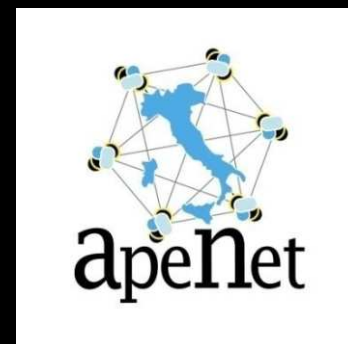


42nd APIMONDIA Congress



APENET, a network for monitoring honeybee mortality and colony losses in Italy

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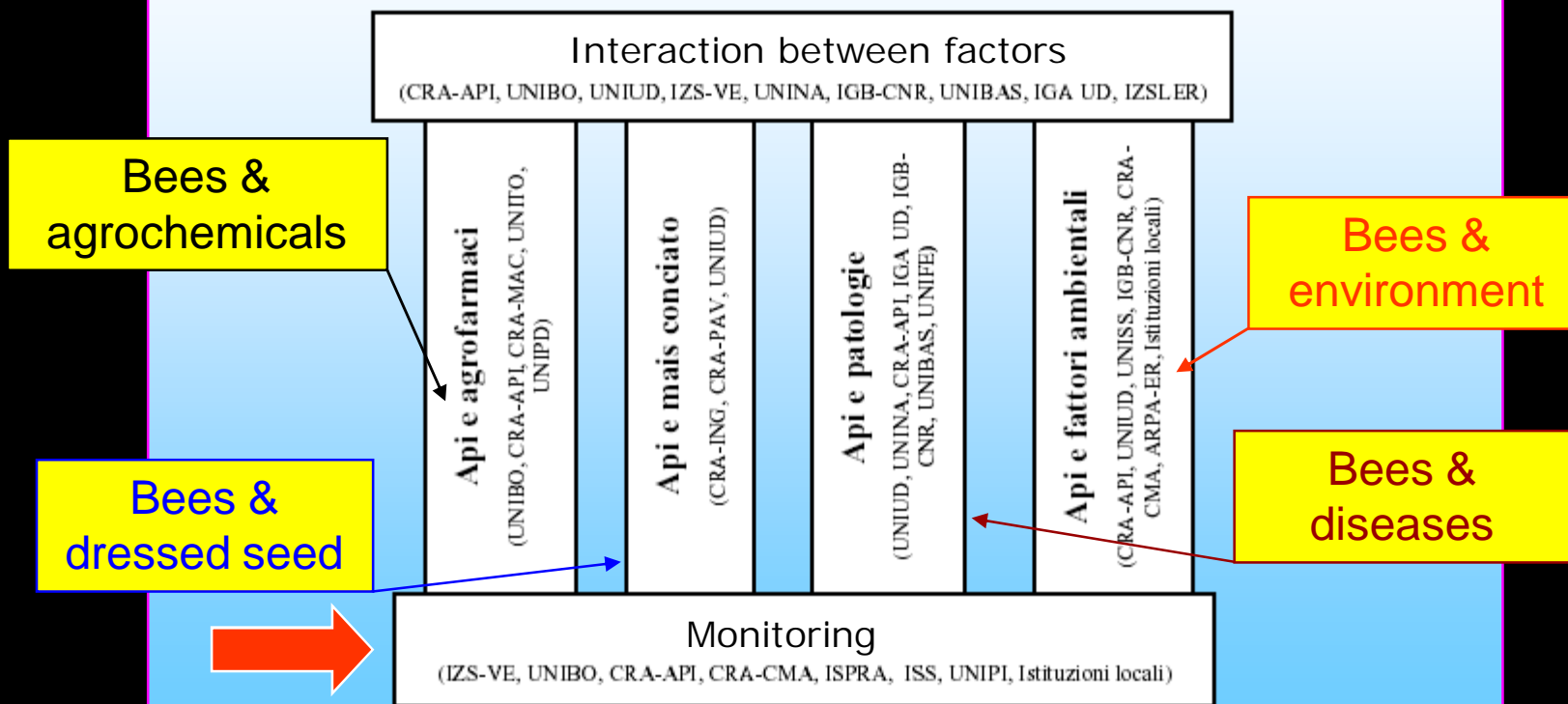
²*CRA-API Unità di ricerca di apicoltura e bachicoltura, Bologna,*

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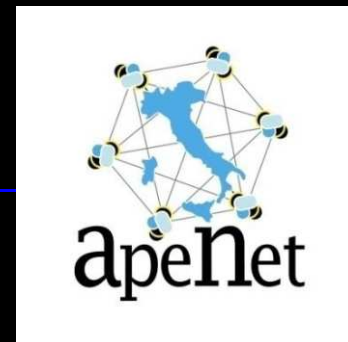
Structure of the project "Apenet"

APENET:





National monitoring network



To assess the extent and investigate the possible causes of honeybee and colony losses in Italy it is needed to establish a national monitoring network.



