
Huseyin	Onen	TR	huseyin.onen@gop.edu.tr
Roy	Kennedy	UK	r.kennedy@worc.ac.uk
Marion	Seier	UK	m.seier@cabi.org

## I.C. Overview activities and expenditure **SUZANNE**

### (01.02.2013 – 31.05.2014) Budget

This is the amended budget plan

Total Action Budget: 238000 euro for the period 01.02.2013 to 31.05.2013

Remaining Action Commitment: 106286 euro to be spent from 01.02.2014 to 31.05.2014

Instrument	details	date	place	total
(1) MEETINGS	CG	09/03/2013	Vienna	13745
(1) MEETINGS	CG, MC, WG	21/06/2013-23/06/2013	Samsun	54854
(1) MEETINGS	WG	25/11/2013-27/11/2013	Berlin	24585
(1) MEETINGS	WG (Task Force)	17.01.2014	Fribourg	1843
(1) MEETINGS	WG (Task Force)	14.02.2014	Barcelona	4000
(1) MEETINGS	Other	unknown	Switzerland	1440
(1) MEETINGS	WG (Task Force)	17.03.2014	Dijon	4500
(1) MEETINGS	WG (Task Force)	08.05.2013-09.05.2013	Milano	4950
(1) MEETINGS	CG, WG	23-25/04/2014	Montpellier	68160
<b>(1) MEETINGS Total</b>				<b>178077</b>
(2) SHORT-TERM SCIENTIFIC MISSIONS	Mr William Ortmans	01.10.2013-15.11.2013	Dijon, France	2428
(2) SHORT-TERM SCIENTIFIC MISSIONS	Prof. Heinz Müller-Schärer	22.07.2013-06.08.2013	various, China	2446
(2) SHORT-TERM SCIENTIFIC MISSIONS	Ms Yan Sun	22.07.2013-06.08.2013	various, China	2500
(2) SHORT-TERM SCIENTIFIC MISSIONS	Dr Massimo Cristofaro	21.07.2013-26.07.2013	various, Serbia	800
(2) SHORT-TERM SCIENTIFIC MISSIONS	Ms Ona Auskaliene	10.10.2013-16.10.2013	Vienna, Austria	1200
(2) SHORT-TERM SCIENTIFIC MISSIONS	Dr Suzanne Lommen	01.11.2013-22.11.2013	Nijmegen, Netherl	2500
(2) SHORT-TERM SCIENTIFIC MISSIONS	member x			1650
(2) SHORT-TERM SCIENTIFIC MISSIONS	member x			1800
<b>(2) SHORT-TERM SCIENTIFIC MISSIONS Total</b>				<b>15324</b>
(3) TRAINING SCHOOLS				0
<b>(3) TRAINING SCHOOLS Total</b>				<b>0</b>
(4) DISSEMINATION	action flyer	28.05.2013		973
(4) DISSEMINATION	website 1	13.01.2014		3000
(4) DISSEMINATION	website 2	13.01.2014		1500
(4) DISSEMINATION	printing action poster	13.01.2014		410
(4) DISSEMINATION	action trailer	13.01.2014		1000
(4) DISSEMINATION	open access 1			2250
(4) DISSEMINATION	open access 2			2250
(4) DISSEMINATION	website 3			500
(4) DISSEMINATION	flyer Ambrosia species			923
<b>(4) DISSEMINATION Total</b>				<b>12806</b>
(5) OTHER	currency diff			750
<b>(5) OTHER Total</b>				<b>750</b>
<b>Grand Total</b>				<b>206957</b>
	(100/115 of total budget = 206'957)			
<b>FSAC</b>				<b>31044</b>
	(15/115 of total budget = 31'043)			
<b>TOTAL BUDGET</b>	<b>(238'000 available)</b>			<b>238001</b>

## **II. Scientific Report**

### **General structure of the Action**

The Action started with the kick-off meeting in Brussels in November 2012. The overall duration of the Action is 48 months, with the first budget period starting 01.02.2013. The Action has been structured into four working groups:

