IPM for seedling insects in winter and spring oilseed rape production.

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EMPHASIS

Effective **M**anagement of **P**ests and **H**armful **A**lien **S**pecies - **I**ntegrated **S**olutions

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Practical solutions

EPPO Workshop on integrated management of insect pests in oilseed rape
Berlin, 2017-09-20/22
I.Gaile, G. Gulbis

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 634179 20.-22.09.2017

EMPHASIS' FRAMEWORK

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- **THE EUROPEAN PROGRAMME** Horizon 2020, the Framework Programme for Research and Innovation (2014-2020)
- **THE PROJECT** EMPHASIS - Effective Management of Pests and Harmful Alien Species – Integrated Solutions
- **DURATION** 48 months (2015-2019)
- **COORDINATOR**

Maria Lodovica Gullino

UNIVERSITÀ DEGLI STUDI DI TORINO

Agroinnova, Center of Competence for the Innovation in Agro-environmental Center of the University of Torino (Italy)

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ACTIVITIES

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PREDICT

pest management challenges and opportunities will be evaluated according to stakeholder-focused criteria and through pathway analysis.

WP1

PREVENT

practical solutions for surveillance in different pathways to enhance preparedness will be provided to end-users, and monitoring tools following outbreaks and eradication will be developed.

WP2

PROTECT

practical solutions for managing native and alien pests in agriculture, horticulture and forestry will be developed, their technical and economic feasibility will be demonstrated and their market uptake will be enhanced.

WP3 – WP4

PROMOTE

a mutual learning process with end-users will be developed, and the solutions identified by the project will be promoted through training and dissemination.

WP5

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EMPHASIS' NUMBERS

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- **4 YEARS DURATION**
- **13 PATHOSYSTEMS** (IPM for OSR seedling insects is one of 13)
- **10 COUNTRIES** INVOLVED
- **21 ENTERPRISES, (9 SME)**
- MORE THAN **1.000 MAN/MONTH** OF WORK

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PATHOSYSTEMS TO BE STUDIED

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Agri-ecosystem/Target plants	Target pests	Management approaches
(Field crops) Cereals	*Puccinia spp.* on wheat	Optimized chemical control, Host plant resistance, Sentinel crops.
	Aphids	Biological control with endogenous entomopathogenic fungi.
	Ambrosia artemisiifolia on summer cereals	Optimized chemical control (selective herbicides), Cultural control (mechanical means).
(Field crops) Rotation oilseed rape (OSR) and wheat	*Mycosphaerella graminicola* *Leptosphaeria maculans*	Biological control, Cultural Control (debris management), Optimized use of chemicals, Sentinel crops.
	Seedlings insects	IPM, Optimized chemical control.
(Protected crops) Vegetables and high-value crops	*Bemisia tabaci* and associated viruses	Biological control with new macrobials (predatory bugs and mites). Enhancing efficacy of entomopathogenic fungi.
	Downy mildew Soil-borne diseases	Host plant resistance, Physical methods, Optimized chemical control, Biological Control, Cultural control, LAMP assays, metagenomic approaches.
(Orchards) Pome fruit	*Cydia pomonella*	Semiochemicals (validation of puffer pheromones technique), Cultural control
(Forestry and amenity plants) Fraxinus	*Chalara fraxinea*	Host resistance.
(Forestry and amenity plants) Conifers	*Heterobasidion irregulare* *Heterobasidion* spp.	Screening microbials for biological control, Cultural control, Optimized chemical (user-friendly devices) and biological control, Sanitation procedures for eradication.
(Open land) Amenity plants, Non-agricultural areas	*Ambrosia artemisiifolia* *Ailanthus altissima* *Heracleum* spp.	Optimized chemical control (non-persistent broad spectrum pesticides), Cultural control (mechanical and physical means), Biological control .

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COUNTRIES INVOLVED

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THE PARTNERS

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UNIVERSITÀ DEGLI STUDI DI TORINO

AgraCEAS Consulting (AGRACEAS)

Agoinnova (AGROINNOVA)

AgriNewTech (ANT)

Agrobio S.L. (AGROBIO)

Confederazione Generale dell'Agricoltura Italiana (CONFAGRICOLTURA)

European and Mediterranean Plant Protection Organisation (EPPO) Food and

Environment Research Agency (FERA)

Imperial College London (IMPERIAL)

Institut National de la Recherche Agronomique (INRA)

Integrētās Audzēšanas Skola Ltd. (IAS)

Mendel University in Brno (MENDELU)

Metec Innovation Consulting Srl (METEC)

Moverim Consulting (MOVERIM)

National Institute of Agricultural Botany (NIAB)

OPTISENSE Limited (OPTISENSE)

for Central and Eastern Europe (REC)

Semios BIO Technologies Inc (SEMIOS)

SPIN-TO Srl (SPINTO)

Stichting Dienst Landbouwkundig Onderzoek (DLO)

Universidad de Lleida (UdL)

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EMPHASIS project. IPM for seedling insects in winter and spring oilseed rape production.

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“Integrētās Audzēšanas Skola”

(founded 22.09.2006)

Lielvārdes str. 41, Rīga LV – 1006, Latvia

ph/fax +37167553596

www.ias.lv

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 634179 20.-22.09.2017

Krišjānis Valdemārs 1825 -1991

Krišjānis Valdemārs inspired us to open our School www.ias.lv

In 1864, as an official of the Ministry of Finance of Imperial Russia he invented and established the first Naval School/Ainazi for Latvians in Latvian language. 30 years later there was >3000 educated Latvian captains, steersmen and engineers with international experience who brought home not only money, but also knowledge from overseas.

Being student of Terbata University in 1855 / today Tartu Estonia, he put on his door “Krišjānis Valdemārs. Latvian”.
This is historic note, for political freedom and independence of Latvia.
After Terbata University he worked in St. Petersburg as state officer in the Ministry of Finance of Imperial Russia.

He was a publicist, a politician, a founder and spiritual, startegic leader of the New Latvian Movement together with K. Barons and J. Alunāns.

K. Valdemārs followers compared for Latvia the leader of the national movement with the church reformer Martin Luther, but his contribution to the maritime development of the Russian Empire with the contribution of Peter Ist.

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"The most necessary is knowledge, later it attracts the necessary capital, as a magnet attracts the iron."

Krišjānis Valdemārs

EPPO, Berlin, 2017-09-20/22_ I. Gaile, G. Gulbis / Integrētās Audzēšanas Skola www.ias.lv
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Six Steps of IPM:

1. Proper identification of pest
2. Learn pest and host life cycle and biology
3. Monitor environment for pest population
4. Establish threshold
5. Choose appropriate combination of management tactics* (see next page)
6. Evaluate results

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Six Tactics/ methods of IPM:

1. Cultural methods
2. Physical methods
3. Genetic methods
4. Biological methods
5. Chemical methods
6. Regulatory

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Pests don’t read and react to regulatory rules.
We must think as pests, if we want to find solutions.

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IPM follows a stepwise approach.

IPM typically uses several tactics to dealing with the pest to reach the effective result.

Chemical method is used only after first three methods and less toxic products are used first.

The advantages of IPM - efficacy, cost and safety.
Build measurable objectives for each of those goals into practical solution plan from the beginning.

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Integrated Pest Management. Whay it is not working always?

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- Knowledge is a missing element to be successful with IPM.

  (mentioned in many presentations!)

- It does not mean that knowledge is missing in EU. EU has the best knowledge word wide.

- **For success there must be multidisciplinary interaction**.
- EMPHASIS is a good example how it can be done.

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IPM for seedling insects in winter and spring oilseed rape production.

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EMPHASIS. Seedling insect IPM control [Oilseed rape] while preserving honey bees populations.

continuity of science and knowledge transfer in EU

Integrētās Audzēšanas Skola/IAS (Latvia)
Fera Science Limited/FERA (UK)
National Institute of Agricultural Botany/NIAB (UK)
European and Mediterranean
Plant Protection Organization /EPPO (France)

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IPM for seedling insects in winter and spring oilseed rape production.

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EMPHASIS. Seedling insect IPM control [OSR/Oilseed rape] while preserving honey bees populations.

Integrētās Audzēšanas Skola/IAS (Latvia)
Fera Science Limited/FERA (UK)
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Plant Protection Organization /EPPO (France)

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EU /2014-2017/ after ban

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- many additional millions spend in EU for foliar OSR insecticide application
- 912,000 tons of missing OSR harvest in EU per year*
- Significant fall of OSR production across Europe has resulted with obvious losses to farming and food businesses, **and the need to import crop from outside the EU, where oilseed rape is produced using neonicotinoids***

* from the HFFA Research/ Germany report.

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

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OCT 15 2014

OFFICE OF CHEMICAL SAFETY
AND POLLUTION PREVENTION

MEMORANDUM

SUBJECT: Benefits of Neonicotinoid Seed Treatments to Soybean Production

2014 United States Honey Production Up 19 Percent

Posted On: March 20, 2015

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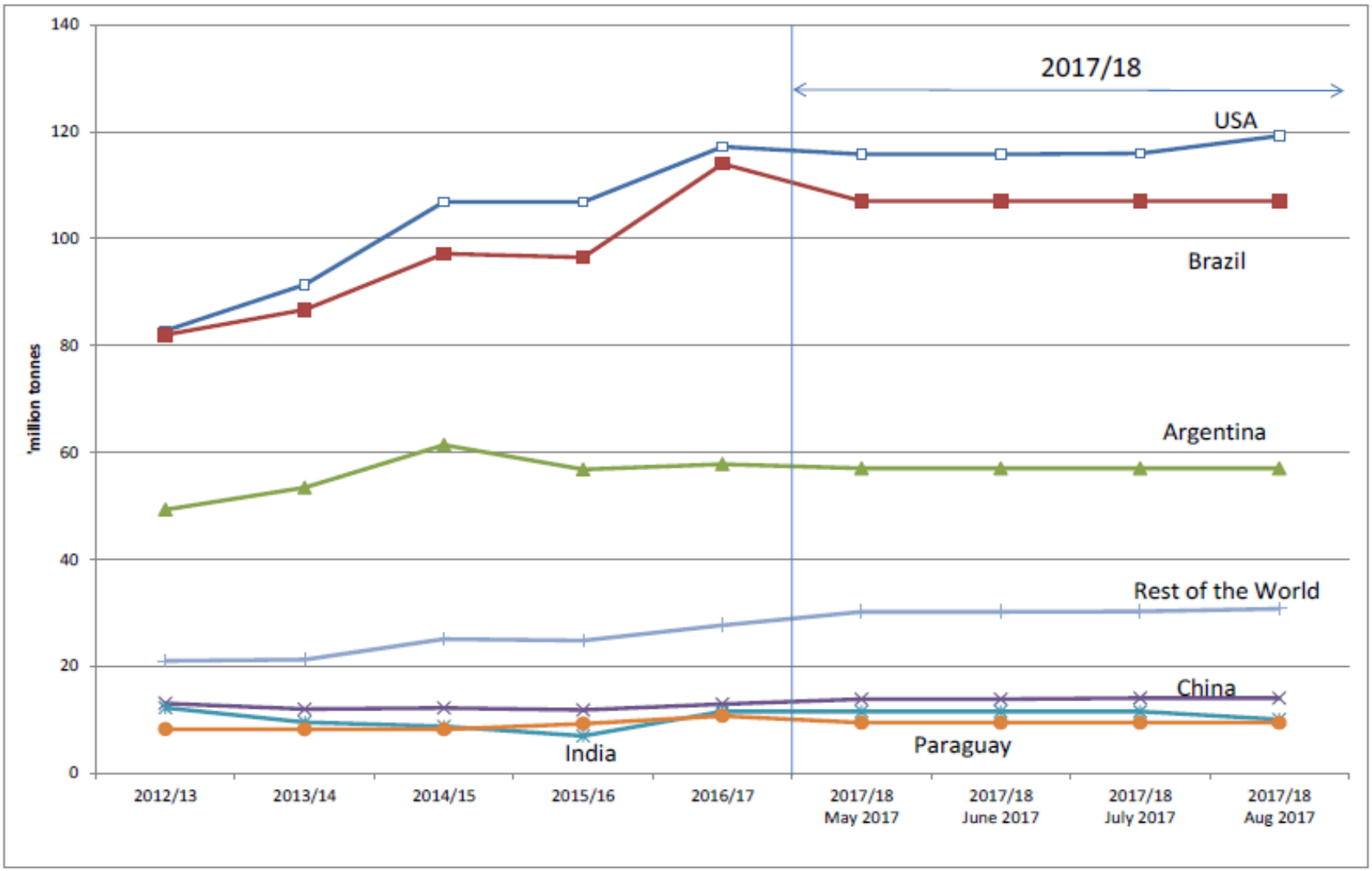
Soybeans production by country