Monitoring network

- ✓ National monitoring network
- ✓ Dedicated software
- ✓ Data collection on environment
- ✓ Data collection on honey bee health status
- ✓ Analysis on bee hive matrices
- ✓ Data analysis



Apenet

- ✓ Target apiaries will be distributed in selected sites (modules), ideally one per region, to cover the national territory.
- ✓ Each module, composed of five apiaries with ten non-migratory colonies each, will be chosen based on environmental characteristics with a distance to the centre of the module of about 50 km.
- ✓ Georeferencing of apiaries



Coordination centre

Apiary composed of 10 hives



Monitoring network

Monitoring network
composed of
19 modules =
93 apiaries =
930 hives



Steps in the monitoring project

Field data collection



Data input



Data storage



SCHEDA APENET

MODULO APICOLTORE

LOCALITA' INDIRIZZO

COORDINATE GIS N° TOTALE ALVEARI DELLA PARCHE

TIPO DI ZONA: PIANURA COLLINARI MONTAGNI ZONA UMIDA

TERRITORIO (n. %): AGRICOLA INDUSTRIALI URBANO NATURALE

COLTURE (n. %): ORTICOLA FRUTTICOLA FORAGGERE CEREALICOLE

SERRI FLORICOLI SILVICOLE ALTRO

EPISODI DI MORTALITA'/POPOLAMENTI NEGLI ANNI PRECEDENTI: SÌ NO

Se SÌ ANNO PERIODO ALVEARI COINVOLTI (n. %):

CAUSE PRESUNTE O STABILITE

DATA/ORA CONTROLLO N° (1, 2, 3, 4, altro)

OSSERVAZIONI (es. condizioni meteo, malattie, controllo)

OSSERVAZIONI METEOROLOGICHE DEL PERIODO (nei 15 giorni antecedenti la data del controllo)

Normale (giornate di bel tempo intervallate da giornate con pioggia)

Piovoso (molte giornate caratterizzate da pioggia e cielo nuvoloso)

Siccitoso (molte settimane caratterizzate da assenza di pioggia)

Freddo (molte giornate con basse temperature che inducono il volo)

Caldo afoso (molte giornate di alte temperature, presenza di barba)

OSSERVAZIONI AGRONOMICHE E VEGETAZIONALI DELLA ZONA

Pratiche agronomiche del periodo (nei 15 giorni antecedenti la data del controllo)

Coltura	Pratica	Treatmenti
Coltura	Pratica	Treatmenti
Coltura	Pratica	Treatmenti
Coltura	Pratica	Treatmenti
Coltura	Pratica	Treatmenti

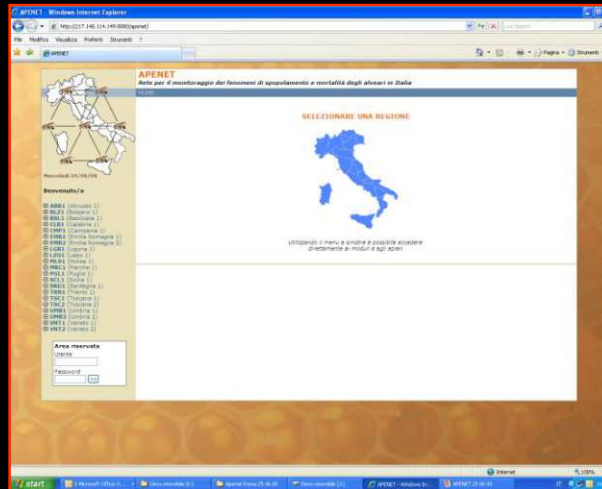
Specie (n. popolazione, data trattamento, tipo sostanza)