1. WG1 Population Dynamics and Biological control
2. WG2 Vegetation management
3. WG3 Integration of management options
4. WG4 Management evaluation

The Action has elected the Core Group with the following composition:

- Chairman: Prof Heinz Müller-Schärer
- Vice-Chair and Scientific Coordinator: Carsten Ambelas Skjoth
- WG1 Chair: Urs Schaffner (CH). WG Chair substitute: Maurizio Vurro (IT)
- WG2 Chair: Gerhard Karrer (AU). WG Chair substitute: Gabriela Kazinczi (HU)
- WG3 Chair: Per Kudsk (DK). WG Chair substitute: Bruno Chauvel (FR)
- WG4 Chair: Alfons Oude Lansink (NL), WG Chair substitute1: Matt Smith (AU), WG Chair substitute2 Letty A. de Weger (NL)
- Training and STMSs Chair: Maurizio Vurro (IT), Vice-chair: Ingrida Šaulienė (LT)
- Website coordinator (Christian Ries, LU)
- Editorial Board coordinator (Matt Smith, AT)

According to the work plan of the Action, we mainly devoted the first year of the Action to extending the network to people working in fields where expertise was lacking, establishing Working Groups and Working Group programmes, collecting of information about current status and management of *Ambrosia* in each country, producing tools for dissemination. In addition 6 STSMs have been carried out. We planned summer schools and the involvement of stakeholders for the next year.

In the first year, two Task Forces have been initiated to study issues that could not be covered by single WGs

1. *Ophraella*. During the summer of 2013, it was discovered that the ragweed leaf beetle, one of the potential North American biocontrol agents and the most efficient control organism in China, has accidentally established in some European regions. Action members coordinated an ad-hoc scientific publication on this topic, and initiated a Task Force to study the target and non-target effects of this discovery in the 2014 field season to determine whether this event should be considered a troublesome introduction or whether it is likely to become the first case of a successful biological control of an invasive weed in continental Europe.
2. Genetics. WG meetings revealed that it would be important to include the field of genetics into the Action. Since this topic was not covered by one of the existing WGs, a special Task Force was created to harmonise (population) genetics studies on ragweed.

### **Meetings**

- The Core Group met in Vienna in March 2013 to advance the Working Plan and to further elaborate the structuring of the Action.
- The first set of WG meetings was held in Samsun, Turkey, followed by a MC meeting. These SMARTER events were held in connection with the symposium of the EWRS (European Weed Research Society) to strengthen links between SMARTER and the European weed research community, and to increase awareness of our Action. This produced also the 1<sup>st</sup> draft of the scientific programme. A great deal of effort was devoted to establishing a European-wide *Ambrosia* monitoring programme on ragweed, the 'SMARTER Ambrosia survey', similar to the existing atmosphere-health programme on ragweed pollen. This included harmonising protocols for monitoring, and the development of an iPhone application (financed by the Grant Holder's Institution) as a tool for this survey, but also to raise public awareness of the problem and to increase the visibility of the Action.

- In November 2013, a special meeting with experts and stakeholders was held in Netherlands, to initiate a national pilot study on the participation of researchers and citizen-scientists in this survey.
- To boost the research, a planned CG meeting was replaced by an additional WG meeting, held in Berlin in November 2013, where we discussed how to connect models on different aspects of the ragweed problem, covering the entire spectrum from vegetation to atmosphere, health and ultimately economy.
- Finally, an ad-hoc meeting was held of the newly established *Ophraella* Task Force.

### **Short term scientific missions**

During 2013, 6 STSM were carried out, as listed in the table below, all in the field of biology of ragweed plants (<http://ragweed.eu/short-term-scientific-missions/>).