Presentation: Committee for the Common Organisation of Agricultural Markets /24 August 2017

European Commission Department: Agriculture and Rural Development

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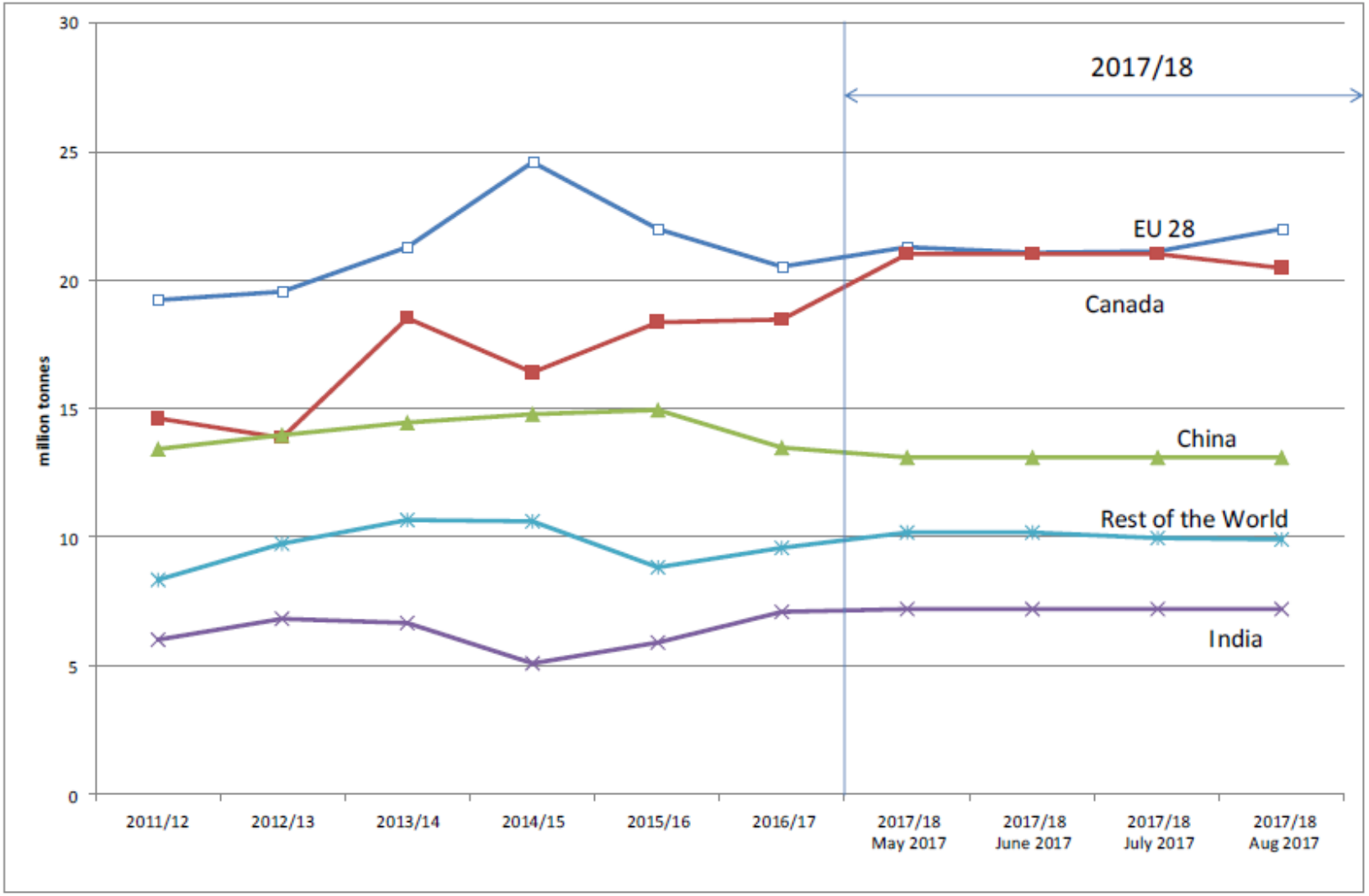
Rapeseed production by country



Presentation: Committee for the Common Organisation of Agricultural Markets /24 August 2017

European Commission Department: Agriculture and Rural Development

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Soybeans and Rapeseed production by countries

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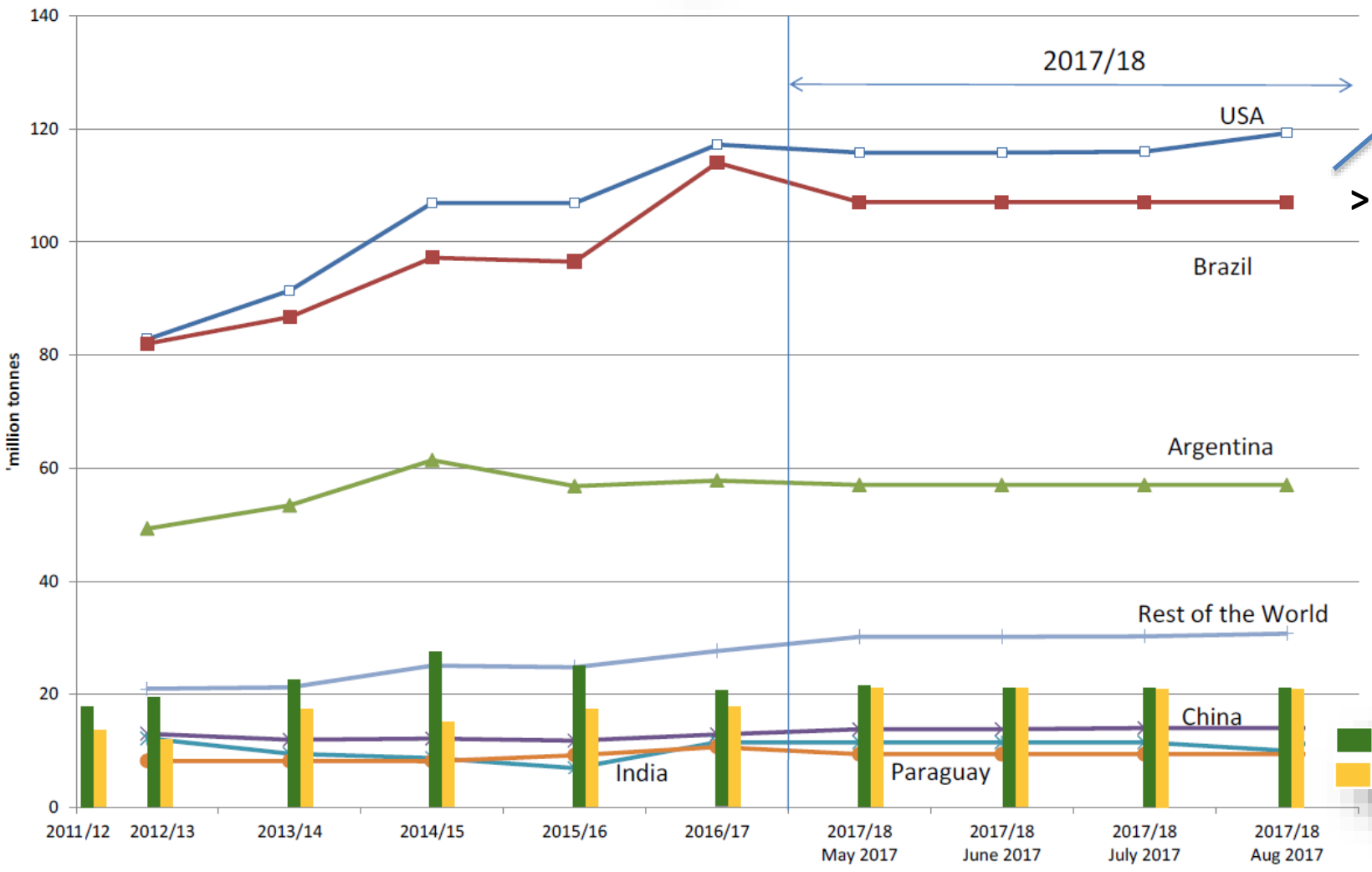

> 40 % up

From presentation: Committee for the Common Organisation of Agricultural Markets /24 August 2017

European Commission Department: Agriculture and Rural Development

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efsa
European Food Safety Authority

European Commission

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Bee health *page*

Paragraph 4.Over the past 10 to 15 years, beekeepers have been reporting unusual weakening of bee numbers and colony losses, particularly in **Western European countries including France, Belgium, Switzerland, Germany, the UK, the Netherlands, Italy, Spain.** *Zonal registration! North EU?*

Paragraph **5.No single cause of declining bee numbers has been identified**. However, several possible contributing factors have been suggested, acting in combination or separately.

These include the effects of intensive agriculture and pesticide use, starvation and poor bee nutrition, viruses, attacks by pathogens and invasive species – such as the Varroa mite (*Varroa destructor*), the Asian hornet (*Vespa velutina*), and the small hive beetle *Aethina tumida* and environmental changes (e.g. habitat fragmentation and loss).

Honey bees *page*

Paragraph 3.Veterinarians and beekeepers should follow certain rules when applying veterinary medicines to bee colonies. There are also special requirements for trade and import of live bees.