Principali specie botaniche (coltivate o spontanee) in PDRE presenti

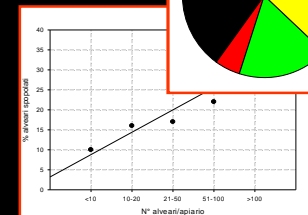
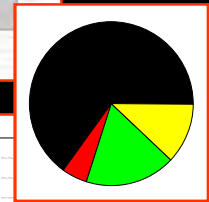
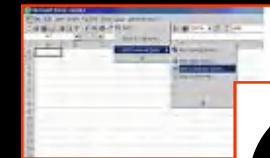
Specie	Esposizione	Periodo

Presenza di melata Specie botanica

Forms



Web page



Data analysis



Seasonality of routine controls

- 1st inspection: last decade of March/first week of April;
- 2nd inspection: last 3 weeks of June;
- 3rd inspection: last week of August/first decade of September;
- 4th inspection: last week of October/first decade of November.



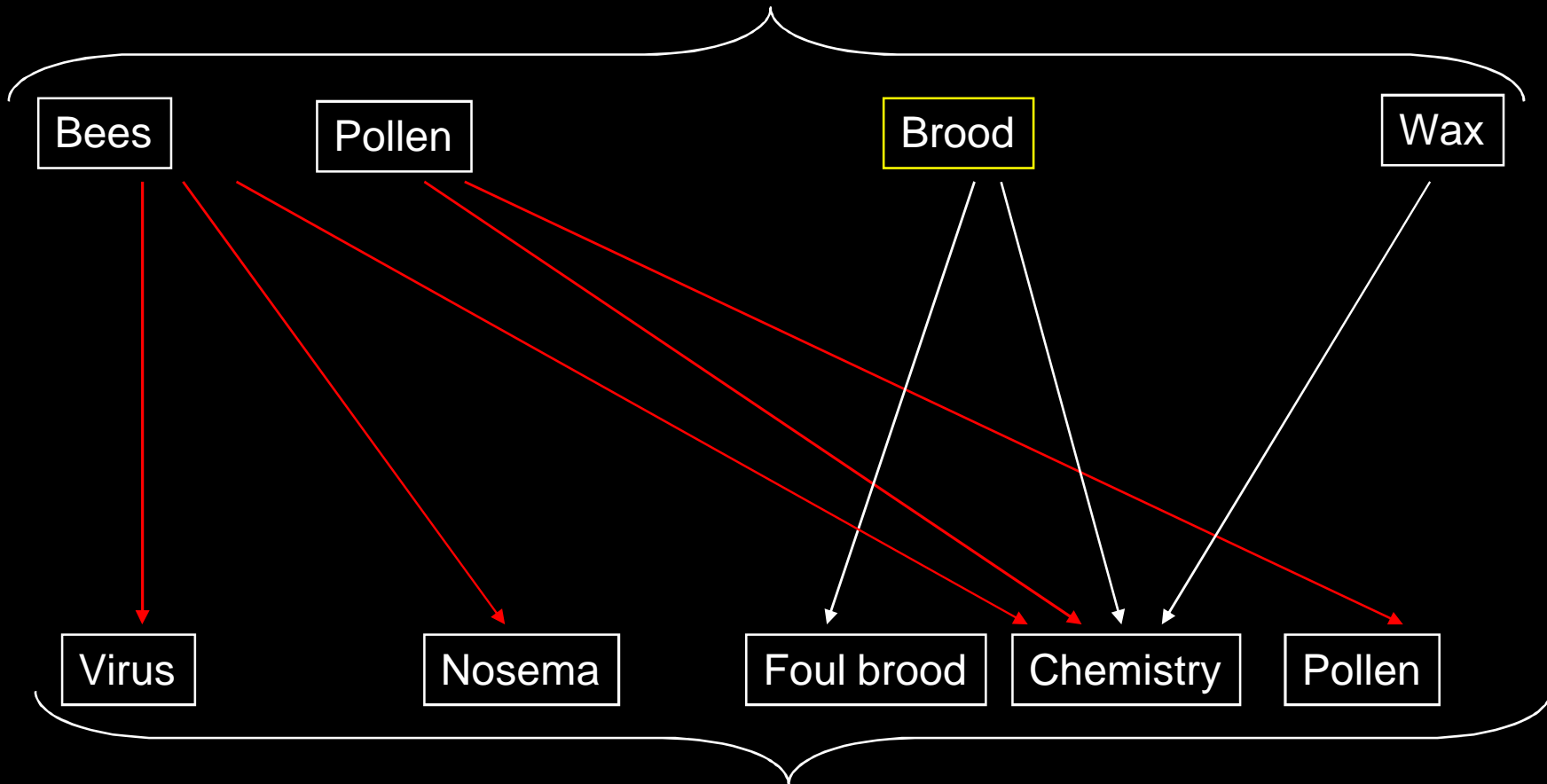
Colonies inspection

- Colonies were visually inspected four times a year
- In each inspection several parameters of each colony will be considered:
 - ✓ health and nutritional condition,
 - ✓ number of bees and brood,
 - ✓ queen's age,
 - ✓ climate, agronomy and vegetation of the territory at the time of apiary inspection



Sampling

MATRIX



ANALYSIS

Aims of sampling

Samples collected



Analysis:

- Pesticide residues
- Pollen identification
- Honey bee diseases

Collected data



Analysis:

- Culture pattern
- Intensive/extensive agriculture
- Meteo
- Colony development