Scientist	Institution	Country	Hosting Country	Hosting Institution	Topic of STSM
Heinz Mueller-Schaerer	University of Fribourg	Switzerland	China	Wuhan Botanical Garden/Institute, Chinese Academy of Sciences,	Strengthening our research collaboration with China within SMARTER
Sun Yan	University of Fribourg	Switzerland	China	Institute of Plant Protection, CAAS, Beijing(	Common ragweed seed collections in China at sites differing in intensity& exposure time to herbivory
William Ortman	University of Liege	Belgium	France	INRA Dijon	Ambrosia artemisiifolia L. seed collection along a latitudinal gradient in Western Europe
Massimo Cristofaro	ENEA	Italy	Serbia	University of Belgrade	To select a Serbian population of <i>Aceria</i> sp.
Ona Aukalniene	Lithuanian Research Centre	Lithuania	Austria	University of Natural Resources	Methodology for soil sampling to estimate <i>Ambrosia</i> seeds
Suzanne Lommen	University of Fribourg	Switzerland	The Netherlands	Radboud University Nijmegen	Developing a population model for <i>Ambrosia artemisiifolia</i>

In one STSM, collaboration with two of our non-COST parties was set up. Another mission allowed to learning methods that could be used in collecting soil samples, preparing them for the analyses, analysing the soil seed bank and estimating viability of *Ambrosia* seeds.

Another STSM allowed to visiting several locations in North and Central Serbia, collecting ragweed plant samples showing some eriophyid mite symptoms.

Thanks to the STSM one researcher started to develop a population dynamics model for *Ambrosia artemisiifolia*, designing a protocol for the collection of demographic data to parameterise this model. This will allow (i) to quantify and understand the natural variation in the dynamics of common ragweed, and (ii) to prospectively evaluate and compare the long term impact of different management strategies on the population dynamics in a wide range of environments throughout Europe.

One scientist collected data in populations of *A. artemisiifolia* from the South of Netherlands to the Rhône valley in France, measuring phenotypic traits (height, diameter, biomass), reproductive traits (number and weight of seeds) and functional traits (specific leaf area), as well as the populations description (location, level of native flora competition, type of soil, type of habitat, number and density of *A. artemisiifolia* plants).

Finally, with the support of the STSM, one participant had the chance to visit a mosaic of ragweed populations differing in intensity of and exposure time to insect herbivore in several Chinese provinces, recording information on the biocontrol insect prevalence and incidence.

### **Scientific output per Working Group**

Overall, the following scientific advances have been made by each of the Working Groups (reporting period is only until 1 Feb. 2014):

#### WG1 Population Dynamics and Biological control



During the kick-off meeting in Brussels, the objectives of WG1 as proposed in the project proposal were discussed and slightly revised; besides the key objectives related to the coordination and implementation of classical and inundative biological control of ragweed in Europe, activities in WP1 will also include the assessment of non-target risks of biological control candidates and the development of population models for both the target weed and biological control candidates.

In Samsun, the WG1 meeting was used to address several objectives for year 1 of SMARTER, i.e. obtain an overview of the expertise among members of WG1, invite additional experts, strengthen skills, seek additional funding, and establish data collection. During the meeting, it was reported that two exotic herbivores have recently been detected in COST countries, i.e. the gall-forming moth *Epiblema strenuana* on *Ambrosia confertiflora* in Israel and an unidentified *Aceria* mite on *A. artemisiifolia* in Serbia. Soon after the meeting, an additional exotic herbivore was found attacking *A. artemisiifolia* in southern Switzerland and northern Italy, i.e. the leaf beetle *Ophraella communa*. In all cases, it is assumed that these herbivores were introduced accidentally. This new information will significantly affect work in WG1, since *E. strenuana* and *O. communa* are the two insects that are successfully used as biological control agents of common ragweed in China. In late summer/early autumn, a field survey was conducted to assess the distribution and incidence of attack of *O. communa* in Europe. The results of this survey were published in the journal 'Weed Research' (cf. Annex 2).