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Bee health, 2015

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Fast facts

630 000 Beekeepers in the EU

16 000 000 Hives in the EU

1 884 wild bee species in the EU

1 domestic bee species *(Apis mellifera)*

Average number of medicines authorised per EU Member State
bees = **3** pigs = **426** dogs = **592**

33 100 000 €/year
EU co-financing for beekeeping

204 000 t Honey production in the EU

165 500 t Honey imported into the EU

created by **European Commission**

https://ec.europa.eu/food/sites/food/files/animals/docs/la_bees_infograph_bee-health_201507.pdf

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Honey Production EU ('000 Tonnes) 2015

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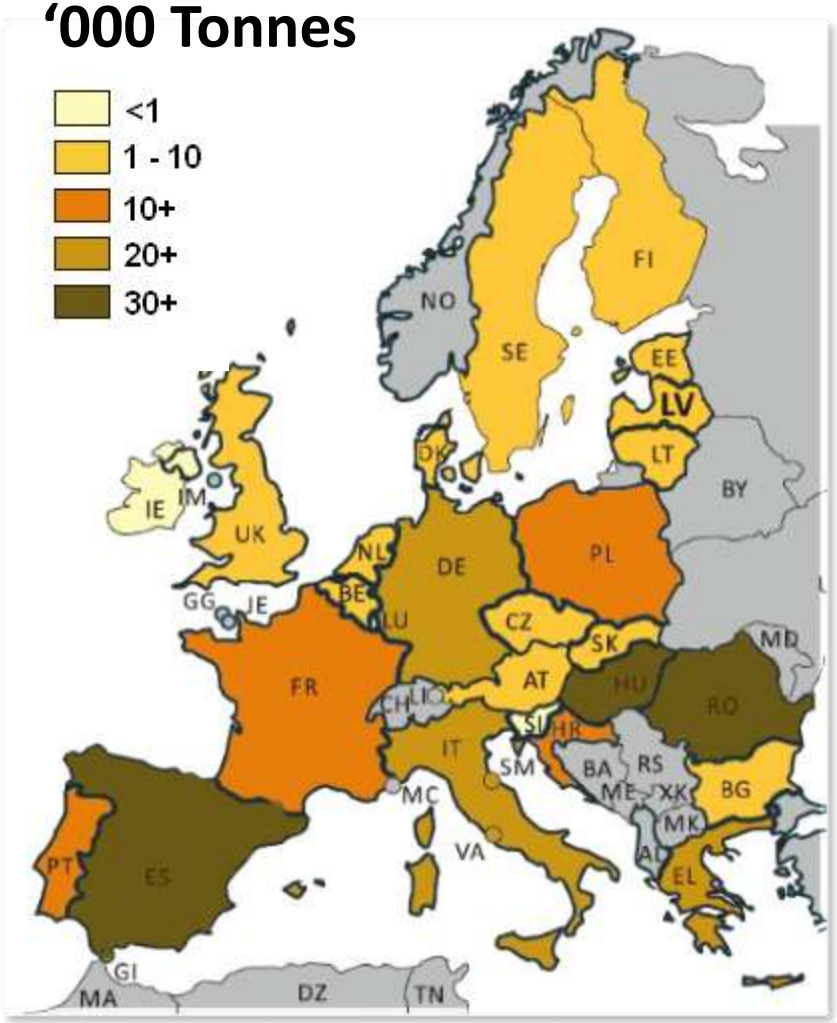

Honey Production EU:

> 80 % in 6 countries

Romania
Spain
Hungary
Germany
Italy
Greece

https://ec.europa.eu/agriculture/sites/agriculture/files/honey/presentation-honey-2015_en.pdf

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Honey Production EU (‘000 T) OSR area % EU

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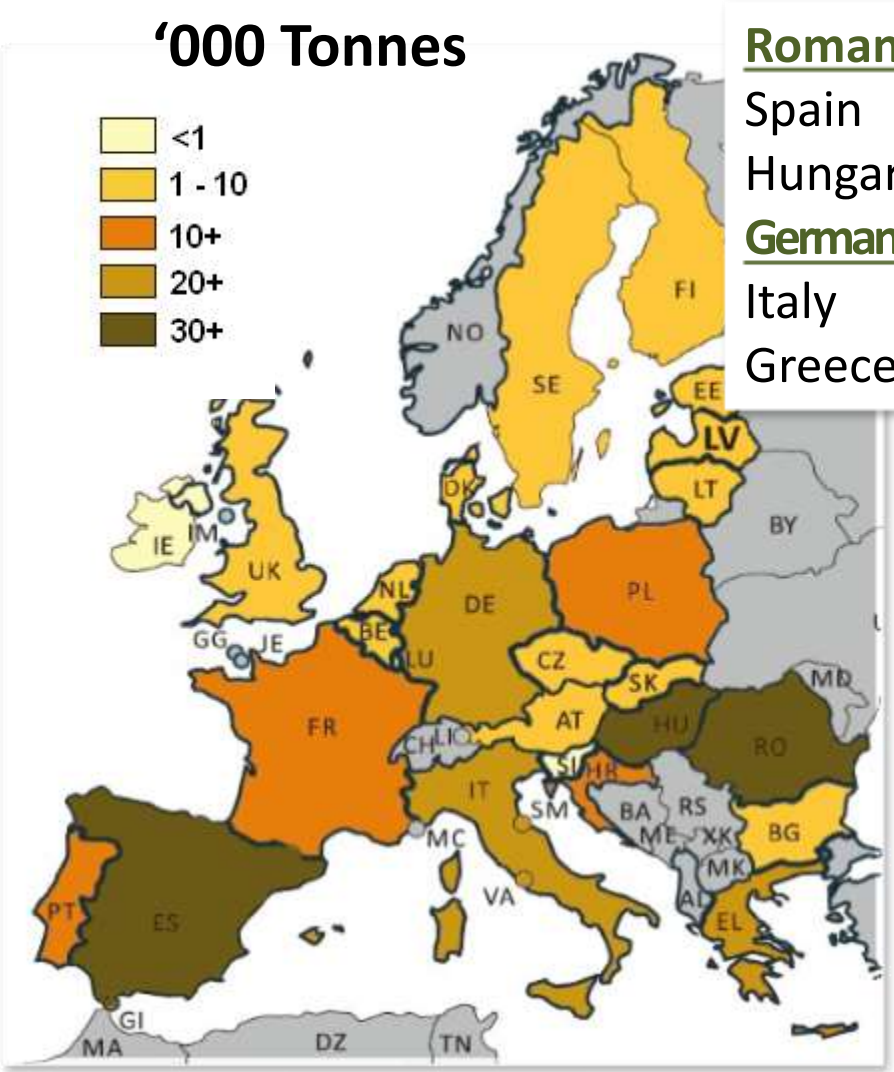
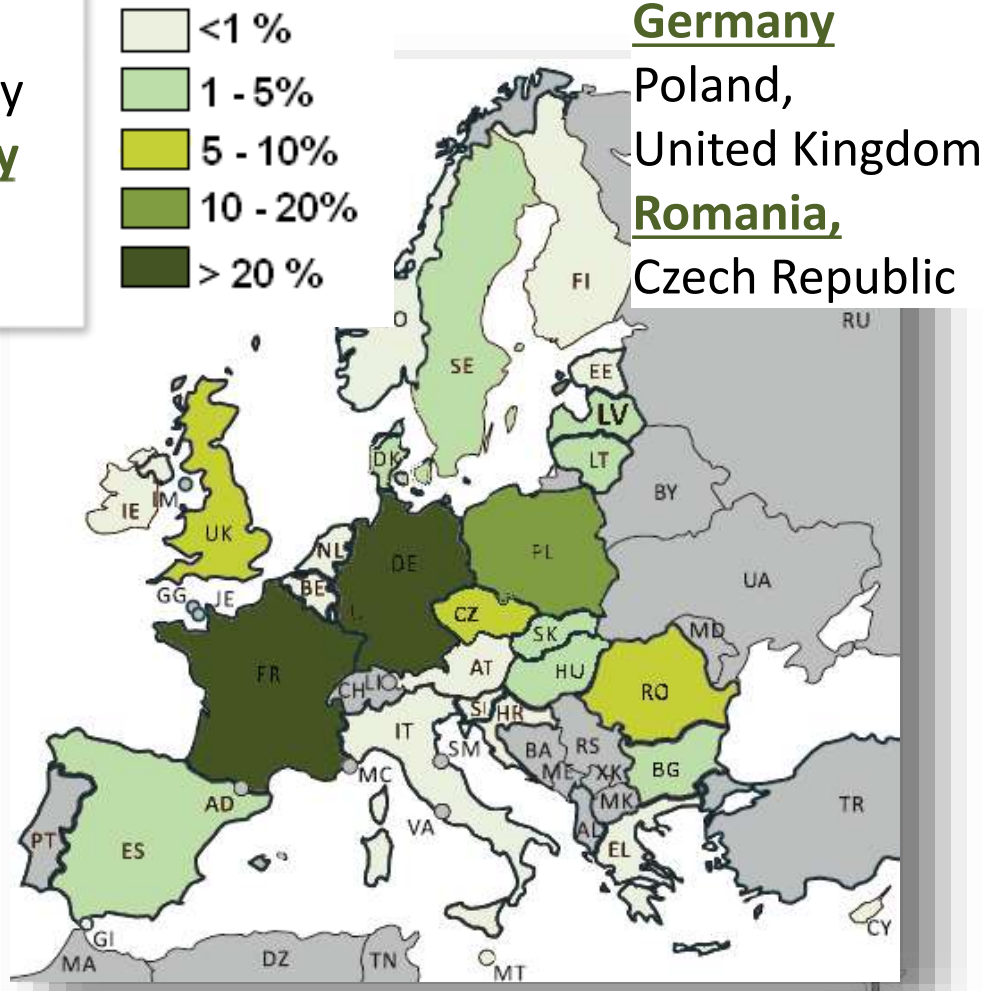


Romania
Spain
Hungary
Germany
Italy
Greece



France
Germany
Poland,
United Kingdom,
Romania,
Czech Republic

http://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do

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Beekeeping in Latvia 20th and 21st century