Hypotheses on relationship between different causes and honey bee health status

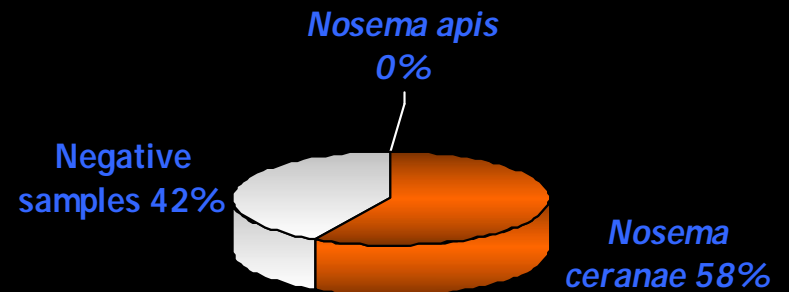
Results - *Nosema* 2009

Italian regions	<i>Nosema ceranae</i>	<i>Nosema apis</i>
Veneto	✓	
Prov. Auton. Bolzano	✓	
Prov. Auton. Trento	✓	
Liguria	✓	
Emilia Romagna	✓	
Toscana	✓	
Marche	✓	
Lazio	✓	
Abruzzo	✓	
Umbria	✓	
Sardegna	✓	
Molise	✓	
Campania	✓	
Basilicata	✓	
Puglia	✓	
Calabria	✓	
Sicilia	✓	

North Italy
Central Italy
South Italy

✓ Positive sample Negative sample

Italian region	N. samples	<i>Nosema ceranae</i> positive samples	<i>Nosema apis</i> positive samples	Negative samples
Veneto	10	12	0	8
Prov Auton Bolzano	11	5	0	6
Prov Auton Trento	17	11	0	6
Liguria	20	14	0	6
Emilia Romagna	31	19	0	12
Toscana	19	15	0	4
Marche	18	6	0	12
Lazio	20	13	0	7
Abruzzo	10	2	0	8
Umbria	19	5	0	14
Sardegna	17	9	0	8
Molise	20	5	0	15
Campania	20	16	0	4
Basilicata	15	2	0	13
Puglia	20	16	0	4
Calabria	17	14	0	3
Sicilia	20	17	0	3
Total	314	181	0	133



Results - *Nosema* 2010

Italian regions	<i>Nosema ceranae</i>	<i>Nosema apis</i>
Veneto	✓	
Prov. Auton. Bolzano		
Prov. Auton. Trento	✓	
Liguria	✓	
Emilia Romagna	✓	
Toscana	✓	
Marche	✓	
Lazio	✓	
Abruzzo		
Umbria	✓	
Sardegna	✓	
Molise	✓	
Campania	✓	
Basilicata	✓	
Puglia	✓	
Calabria	✓	
Sicilia	✓	