In the general WG meeting, a WG1 member presented, together with a WG4 member, a proposal for a European-wide survey of *Ambrosia plants*, including (i) *Ambrosia* distribution (part of WP4) and (ii) *Ambrosia* population dynamics (part of WP1) (<http://ragweed.eu/the-smarter-ambrosia-survey/>). This survey will be primarily conducted by SMARTER members all over Europe, but will also include contributions of stakeholders and laymen ("citizen-scientists"). WG1 will coordinate the data collection of *Ambrosia* population dynamics.

At the meeting in Berlin, we discussed protocols for (i) seed collections, (ii) surveys of herbivore and pathogen communities associated with ragweed in Europe, (iii) monitoring of ragweed population dynamics, and (iv) setting up a test-plant list for host-range testing of biological control candidates and (v) biological control agent impact at the population level. Members of the WG1 were assigned to take the lead in finalizing these protocols until the next meeting in Montpellier in May 2014.

In the general WG meeting, WG1 members presented their preparations for the SMARTER *Ambrosia* survey. They presented (i) new iPhone App, developed for data collection on *Ambrosia* distribution data, and to be launched in 2014, and (ii) protocols for the data collection of *Ambrosia* population dynamics, in relation to a preliminary population dynamics model, which were then discussed with all present participants. In addition, links between the population dynamics model and models developed by other WGs were discussed. Also, it was agreed to launch an *Ophraella* task force that will develop and conduct data collections in order to quantify the spread of *O. communa*, its impact on the population dynamics of ragweed population and on pollen concentration in the air. A first meeting of the task force was held on 17 January 2014 in Fribourg, Switzerland.

Members of the WG 1 were also successful in obtaining new funding to work on objectives of WG 1. Large grants were secured to work on the ragweed population dynamics of ragweed in Europe and on the newly detected biological control candidate *Epiblema strenuana* in Israel. Furthermore, a small grant was secured to start collaboration with China on assessing host-specificity and impact candidate biological control agents and on assessing the economic impact of biological control of ragweed (c. Annex 3 and 4).

### WG2 Vegetation Management

This WG was originally created to focus on non-chemical measures on natural sites. During the MC meeting in Brussels the scope of WG2 was enlarged including not only direct and competitive effects of control options (mowing; sowing or fostering competitors), but also soil seed bank analysis (as efficacy measure for the sustainability of control options), seed and germination biology, and allelopathy.

The next meeting at Samsun gave the opportunity to discuss the main objectives for the next year (2014) that turned out to be two groups: First a discussion group on experiments on cutting and

outcompeting ragweed intended to develop a protocol for future experimental designs on cutting and outcompeting trials. A second group planned to specifically discuss the efficacy measure “soil seed bank”. Both groups prepared preliminary statements at the WG-meeting in Berlin and results of these discussions could be integrated to the setup of the population monitoring activity within SMARTER. A final discussion round during the WG2 meeting at Montpellier will provide written protocols on soil seed bank measurement and on new cutting and competition experiments in the different geographical regions of the Action. Several groups plan to consider these instructions.

A task force on population genetics of ragweed developed also from the Berlin meeting. Some new scientists were inspired to contribute as participants to SMARTER and will meet in March 2014 at Dijon. All members of the EU HALT-AMBROSIA project are also SMARTER participants and were responsible for the meanwhile finished final scientific report that will provide much relevant input to WG2 as well as WG3 of SMARTER.

### WG3 Integration of management options

This WG was created to ensure that the outcomes of WG1 and WG2 are taken up by stakeholders involved in the management of *Ambrosia artemisiifolia* with the objective of either to improve the performance and sustainability of current management practices or to develop novel management strategies. As WG3 relies on input from WG1 and WG2 no activities were planned for the first year. The Chair and Chair-substitute have attended the meetings of WG1 and WG2 and the first meeting of WG3 is planned for May 2014 in Montpellier where we will review the current management practices

### WG4 Management evaluation

In Samsun, this WG decided to organise the work in three groups: Economics (Alfons Oude Lansink), Health (Letty de Weger) and spread (Matt Smith). Cross linkages between the three WG4 groups were discussed as well during WG4 meetings in Samsun and Berlin. The result of the meetings was a conceptual framework for evaluating the management in terms of its cost effectiveness and in terms of its contribution to reduced health impacts.