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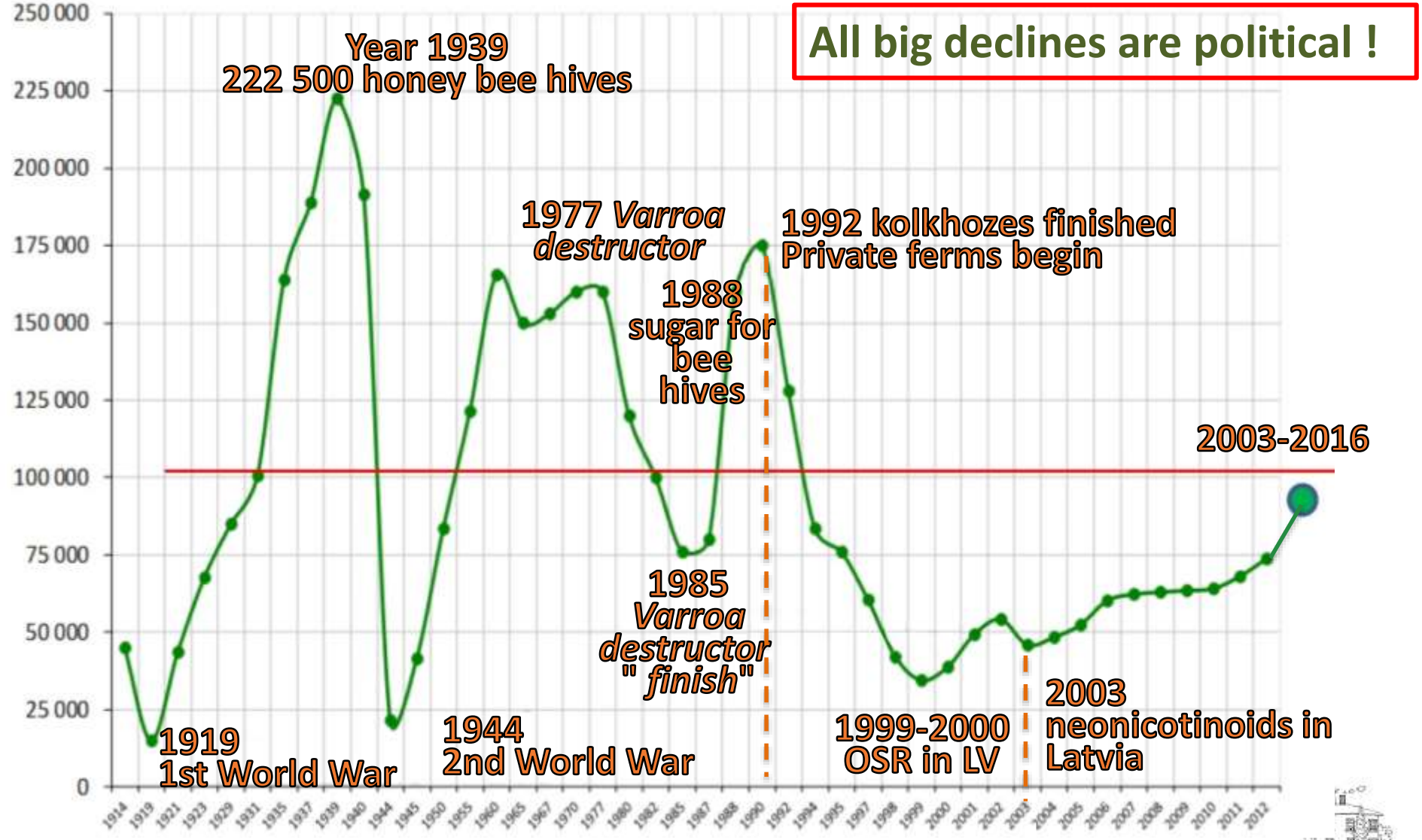

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Beekeeping in Latvia 2003 – 2016
Total yield of honey in Latvia 2009 -2016

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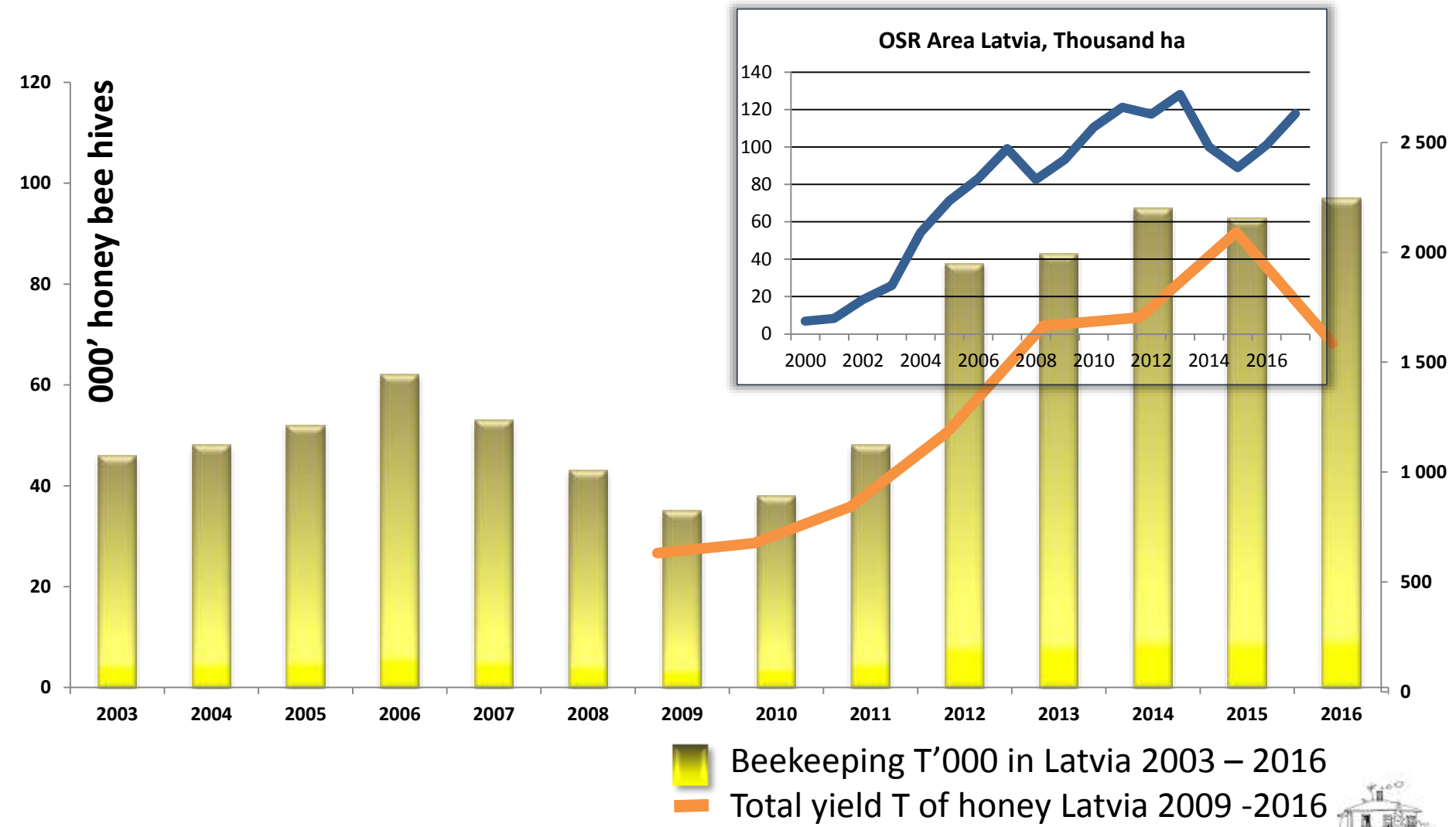

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Latvia 2016

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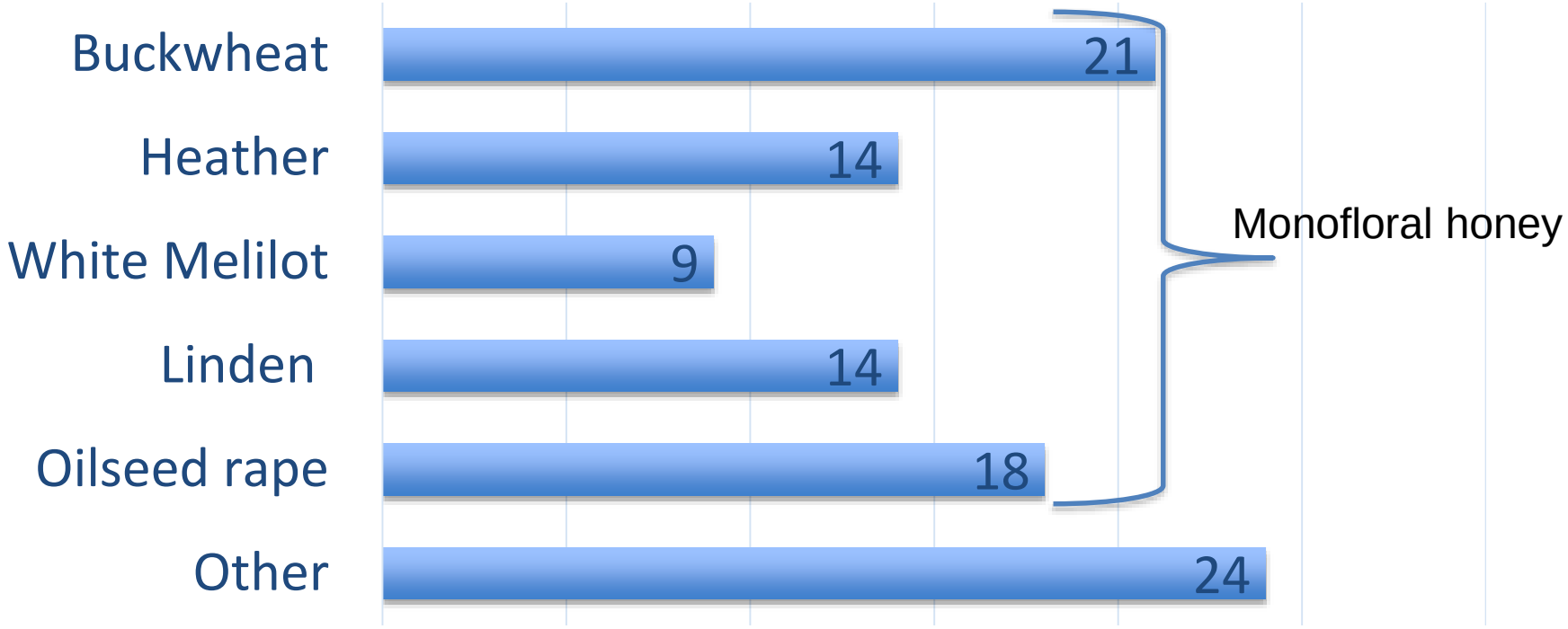
Nectar sources for honey bees %*