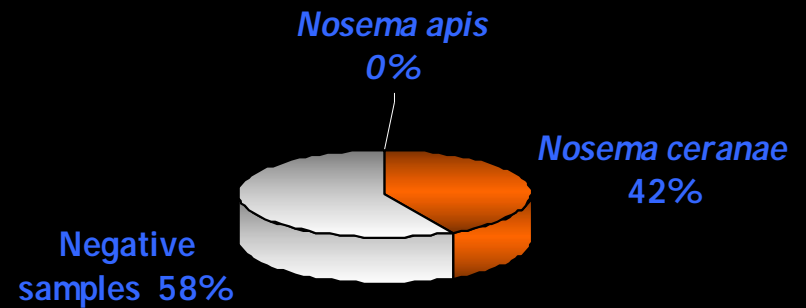
North Italy

Central Italy

South Italy

✓ Positive sample Negative sample

Italian region	N. samples	<i>Nosema ceranae</i> positive samples	<i>Nosema apis</i> positive samples	Negative samples
Veneto	26	13	0	13
Prov Auton Bolzano	3	0	0	3
Prov Auton Trento	12	9	0	3
Liguria	23	13	0	10
Emilia Romagna	30	16	0	14
Toscana	19	15	0	4
Marche	17	4	0	13
Lazio	17	12	0	5
Abruzzo	4	0	0	4
Umbria	26	3	0	23
Sardegna	18	5	0	13
Molise	20	2	0	18
Campania	20	10	0	10
Basilicata	15	3	0	12
Puglia	10	2	0	8
Calabria	66	30	0	36
Sicilia	8	6	0	2
Total	335	141	0	194



Results - virus (1st and 2nd semester 2009)

	EF1	DWV	BQCV	SBV	AIV	APBV	KBV	CPV	IAPV
POS	172	131	108	1	0	15	0	2	0
% of samples	98,85	75,29	62,07	0,57	0,00	8,62	0,00	1,15	0,00
LOW POS	0	6	12	1	0	6	1	0	0
% of samples	0	3,45	6,90	0,57	0,00	3,45	0,57	0,00	0,00
NEG	2	37	54	172	174	153	173	174	174
% of samples	1	21	31	99	100	88	99	100	100

	18S	DWV	BQCV	SBV	AIV	APBV	KBV	CPV	IAPV
POS	204	71	77	28	0	7	0	13	0
% of samples	100	34,80	37,75	13,73	0	3,43	0	6,37	0
LOW POS	0	14	15	25	0	6	0	3	0
% of samples	0	6,86	7,35	12,25	0	2,94	0	1,47	0
NEG	0	119	112	151	204	191	204	188	204
% of samples	0	58,33	54,90	74,02	100	93,63	100	92,16	100

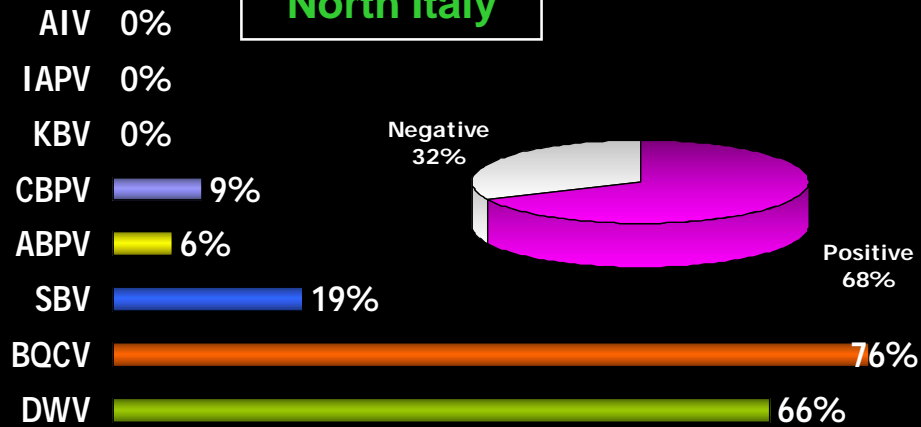
Results – Viruses 2009

Italian regions	DWV	BQCV	SBV	ABPV	CBPV	KBV	IAPV	AIV	
Veneto	✓	✓	✓	✓	✓				North Italy
Prov. Auton. Bolzano	✓	✓	✓		✓				
Prov. Auton. Trento	✓	✓	✓	✓					
Liguria	✓	✓							
Emilia Romagna	✓	✓	✓	✓	✓				Central Italy
Toscana	✓	✓	✓		✓				
Marche	✓	✓	✓	✓					
Lazio	✓	✓	✓	✓					
Abruzzo	✓	✓							South Italy
Umbria	✓	✓	✓	✓	✓	✓			
Sardegna	✓	✓	✓	✓					
Molise	✓	✓	✓	✓	✓				
Campania	✓	✓	✓	✓					South Italy
Basilicata	✓	✓	✓	✓	✓				
Puglia	✓	✓	✓	✓	✓				
Calabria	✓	✓		✓	✓				
Sicilia	✓	✓	✓	✓					

