

Appendix A. Final questionnaire.

DATE _____ START TIME _____ PLACE _____ SURVEY N° _____

Good day/afternoon, my name is _____. From a research project funded by INIA, MinEco and FEDER, we are conducting a survey to evaluate the perception of the agricultural sector on the role of natural enemies in apple crops. The survey is completely anonymous and confidential and your information will only be used for the purposes of this study.

Special training or relationship to the subject is not required to complete the questionnaire. There are no "right answers", simply expose your opinion or knowledge after reading the questions carefully.

The survey takes between 30 and 45 minutes. Thanks a lot.

I. Importance of biological control

1. What do you understand by biological control?

What do you understand by natural enemy?

2. Do you think that natural enemies are important for crops?

Yes

No

Why? _____

3. Are natural enemies important for your cider-apple orchards?

Yes

No

Why? _____

4. Does the application of natural enemies change your agriculture production in your cider-apple orchards?















Yes

No

Why? _____

II. Knowledge of the different natural enemies

5. From the species that I show you here, what do you know and have you seen in the area? If you know them but you haven't seen them, why do you know them? Which of them are natural enemies?

		Name	Known	Sighted	Non Sighted	If it is known but haven't seen it, why do you know it?
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						











6. Are there other species deemed important for pest control that are not displayed in the panel?

Yes Which are they? _____

No

III. Knowledge of natural enemies of pests in cider-apple crops and in their own cider-apple orchards

7. How important are the following species for your cider-apple orchards due to pest control? Value their contribution on a scale of 0 to 3.

	Species	Importance					Why is it important for pest control?
		0	1	2	3	No answer	
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							

8. Which is the importance of the following pests in your apple orchards (0-nothing harmful; 1-little harmful, 2-intermediate, 3-very harmful, No answer)? What natural enemies from the previous questions attack them?

	Importance	Attack by		Importance	Attack by
Rosy apple aphid			Roe deer		
Woolly apple aphid			Apple proliferation		
Green aphid			Land slug		
Water vole			Wood leopard moth		
Apple blossom weevil			Cochineal		
Green weevil			Leaf roller		
Codling moth			European canker		
European red mite			Mistletoe		

IV. Socio-economic characteristics

1. Could you tell me where do you live? _____
2. How many years have you been living there? _____ years
3. Where did you born? _____
4. Which type of relationship do you have with the agricultural sector? (multianswer)
 - I am a farmer with exclusive dedication
 - I am a farmer with partial dedication
 - I work transforming agricultural products (secondary sector)
 - I don't dedicate myself professionally to agriculture but as hobby/ complementary income/ maintain family tradition/ consume my own products
 - I belong to agricultural trade unions/ associations
 - Management agent/ territory manager
 - Beekeeper
 - Other, which? _____
5. How many years have you engaged in agriculture (or worked related to it)? ____ years
6. If you cultivate something, what crops do you grow?
7. In your opinion, what are the main problems that face your crops and your production?
8. What the causes of these problems are?
9. What do you do with your crops production? (Multianswer)
 - Home supply
 - Barter or exchange
 - Local direct sale
 - Mass market

10. What kind of production do you have in your apple orchards?

Do you use herbicides? Yes _____ No _____
 Do you use insecticides? Yes _____ No _____
 Do you use chemical fertilizer? Yes _____ No _____

I. Personal and socioeconomic aspects

11. Could you tell me your year of birth? _____

12. How many lands do you work? _____ How many hectares? _____ Are they your property? Yes _____ No _____ (Some) How many of them? _____

13. Of these categories, where would you fit based on your monthly income?

a	No incomes	
b	Less than 600 €	
e	Between 600 and 1200 €	
f	Between 1200 and 1800 €	
g	Between 1800 and 2400 €	
h	More than 2400 €	

14. Could you tell me until what stage did you study?

a	Without formal studies	
b	Primary studies	
c	Secondary studies	
d	Bachelor / Medium profesional studies	
e	High profesional studies	
f	University studies	

15. Do you currently have any other occupation / profession?

a	Work in the primary sector (farmer, shepherd, fisherman...)	
b	Work in the secondary sector (industry, energy, construction ...)	
c	Work in the tertiary sector / services (markets, hotels, tourism, transport, communications, administration, finance)	
d	Work in the quaternary sector (education, health, research, art)	
e	Retired	
h	Others:	

16. Do you belong to any association or organization? (Multianswer).

Yes, to one of character...	c	Agriculture / Livestock	
	d	Environment	
	e	Politic	
	f	Cultural	
	h	Other _____	
No			

Appendix B. Natural enemies and pests in cider-apple orchards.