#### *Economics Group*

This group developed a conceptual framework for modelling the economic impacts of Ragweed, thereby distinguishing the impacts on agriculture and human health. Data needs, spatial resolution and economic models suitable for modelling health impacts and impacts on agriculture were identified. The economics group also secured funding for a research project into the economic modelling of management of Ragweed.

#### *Spread Group*

The spread group examines the distribution and abundance of the plant and the pollen. Several publications produced during the life of the Action and directly related to the aims of SMARTER have been published in peer reviewed scientific journals by members of SMARTER (cf. Annex 2).

In addition, a study was presented at the EAACI-WAO World Allergy Congress held in Milan, Italy, in June 2013 and subsequently published (Grewling et al. 2013, cf. Annex 2).

Members of the Action also examined the possible effect of the *Ophraella* leaf beetle on airborne concentrations of *Ambrosia* pollen recorded in the Milan region, and results were presented at the Third International Ragweed Conference (IRC) being held in Rho near Milan in Italy on April 3-4 2014 (Bonini et al. 2014; Annex 2).

Further work is planned concerning the influence of the *Ophraella* leaf beetle on airborne concentrations of *Ambrosia* pollen recorded in Milan. This will be in the frame of a STSM being conducted in May (Šikoparija to visit Poznan, in Poland) and forms part of the *Ophraella* Task Force.

In preparation for future work, the spread group has produced a protocol for collecting and analysing spatial and temporal variations in airborne *Ambrosia* pollen concentrations in Europe. The protocol

was completed by Branko Šikoparija, Carsten Ambelas Skjoth and Matt Smith. The protocol is now ready to be disseminated to aerobiologists in Europe.

#### The health group

The health group discussed the possibilities to measure the impact of *Ambrosia* on public health. Direct measurements on patient level include (i) monitoring of the incidence rate of *Ambrosia* sensitization or (ii) monitoring the symptoms of patients. Indirect measurements for the impact of *Ambrosia* on the patient health include (i) number of allergy related drugs sold (ii) doctor of hospital visits (iii) quality of life questionnaires (QOL). Based on these discussions we will create a list of health data, which are best for economic evaluation studies and identify potential sources for these data.

### ***II.A. Innovative networking***

#### On innovative knowledge sharing:

At the start of the Action (the first meeting in Brussels) it was emphasised that SMARTER should ensure connections with all major European initiatives related to the Action topic and that important ragweed centres such as Ukraine became involved in the Action. This was achieved after the first 6 months. SMARTER is linked, via Action participants, to the following four international projects on *Ambrosia* that are funded by the European Commission:

- The ATOPICA project (funded by FP7)
- 'Assessing and controlling the spread and the effects of common ragweed in Europe'
- 'HALT Ambrosia'
- The 'MACC-II' project that has a component on pollen forecasting.

Connections were also established to the permanent collaboration network 'European Aeroallergen Network ([www.polleninfo.org](http://www.polleninfo.org)). Finally connections were established to related COST Actions (e.g. TD1209: Information System for Alien Species) or with SME companies and another COST Action (TD1105-European Network on New Sensing Technologies for Air-Pollution Control and Environmental Sustainability) Actions (working contacts have been set with European. These other networks contain core group members from SMARTER and address core topics for the Action: vegetation and atmosphere.

The Action is presented through its own web-page through a poster, a leaflet and more recently also through a trailer film, which is all available on [www.ragweed.eu](http://www.ragweed.eu).

During the first meetings of the WGs and the MC, a main challenge was to develop an integrated approach that combines field experiments with models that include existing knowledge on vegetation, atmosphere and economy, and to identify the gaps where new knowledge is needed and whether this should be achieved by field experiments or (mainly) interdisciplinary model experiments.