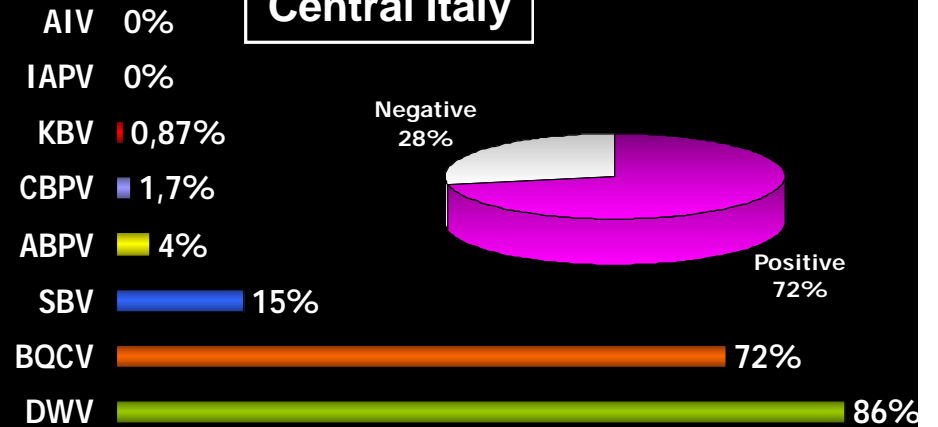
Results – Viruses 2009



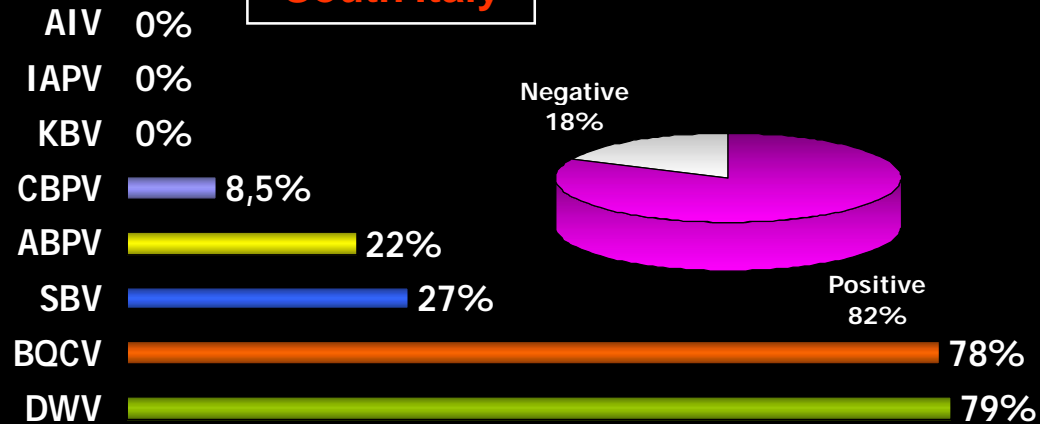
North Italy



Central Italy



South Italy



Results - virus (1st and 2nd semester 2010)

	EF1	DWV	BQCV	SBV	AIV	APBV	KBV	CPV	IAPV
POS	197	122	181	110	0	37	0	22	1
% of samples	100	62	92	56	0	19	0	11	1
LOW POS	0	7	6	0	0	3	0	2	0
% of samples	0	3,55	3,05	0,00	0,00	1,52	0,00	1,02	0,00
NEG	0	68	10	87	197	157	197	173	196
% of samples	0	34,52	5,08	44,16	100,00	79,70	100,00	87,82	99,49