Table 1. Description of the possible natural enemies used in the questionnaire. * no natural enemies.

Article name	Common name	Scientific name	Taxonomic group	Description
Slug*	Land slug	<i>Arion ater</i> L.	Gastropods	Terrestrial slug (Mollusca; Gastropoda)
Bumblebee*	Buff-tailed bumblebee	<i>Bombus terrestris</i> L.	Insects	Widespread and popular big-sized social bee, distinguishable by three-color ringed abdomen
Buzzard	Common buzzard	<i>Buteo buteo</i> L.	Birds	Medium-to-large raptor, common resident in northern Spain
Ladybug	Seven-spot ladybug	<i>Coccinella septempunctata</i> L.	Insects	Also known as C-7, it is the most common ladybug in Europe
Robin	European robin	<i>Erithacus rubecula</i> L.	Birds	Common and popular song, easily recognizable by his red breast
Earwigs	European earwig	<i>Forficularia auricularia</i> L.	Insects	Common omnivorous insect, easily recognizable for its hindwings
Hoverfly	Dronefly	<i>Leucozona lucorum</i> L.	Insects	Common and cosmopolitan hoverfly (Diptera: Syphidae)
Stag beetle*	Stag beetle	<i>Lucanus cervus</i> L.	Insects	Popular big-sized, xylophagous beetle, easily distinguishable by horn-like mandibles in males
Spider	Spider	<i>Lycosa</i> sp.	Arachnids	Non-flying arthropod with 8 joint-legged
Tit	Great tit	<i>Parus major</i> L.	Birds	Common tit (Paridae) with a black tie as a main distinctive
Magpie*	Eurasian magpie	<i>Pica pica</i> L.	Birds	Widespread and popular crow (Corvidae) easily distinguishable by the black and white body design and long tail
Woodpecker	European green woodpecker	<i>Picus viridis</i> L.	Birds	Insectivorous woodpecker widespread in rural areas
Blackbird	Common blackbird	<i>Turdus merula</i> L.	Birds	Common and popular song bird that also lives in urban areas, easily recognizable by the black body and a contrasted yellow beak (in male)
Fox	Red fox	<i>Vulpes vulpes</i> L.	Mammals	Abundant and very popular, medium-sized dog-like Carnivora (Canidae)

Table 2. Description of the cider-apple pests used in the questionnaire and the average importance given by farmers (0-nothing harmful, to 3-very harmful).

Article and common name	Scientific name	Taxonomic group	Damage on cider-apple trees	Importance by farmers
Apple blossom weevil	<i>Anthonomus pomorum</i> L.	Insects	Blossoms	1,4
Green aphid	<i>Aphis pomi</i> DeGeer	Insects	Leaves and shoots (especially of young trees)	0,9
Land slug	<i>Arion ater</i> L.	Gastropods	Trunk	0,4
Water vole	<i>Arvicola terrestris</i> scherman Shaw	Mammals	Roots parts	2,6
Apple proliferation	<i>Candidatus Phytoplasma</i>	Bacteria	Shoot, leaf, fruit and roots	1,3
Roe deer	<i>Capreolus capreolus</i> L.	Mammals	Trunk bark	2,2
Codling moth	<i>Cydia pomonella</i> L.	Insects	Fruits	2
Rosy apple aphid	<i>Dysaphis plantaginea</i> Pass.	Insects	Leaves, shoots and fruits	1,8
Woolly apple aphid	<i>Eriosoma lanigerum</i> Hausm.	Insects	Aerial and root parts	1,7
European canker	<i>Nectria galligena</i> Bres.	Fungi	Trunk and branches	1,7
European red mite	<i>Panonychus ulmi</i> Koch	Insects	Buds, leaves and shoots	0,7
Leaf roller	<i>Pasiphila rectangulata</i> L.	Insects	Leaves	0,6
Green weevil	<i>Polydrusus formosus</i> Mayer	Insects	Buds, blossoms and shoots	1,1
Cochineal	<i>Quadraspidiotus perniciosus</i> Comstock	Insects	Leaves and branches	0,4
Mistletoe	<i>Viscum album</i> L.	Plant	Tree development	1,2
Wood leopard moth	<i>Zeuzera pyrina</i> L.	Insects	Leaves	0,8