The Action has or will participate in several international events and had back-to-back meetings in connection with conferences such as 16th European Weed Research Society Symposium in Samsun in 2013. There will also be a back-to-back meeting at the forthcoming 4th International Symposium on Weeds and Invasive Plants, which will be held in Montpellier in May 2014, which will contain a joint half-day session with SMARTER on *Ambrosia*. Strong participation from the Action is also expected at the Third International Ragweed Conference, which is being held in Milan in early April 2014 and the subsequent Italian Ragweed conference. Both meetings have several talks scheduled by SMARTER members (cf. <http://irc.aslmi1.mi.it/>).

#### On significant scientific breakthroughs:

Since the initiation of the Action a number of important findings within the Action have already been published in leading journals in their respective scientific disciplines. This includes scientific studies in Weed Research (2 articles), Agricultural and Forest Meteorology (2 articles), Atmospheric Environment (1 article), Global Change Biology (1 article) and a review in Environmental

International (1 article). Of these, one study on biocontrol has been associated with a press release, which generated a large media coverage including radio interviews, TV programmes and more than 30 newspaper articles. The latter publication was the result of newly established collaborations through SMARTER. Sixteen articles and reports have been published and listed as a part of the COST Action since Nov. 2012 (cf. Annex 2).

#### On tangible socio-economic impacts:

A major socio-economic impact is expected to be related to the discovery of the North American native ragweed leaf beetle (*Ophraella communa*) in the Po Valley, Italy. It should be stressed that the accidental appearance of the ragweed beetle is not related to the Action, but its discovery! Importation and spread of the ragweed beetle so far is strictly forbidden! However, its discovery can be acknowledged to the SMARTER network and further studies within the Action on its impact are envisioned as this beetle, the most successful ragweed biological control agent in China, may also hold a key to a sustainable mitigation of ragweed in Europe. This work will be presented at least at five conferences in 2014. Upon this publication, France has adopted a national strategy on how to deal with this beetle in case it would reach France.

On the administrative part, Denmark was the first European country significantly influenced by the Action. The Danish parliament decided to implement increased awareness and mitigation strategies on ragweed invasion by launching campaigns and by exploring if increased mitigation strategies (e.g. on seed import compared to the current EU regulation) can be implemented. Here the parliament through the ministry of health twice asked a series of questions in relation to ragweed and health in Denmark. These questions were specifically directed towards the scientific coordinator in SMARTER. Of particular relevance was previous research on pollen and ragweed in relation to the Danish areas as well as a recent review written exclusively by SMARTER participants and with support from SMARTER.

#### On Spin off of new EC RTD Framework Programme proposals/projects:

During the period (2013-14 until report) 2 projects have secured international funding with a total of 2.1 Mio Euro. This includes one FP7 collaborative project and one Marie Curie Career Integration Grant. Four other projects (e.g. HALT-Ambrosia and ATOPICA) were running at the beginning of the Action with strong involvement of SMARTER participants and are expected to end during the first two years of the lifetime of the Action. It has been agreed within the Action to apply for funding for a Marie Sklodowska-Curie Action: Innovative Training Network, and a RISE project on the exchange of staff (cf. Annex 4 international funding and participating SMARTER members).

#### On Spin off of new National Programme proposals/projects:

During the period (2013-14 until report) a total of 20 projects have secured national funding with a total of approx. 2.2 Mio Euro from following countries: Switzerland, Israel, Turkey, Croatia, Czech Republic, Denmark, Italy, Belgium, Sweden, Austria. Other countries (e.g. France) had ongoing projects at the beginning of the Action. Several of the new projects last throughout the lifetime of action. Funders include (numbered according to frequency) ministries, research councils and private foundations (cf. Annex 3 for national funding and participating SMARTER members).

## ***II.B. Inter-disciplinary networking***

#### On additional knowledge obtained from working with other disciplines:

During the first reporting period the strongest level of inter-disciplinarity is the scientific review that includes vegetation, management, atmosphere and health (Smith et al, 2013). At the planning level

is the interdisciplinary collaboration project in the Po Valley, which will start in spring 2014 (c.f. the *Ophraella* Task Force mentioned above).