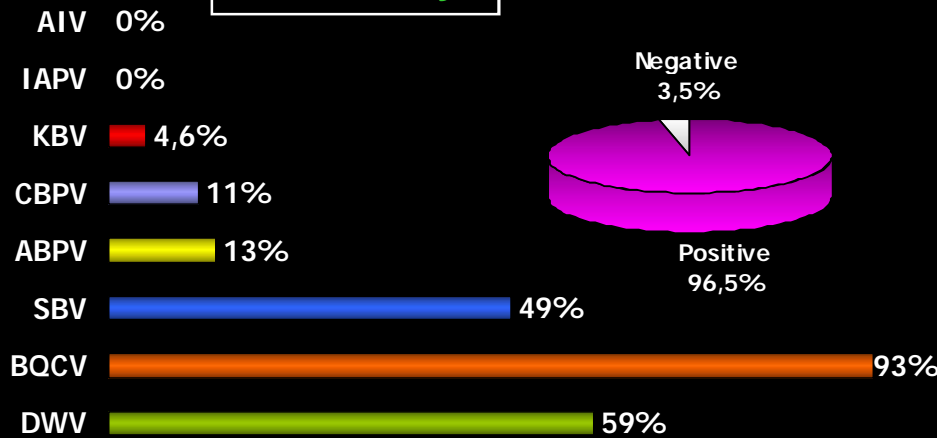
	EF1	DWV	BQCV	SBV	AIV	APBV	KBV	CPV	IAPV
POS	182	149	164	111	0	57	4	14	2
% of samples	100	82	90	61	0	31	2	8	1
LOW POS	0	8	2	0	0	10	1	2	0
% of samples	0	4	1	0	0	5	1	1	0
NEG	0	25	16	71	182	115	177	166	180
% of samples	0	14	9	39	100	63	97	91	99

Results – Viruses 2010

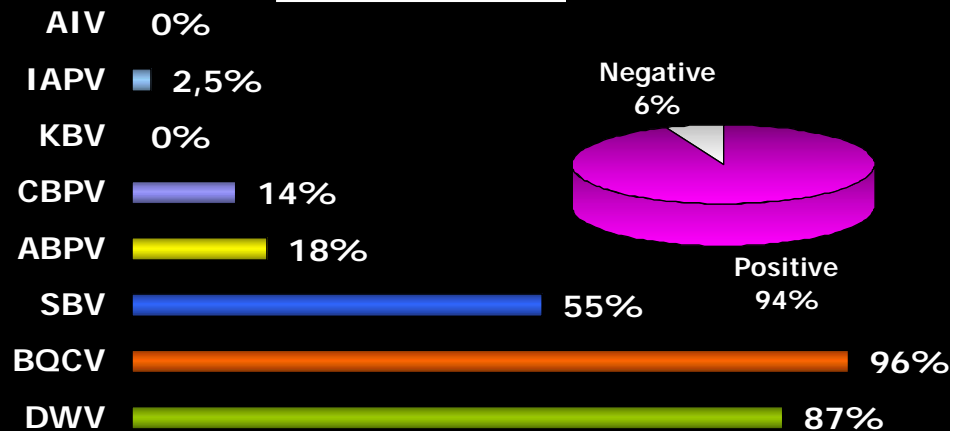
Italian regions	DWV	BQCV	SBV	ABPV	CBPV	KBV	IAPV	AIV	
Veneto	✓	✓	✓	✓	✓				North Italy
Prov. Auton. Bolzano	✓	✓	✓						
Prov. Auton. Trento	✓	✓	✓	✓					
Liguria	✓	✓	✓	✓	✓	✓			
Emilia Romagna	✓	✓	✓	✓	✓	✓			
Toscana	✓	✓	✓	✓	✓		✓		Central Italy
Marche	✓	✓	✓	✓	✓				
Lazio	✓	✓	✓	✓	✓		✓		
Abruzzo	✓	✓	✓		✓				
Umbria	✓	✓	✓	✓	✓				
Sardegna	✓	✓	✓	✓	✓		✓		South Italy
Molise	✓	✓	✓	✓	✓				
Campania	✓	✓	✓	✓					
Basilicata	✓	✓	✓	✓					
Puglia	✓	✓	✓	✓	✓				
Calabria	✓	✓	✓	✓	✓				
Sicilia	✓	✓	✓	✓	✓				