***From Latvia beekeeper survey 2016**

OSR are < than 20 % of honey sources in Latvia

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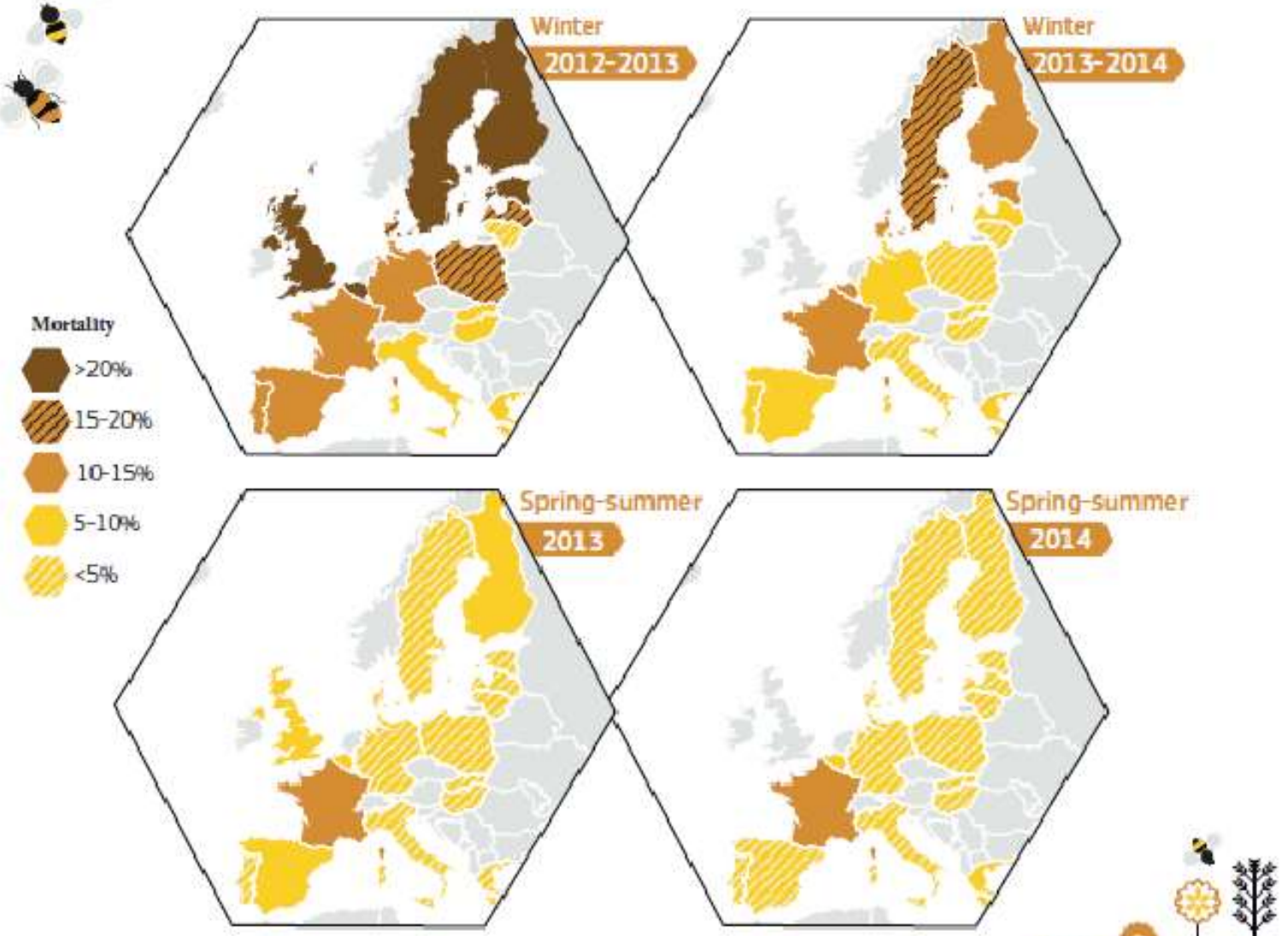
Mortality rate for honey bees EU



https://ec.europa.eu/food/sites/food/files/animals/docs/la_bees_infograph_bee-health_201507.pdf

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Monitor Honey Bee Colony Losses (mortality) 2017 – Latvia
Data from COLOSS survey

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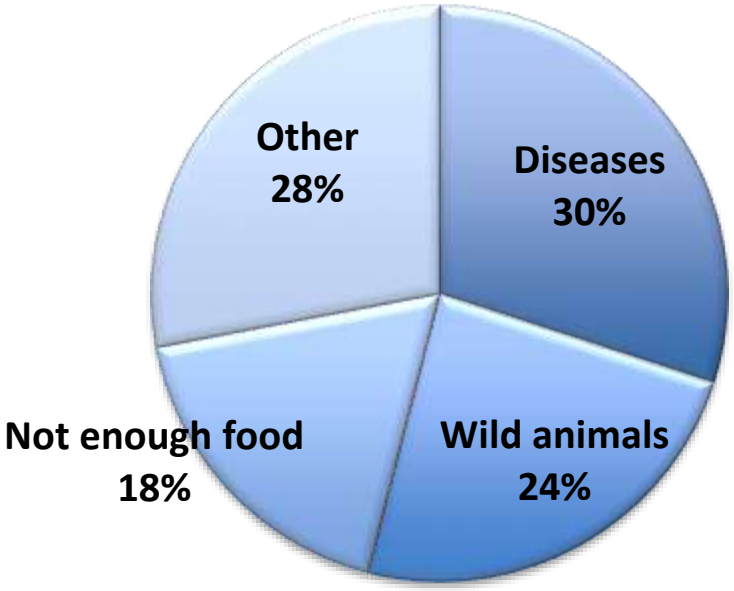
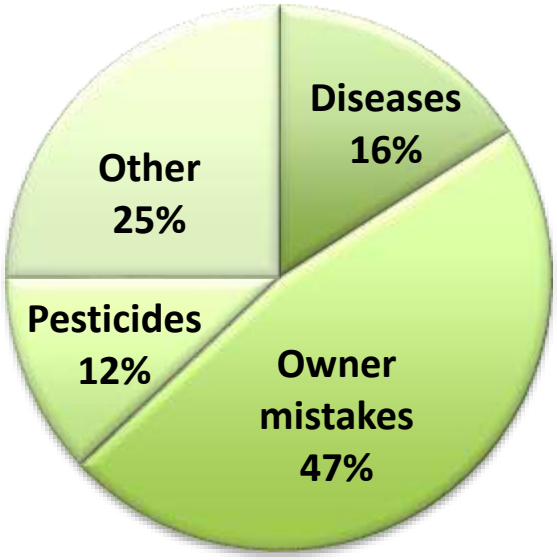
winter colony losses: 14%



summer colony losses: 6,25%



492 respondents - 16,7 % from beekeepers;
(Latvia total: 95 773 bee hives)

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Monitor Honey Bee Colony Losses (mortality) 2017 – Latvia
Data from COLOSS survey

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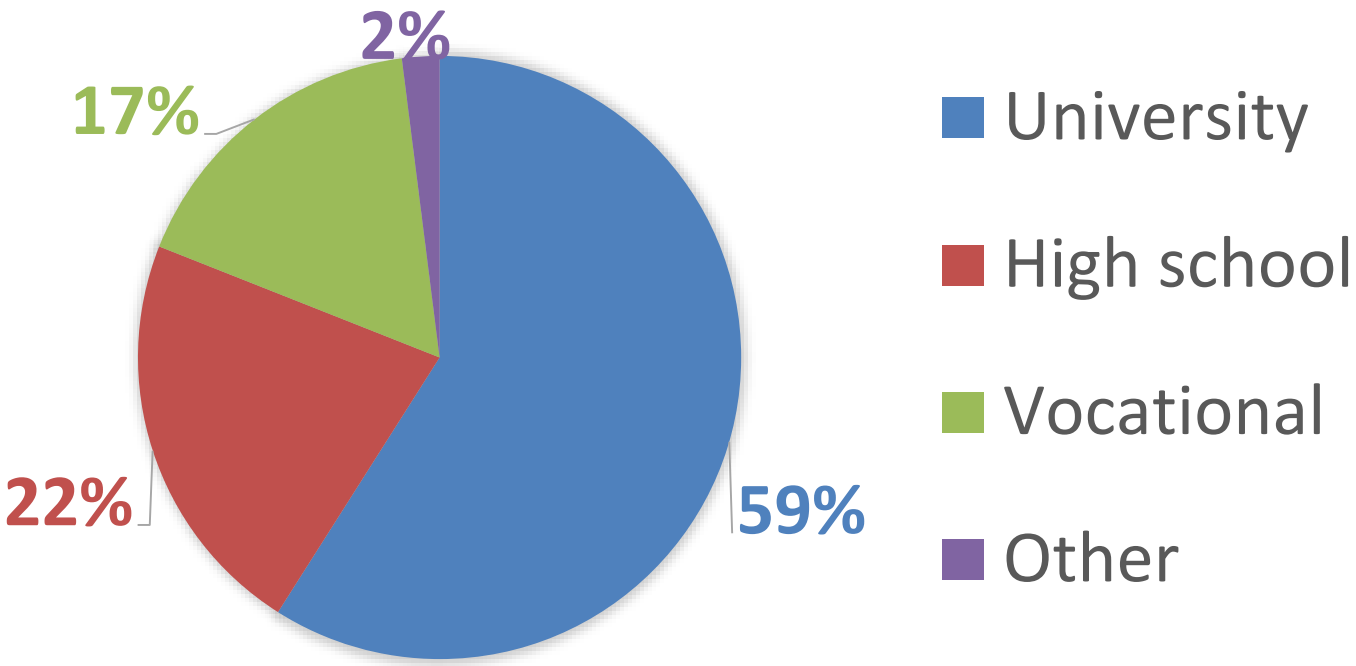
EDUCATION of respondents



492 respondents - 16,7 % from beekeepers;
(Latvia total: 95 773 bee hives)

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Mortality of honey bees is

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natural process

10 - 20% in winter

5-10 % in summer

South EU < North EU

In the warmer weather bees are eating more honey, staying warmer and not dying off as quickly in the cold.

[Warmer November & Less Dead Bees]

Latvia January 2016, temperature -20° C

People who idealize and romanticize beekeeping — I would guess that's 99% of all people who have ever gotten into beekeeping, including me — are in for a big wake up call after they kill their first colony. *April 8, 2016* (beekeeper from 2010).

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3.Veterinarians and beekeepers … There are also special requirements for [trade and import of live bees](#).

No other mortality for honey bees as natural

Latvia 2017

farm 450 ha, in Deksare,
more than 20 times sown OSR (spring and winter rape) treated with Neonicotinoids – no dead bees! **Local bees for > 50 years!!!**
No purchase bees from outside or other country

No other mortality for honey bees as natural

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Latvia 2017

> 800 ha farm in Bauska region. In very intensive agriculture part – Zemgale.
OSR for 15 years (winter and spring), on average OSR is 1/5 from total area. **All years before ban - OSR treated with Neonicotinoids.** Farmer/Beekeeper Janis (43 years old, got bees from his father), said that he never bought bee queens, because the number and activity of swarms is good.

Only local bees for > 40 years!!!