#### On inter-disciplinarily and scientific impacts:

The SMARTER network is very large and contains a wide range of disciplines. This is documented in the published scientific papers that cover biological control (Müller-Schärer et al, 2014), atmosphere (Prank et al, 2013, Sikoparija et al, 2013, Thibaudon et al, 2014), health (Canova et al, 2013), management (Milakovic et al, 2014), and economy or several of the above (Richter et al. 2013, Smith et al, 2013) (cf. Annex 2).

It is however also clear that the level of interaction and the impact is highly dependent on the amount of available resources for the scientific work. The majority of the funding during 2013-14 has been obtained through national funding, mainly public bodies (e.g. environmental agencies or department, such as a Ministry of Agriculture) or National Research Councils. Assuming that those that work with ragweed at the ministry level are also associated with the Action, then it appears that only a limited number of countries provide funding from agencies. It is also clear that only a small group has secured funding from the research councils and this funding does not cover all the scientific disciplines that the Action wants to have involved. Also a number of countries do not appear to have had access to funding so far. The Action will thus benefit from additional focus on this part: securing research funding, especially national funding as this appear to have had most success, but with a direct integration into the main objectives in the action as given by the MoU.

#### On inter-disciplinarily and socio-economic impacts:

The SMARTER network already was successful to include all envisaged disciplines and stakeholders involvements to ensure that the information for dissemination as outlined in the MoU is produced during the life-time of the Action. The key is here WG3: The integration of Management Options. This WG contain a large amount of members from WG1, WG2 and WG4. At the end of the Action (month 42) a major stakeholder conference is planned, which will then be the major milestone in relation to socio-economic impacts. Having said this, then it is already documented that the Action has had an impact at the socio-economic level by providing the main scientific contribution that formed the decision by the Danish parliament: Increased activities to ensure that ragweed does not establish itself with permanent ragweed populations in Danish nature. This is done in order to secure health and economy. This initiative will be carried out in 2014.

### **II.C. New networking**

- *Additional new members joining the Action during its life.*

On 1 April 2013, the number of individually registered participants was 133.

On 1 Feb 2014, this number had raised to 173.

During the first year, the participation of the non-COST countries mentioned in I became officially affiliated to the Action.

- *Total number of individual participants involved in the Action work (number of participant, give % of female and of Early Stage Researcher participants):*

On 1 Feb 2013, 173 participants (MC members, Observers, and registered participants), of which

- 141 WG members (see Annex 1),
- 72 females (=42%),
- 51 ESR (8 PhDs, 43 PhDs+<8 years, =29%)

- *Involvement of Early Stage Researchers in the Action, in particular with respect to STSMs, networking activities, and Training Schools. In addition, justification should be provided if less than 4 STSMs were carried out during the year:*

- 6 STSMs have been carried out, of which 3 female (50%), and 3 ESR (50%)
- WG/CG/MC meeting Samsun June 2013: 60 participants were reimbursed, of which

- 26 females (43%), and 19 ESR (32%)
- WG meeting Berlin, Nov 2013: 40 participants were reimbursed (plus 1 external expert), of which 13 females (33%), and 14 ESR (35%)
  - *Involvement of researchers from outside of COST Countries. (Number of participants from non-COST Countries approved by the CSO. Give % of such participants from countries with reciprocal agreements. Specify their contribution)*
  - 11 participants from non-COST Countries approved by the CSO (0% of countries with reciprocal agreements)
  - *Advancement and promotion of scientific knowledge through publications and other outreach activities. (Number of publications and other outreach activities that resulted from COST networking through the Action. (cf. Annex 2)*
  - *Activities and projects with COST network colleagues (cf. Annex 3 and 4 for national and international funding and participating SMARTER members)*
  - *The capacity of the Action members to raise research funds (cf. Annex 3 and 4 for national and international funding and participating SMARTER members).*