Results – Viruses 2010

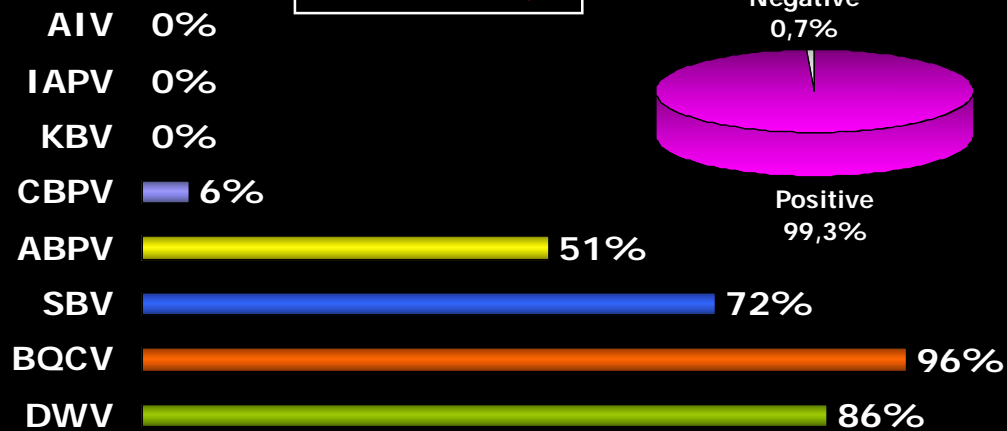
North Italy



Central Italy



South Italy



Results - Residues

Sample type	Area	% positives 2009	% positives 2010	mainly present molecules
BEES	North Italy	16 % (17/102)	10 % (11/111)	Clothianidin, Coumaphos, Fluvalinate, Imidacloprid, Rotenone
	Central Italy	15 % (16/104)	8 % (8/102)	
	South Italy	18 % (20/111)	6 % (8/139)	
WAX	North Italy	41 % (43/106)	42 % (51/121)	Acrinatrina, Chlorfenvinphos, Coumaphos, Fluvalinate
	Central Italy	52 % (56/108)	41 % (43/106)	
	South Italy	39 % (40/102)	47 % (65/138)	
POLLEN	North Italy	32 % (10/32)	27 % (19/70)	Acrinatrina, Chlorfenvinphos, Coumaphos, Fluvalinate
	Central Italy	28 % (30/106)	30 % (30/100)	
	South Italy	19 % (11/59)	24 % (31/129)	

Protein content	Area	% N (2009)	% N (2010)
	North Italy	1.82 – 3.86	0.68 – 4.17
	Central Italy	2.13 – 4.73	2.12 – 5.31
	South Italy	1.06 – 5.68	1.87 – 4.45



Colony mortality

- ✓ Winter mortality 2009/10: **15.0%** (113 dead hives/759)
- ✓ Winter mortality 2010/11: **22.5%** (78 dead hives/347)

COLOSS questionnaire (COST Action FA0803, WG1)

- ✓ 2009/10 Winter mortality of **23%** (1,148 dead hives/4,994) in northeastern Italy,
- ✓ 2009/10 Winter mortality of **15.7%** (1,246 dead hives/7,939) in central Italy
- ✓ 2010/11 Winter mortality of **19,0%** (2,546 dead hives/13,423).



Apenet

Distinction between:

✓ **monitoring**

✓ **reporting of outbreaks** of bee mortality and colony depopulation/losses:

✓ Veterinary Services

✓ Official sampling

✓ Appropriate storage and submission to the laboratory (IZSVe)



Comments

What has been reported by the monitoring network in 2009, 2010 and 2011:

- ✓ No outbreaks of honey bee mortality or bee hive depopulation;

Outbreak reporting system:

- ✓ 2009: 2 Spring outbreaks linked to the use of neonicotinoids coated maize seeds (7 outbreaks in non maize zone)
- ✓ 2010: no outbreaks linked to the use of neonicotinoids coated maize seeds (21 outbreaks in non maize zone)
- ✓ 2011: no outbreaks linked to the use of neonicotinoids coated maize seeds (16 outbreaks in non maize zone)



Conclusions

APENET network provided:

- ✓ evidence of the enzootic condition of *N. ceranae* in Italy
- ✓ systematically investigated the presence of viruses and their geographic distribution
- ✓ systematically investigated the presence of residues (pesticides, acaricides and neonicotinoids) in honey bees, pollen and wax. In wax the presence of acaricides was particularly relevant
- ✓ contributed to the knowledge of pollen nutritional value
- ✓ contributed to determine annual and Winter colony mortality
- ✓ contributed to create a database on honey bee colonies development and health condition in Italy



Acknowledgements

Ministero delle Politiche Agricole Alimentari e Forestali

CRA-API, Bologna

DiSTA, Bologna

IZSVe

Beekeepers, beekeepers' association and the people in charge of the monitoring modules

Regioni/PPAA

Ministero del Lavoro della Salute

Ministero dell'Ambiente della Tutela del Territorio e del Mare

Thank you for your attention