Health of hives represent environment in intensive agriculture with OSR, **and it is one of IPM indicators.**

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OSR in EU 2017

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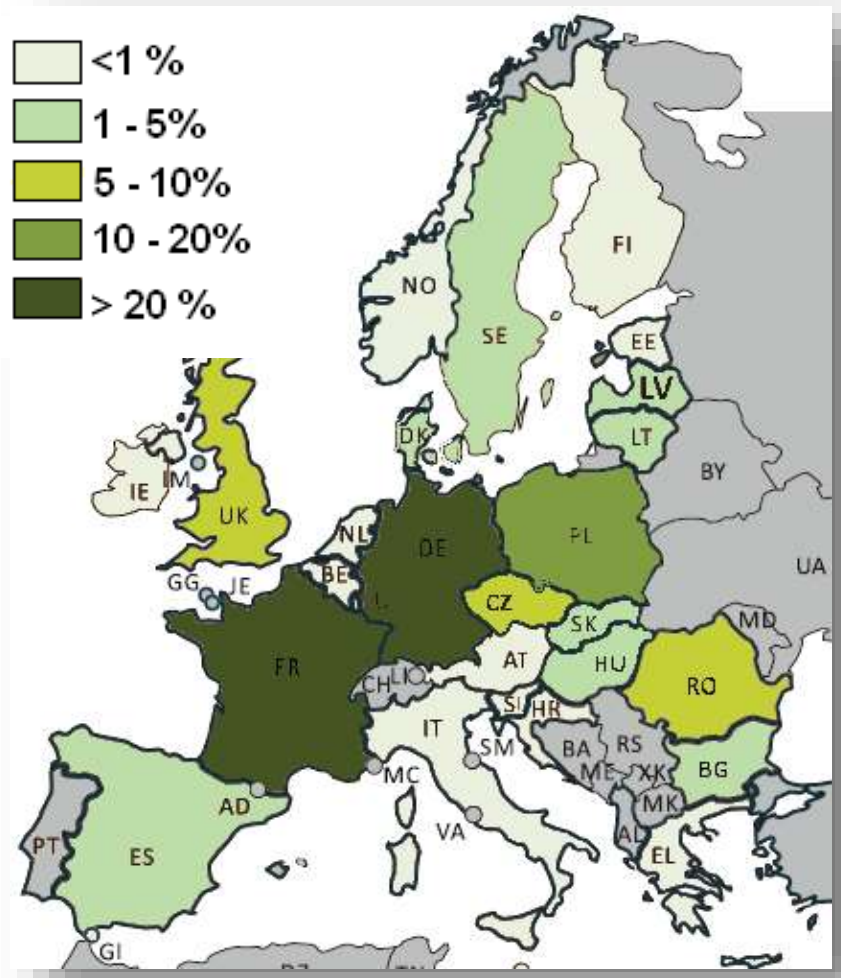
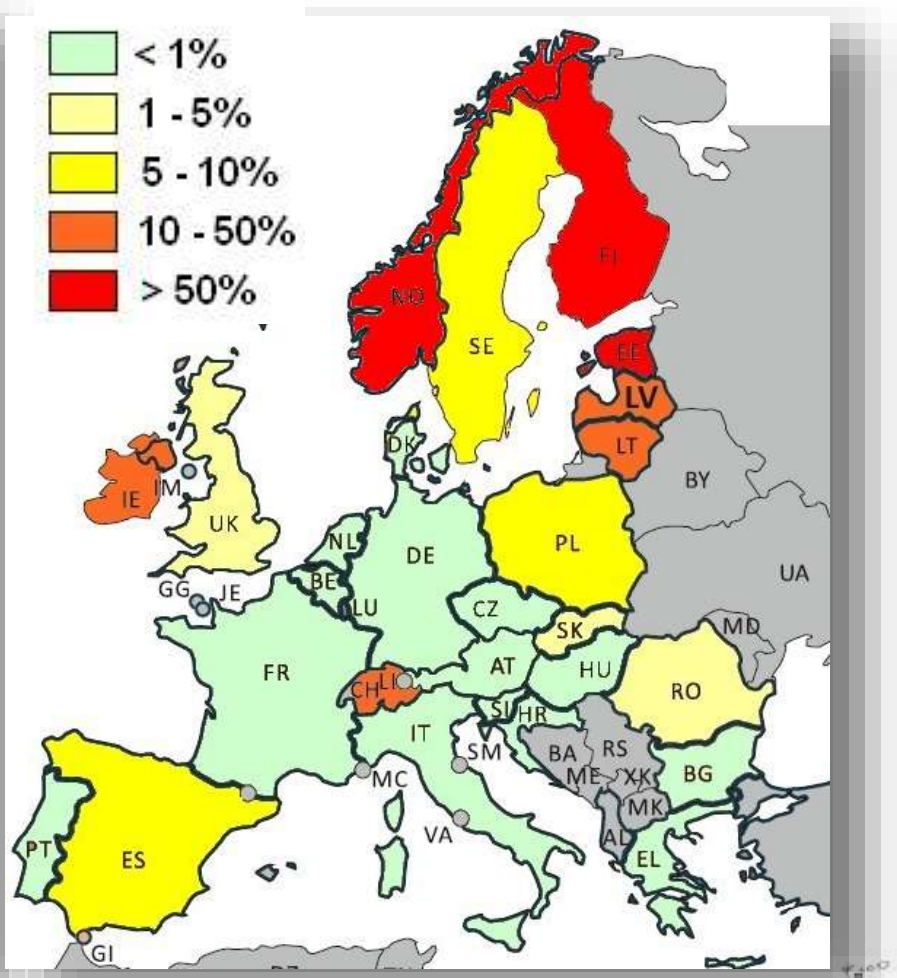
Winter oilseed rape area of total OSR ha EU



Spring OSR area from total OSR in country



http://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do

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North Europe - spring OSR
main seedling insect *Phyllotreta spp.*

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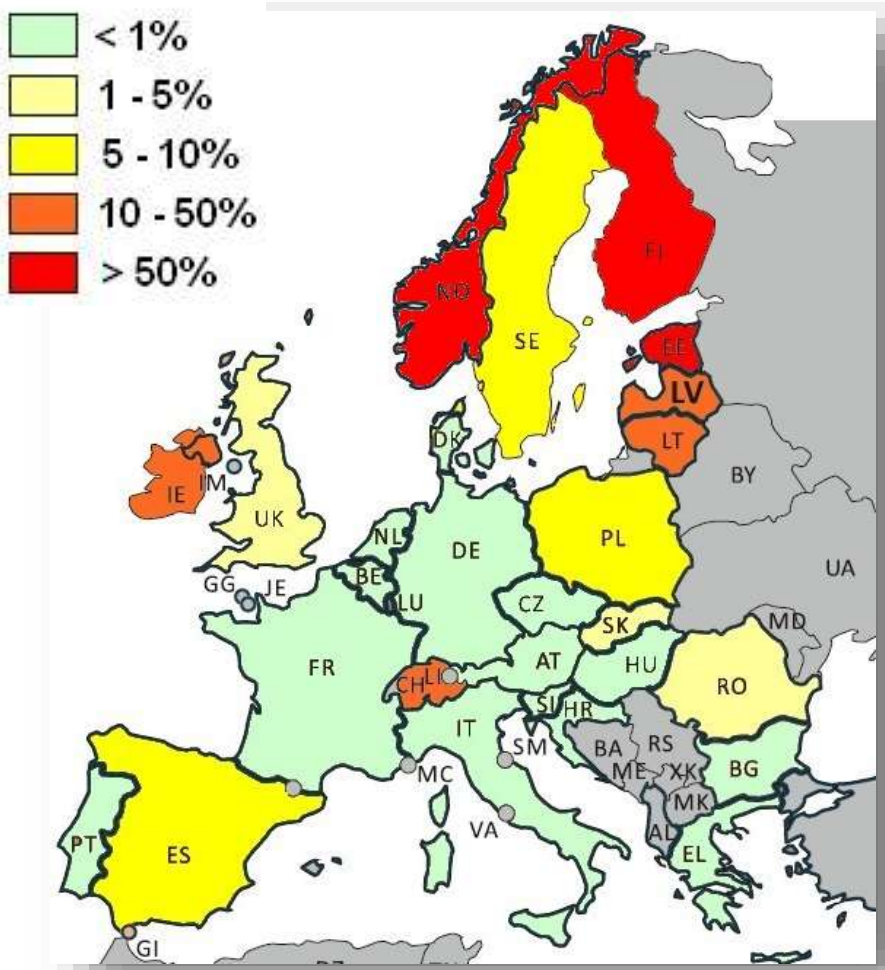
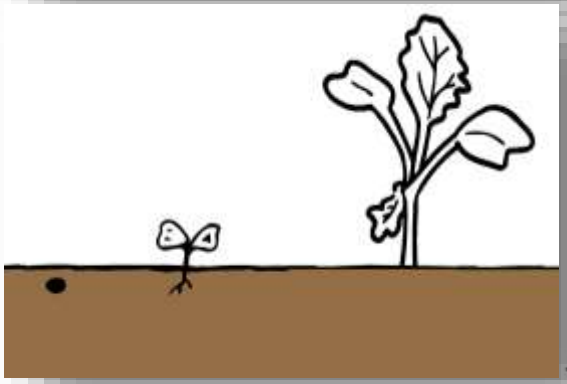
Spring OSR area from total OSR in country

1. Finland
2. Estonia
3. Poland
4. Latvia
5. Lithuania
6. Sweden





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Main rapeseed seedling insects EU 2017

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Winter OSR:

Psylliodes chrysocephala

Delia radicum

Myzus persicae

TuYV transmission

Spring OSR:

Phyllotreta spp.

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Table 2.2 Relative importance of the main pests of oilseed rape in Europe.

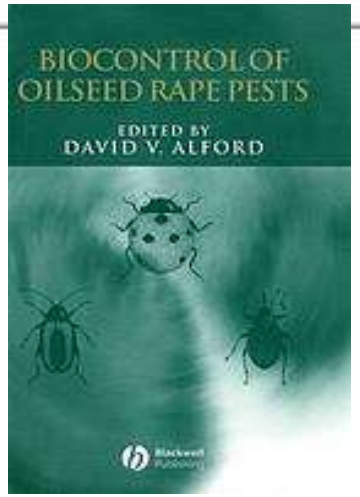
1997-1999

Main OSR insects in EU countries

Pest	Winter rape	Spring rape
Baris weevils	– [Note 1]	×
brassica pod midge (*Dasineura brassicae*)	+	+
cabbage aphid (*Brevicoryne brassicae*)	(+)†	(+)
cabbage flea beetles (*Phyllotreta* spp.)	–	(+)
cabbage root fly (*Delia radicum*)	–	(+)
cabbage seed weevil (*Ceutorhynchus assimilis*)	+	+
cabbage stem flea beetle (*Psylliodes chrysocephala*)	+	×
cabbage stem weevil (*Ceutorhynchus pallidactylus*)	(+)	(+)
peach/potato aphid (*Myzus persicae*)	†	–
pollen beetles (*Meligethes* spp.)	+ [Note 2]	+
rape stem weevil (*Ceutorhynchus napi*)	+	×
rape winter stem weevil (*Ceutorhynchus picitarsis*)	(+)	×
turnip sawfly (*Athalia rosae*)	–	(+)

\+ Often damaging in areas where it occurs.
(+) Occasionally or locally damaging.
– Present but of little or no importance.
† Potentially important as a virus vector.
× Not present.

Note 1. Recorded mainly in France.
Note 2. Rarely of significance on winter oilseed rape in the UK.



EC- founded project BORIS

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 634179 20.-22.09.2017

Main OSR seedling insects in EU countries 1997-1999

Relative importance of the main pests of oilseed rape in Europe

Pest	Spring OSR	Winter OSR
Phyllotreta spp. (cabbage flea beetles)	(+)	-
Delia radicum (cabbage root fly)	(+)	-
Psylliodes chrysocephala (cabbage stem flea beetle)	x	+
Myzus persicae /TuYV transmission	-	†

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+	Often damaging in area where it occurs
(+)	Occasionally or locally damaging
-	Present put of little or no importance
†	Potentially importance as a virus vector
x	not present

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Main OSR seedling insects in EU countries 2015-2017

Relative importance of the main pests of oilseed rape in Europe

Pest	Spring OSR	Winter OSR
Phyllotreta spp. (cabbage flea beetles)	++	(+)
Delia radicum (cabbage root fly)	(+)	++
Psylliodes chrysocephala (cabbage stem flea beetle)	x	++
Myzus persicae /TuYV transmission	-	+

20 years later!

++	**Damaging, up to a complete loss of the crop**
+	Often damaging in area where it occurs
(+)	Occasionally or locally damaging
-	Present put of little or no importance
†	Potentially importance as a virus vector
x	not present

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Main OSR seedling insects in EU countries 2015 -2017

Neonicotinoid seed treatment in OSR were covering all EU main seedling insect problems

Country	Spring OSR	Winter OSR
Germany	**< 1% from rapeseed**	**Delia radicum** (cabbage root fly) different crop loss can result up to a complete loss of the crop. **Psylliodes chrysocephala** (cabbage stem flea beetle) , **Myzus persicae** /TuYV transmission
UK	**< 1% from rapeseed**	**Psylliodes chrysocephala** (cabbage stem flea beetle) different crop loss can result up to a complete loss of the crop. **Myzus persicae** /TuYV transmission **Delia radicum** (cabbage root fly)
Latvia **Estonia**	***Phyllotreta spp.*** (flea beetles) (*P.undulata, P.nemorum, P.atra, P.nigripes* and others) different crop loss can result up to a complete loss of the crop.	**Agriotes spp.** (wireworms) ***Phyllotreta spp.*** (flea beetles) New in 2017 **Psylliodes chrysocephala** (cabbage stem flea beetle)
Finland	***Phyllotreta undulata*** (flea beetles) different crop loss can result up to a complete loss of the crop.	**< % from rapeseed**

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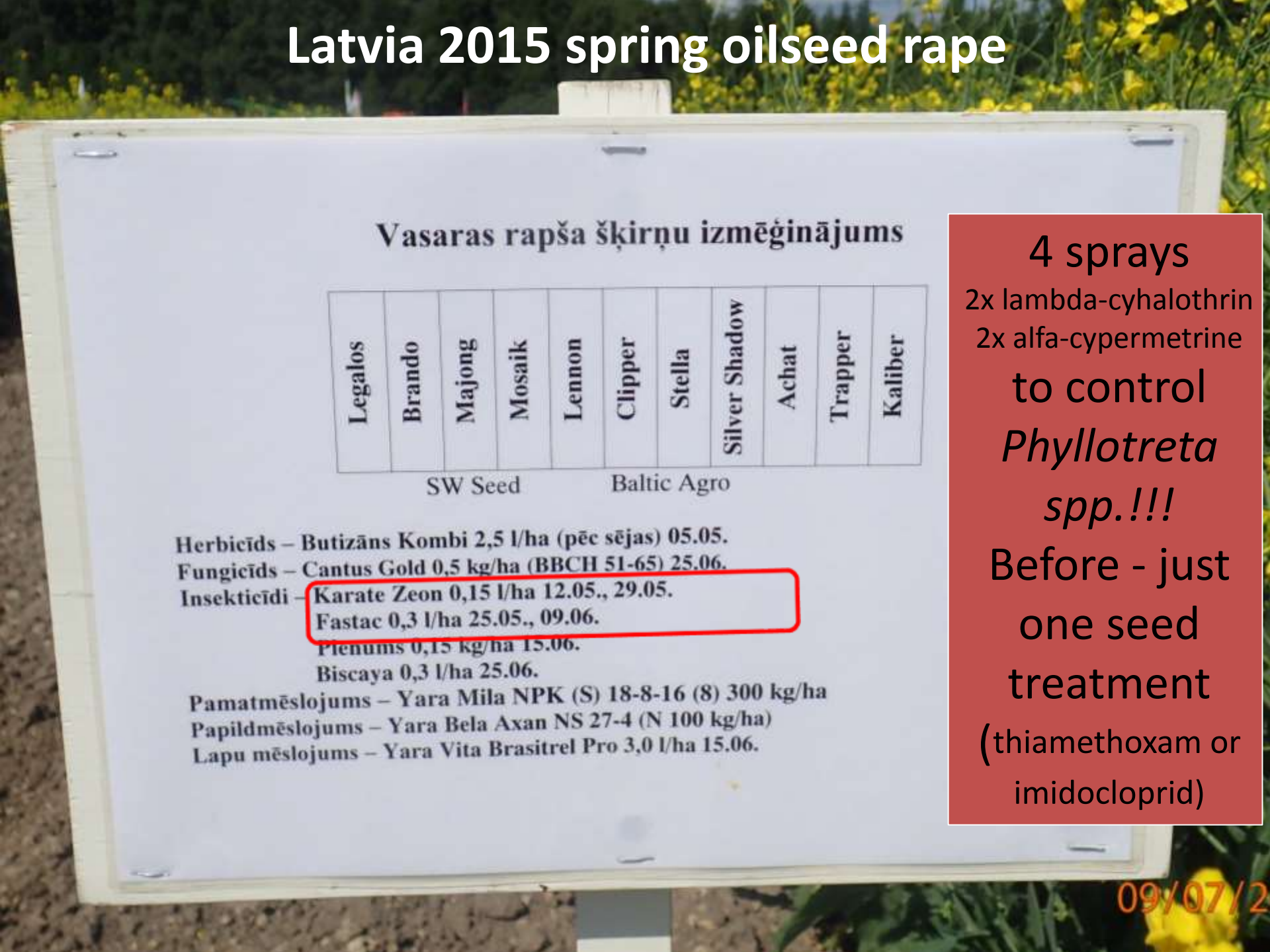
Latvia 2015 spring oilseed rape



4 sprays
2x lambda-cyhalothrin
2x alfa-cypermetrine
to control *Phyllotreta spp.!!!*
Before - just one seed treatment
(thiamethoxam or imidocloprid)

Seedling insects in spring oilseed rape production. Latvia 2016-2017

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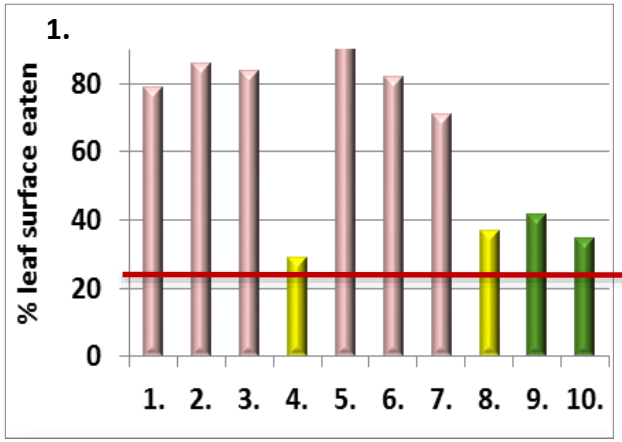

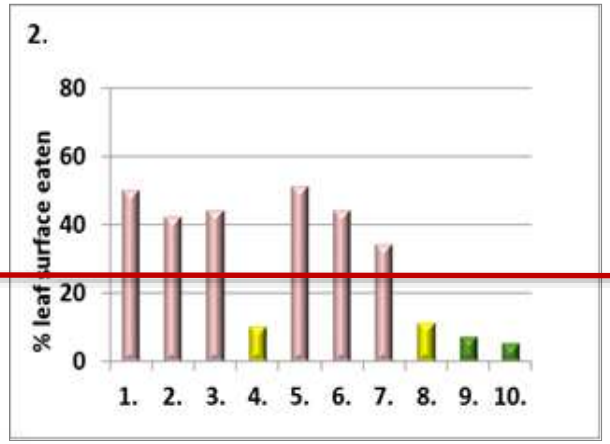

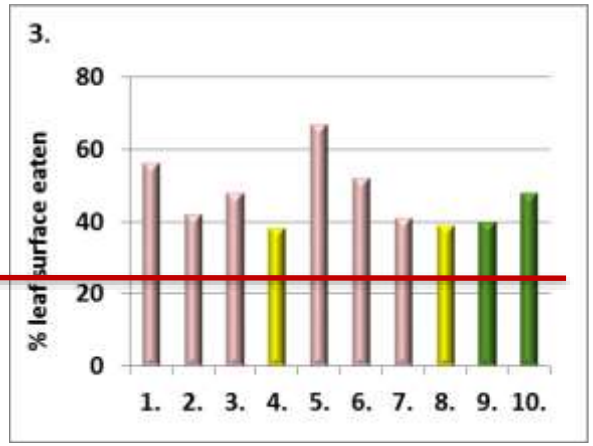

Charts. 3 trials in 2016. 3rd evaluation.
Leaf surface eaten damage % spring oilseed rape by *Phyllotreta spp.*. Evaluation of damage in **% exceeding scale** in EPPO standard PP 1/218 (1) :
1=no damage, 5=>**25 % leaf area eaten**.

Photos. From 1 trial, 1st evaluation.

non-treated controls (1.5); with foliar spray 1x (2.6), foliar spray 2x (3.7) seed treatment variants (4.8.9.10).

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Seedling insects in spring oilseed rape production in Europa 2016-2017 results

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Seed treatment

2x foliar spray

Control

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Scale to be used for evaluation of damage by *Phyllotreta spp*. in spring OSR

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EPPO*		Proposal to EPPO**		Comments
1	no damage	1	no damage	
2	up to 2 % leaf area eaten	2	up to 2 % leaf area eaten	
3	3 -10 % leaf area eaten	3	3 -10 % leaf area eaten	
4	10-25 % leaf area eaten	4	10-25 % leaf area eaten	
5		5	25 % - 50 % leaf area eaten	
5	>25 % leaf area eaten	6	50 % - 70 % leaf area eaten	Plants < 50%
5		7	75% - 100 % leaf area eaten	No Plants

* EPPO standart PP 1/218 (1) *Phyllotreta spp* Using Appendix I scale.

**proposal to update EPPO 1/218 (1)

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USA/EPA's Proposal to Mitigate Exposure to Bees from Acutely Toxic Pesticide Products

May 28, 2015

SUMMARY

As discussed in this paper and consistent with previous actions by the EPA and the Strategy, EPA is proposing additional restrictions for pesticide applications to blooming crops where managed bees are present under a contract, for pesticides that are acutely toxic to bees (i.e., those chemicals with an **acute contact LD_{50}<11µg/bee) all a.i. in Appendix A**

http://pollinatorstewardship.org/wp-content/uploads/2015/05/NEW-RULE-EPA-HQ-OPP-2014-0818-0002.pdf

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Toxicity of products a.i. for control of OSR seedling insects.

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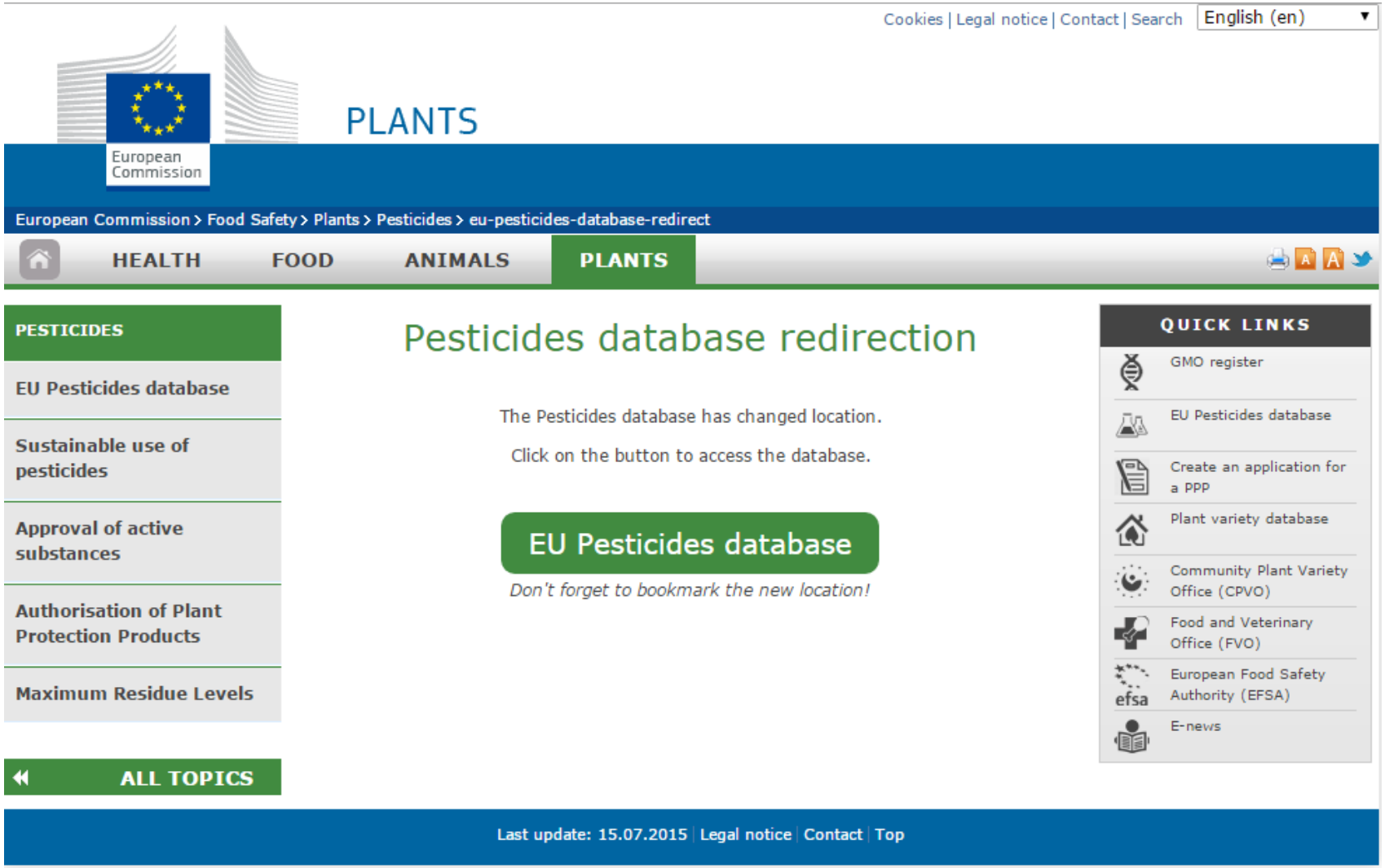

http://ec.europa.eu/food/plant/pesticides/eu-pesticides-database/public/?event=homepage&language=EN

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Efficacy to OSR seedling insects. Toxicity of products, a.i.

Active indegrient Acute toxicity	Efficacy/ Resistance	Rat/Mammal LD_{50} oral mg/kg bw	Earthworms LC_{50} mg a.i./kg soil	Honeybees Oral LD_{50} µg a.s./bee Contact LD_{50} a.s./bee
Alpha-cypermethrin	X /?	57	>100	oral 0,059 µg contact 0,033 µg
Deltamethrin	X /?	87	> 1290	oral 0,079µg or 79 ng contact 0,0015 µg 1,5ng
Lambda-cyhalothrin	X /?	56 (f) 79 (m)	> 1000	oral 0,91µg contact 0,038 µg
Pymetrozine	x/ N	> 5000	> 250	oral > 117 µg , contact > 200 µg
Spinosad	X /N	> 2000	>916	oral 0,057 µg (product) contact 0,0036 µg
Thiacloprid	XX/N	> 500	105	oral 17,32 µg contact 38,82 µg
Thiamethoxam	XXX/N	> 1563	>1000	oral 0,005 µg contact 0,024 µg
Acetamiprid	XX/N	417 (m) 314 (f)	9	oral 14,53 µg contact 8,09 µg
Clothianidin	XXX/N	500	13.21	oral 0.00379 µg contact 0.04426 µg
Imidocloprid	XXX/N	425	10	oral 0,037 µg contact 0,0081 µg

http://ec.europa.eu/dgs/health_food-safety/index_en.htm

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Efficacy to OSR seedling insects. Toxicity of products, a.i.

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Imidocloprid	XXX/N	425	10	oral 0,037 µg contact 0,0081 µg

Seed treatment

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Efficacy to OSR seedling insects. Toxicity of products, a.i.

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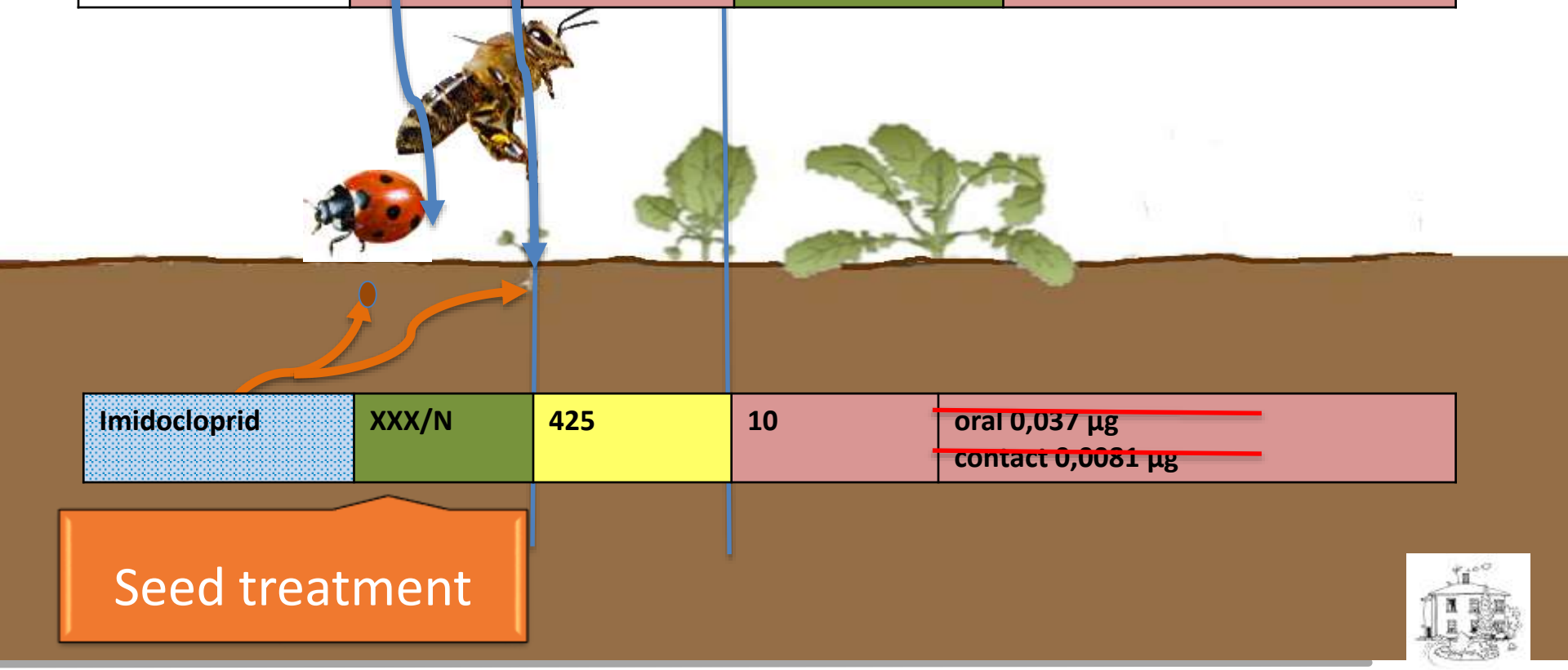
2 x foliar spray

Alpha-cypermethrin	X /?	57	>100	oral 0,059 µg contact 0,033 µg
Deltamethrin	X /?	87	> 1290	oral 0,079µg or 79 ng contact 0,0015 µg 1,5ng



Imidocloprid	XXX/N	425	10	oral 0,037 µg contact 0,0081 µg

Seed treatment

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Efficacy to OSR seedling insects. Toxicity of products, a.i.

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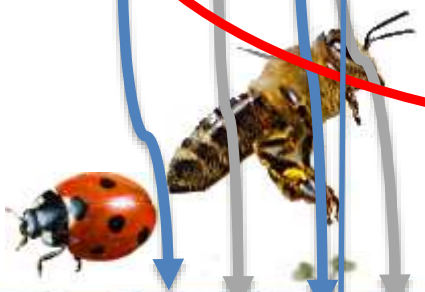
4 x foliar sprays

2 x foliar spray

Alpha-cypermethrin	X /?	57	>100	oral 0,059 µg contact 0,033 µg
Deltamethrin	X /?	37	> 1290	oral 0,079µg or 79 ng contact 0,0015 µg 1,5ng



Thiamethoxam	XXX/N	> 1563	>1000	~~oral 0,005 µg~~ ~~contact 0,024 µg~~

Seed treatment

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Seedling insects OSR

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Insect control by seed treatment

IPM

BBCH 13 -16

protection of plant from seed germination to ≈ 3 - 6 leaves

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EU /2014-2017/ after prohibition of NEONIC

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- 2-7 times more sprays for farmer/operator with insecticides and for beneficial!
- many additional millions spend in EU for foliar OSR insecticide application
- **912,000 tons of missing OSR harvest** in EU per year*
- Significant fall of OSR production across Europe has resulted with obvious losses to farming and food businesses, and the need to import crop from outside the EU, where oilseed rape is produced using neonicotinoids*
- **44 % honey imported from outside the EU, where oilseed rape and other crops (soybeans, maize, sunflower and other crops) are produced using neonicotinoids**

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Conclusions

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- Multidisciplinary stakeholder interaction must be established for OSR growers and beekeepers!!! "Honey in office" or bees and OSR in one farm"!
- We should stop spreading myths about OSR seed treatment.
- Zonal registration/Zonal prohibition. Minor uses. Emergency authorization. Country specific IPM.
- Bees and Oilseed rape are Both strategically important part of EU agriculture, biodiversity and sustainability. Grows of these sectors are related with effective IPM of OSR seedling insects as seed treatment !

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EMPHASIS project Deliverables.

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Guidelines for seedling insects containment in Oilseed rape (2018/2019)

Practical guide for oilseed rape producers to manage seedling insects while preserving honey bees populations.

Latvian: Bites!
English: Bees!

Thank You All !

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