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Facts and figures for an informed opinion on fipronil.

The review of the risk assessment of fipronil revealed several concerns for bees. As for neonicotinoids, the EU Commission has proposed to ban fipronil for certain uses in the EU market. By mid July 2013, Member States must vote again for the stake of our ecosystems and our health.
If Member States want to be consequent with the precautionary principle, they will support the EU Commission in their proposal.

What is fipronil?

Fipronil is an insecticide from the group of phenyl-pyrazoles or fiproles. In the EU farming sector, fipronil is only applied as seed treatment. Regent®, Mundial® or Cosmos® are some of the commercial names. Fipronil is also used to treat fleas and ticks on companion animals e.g. Frontline®. Fipronil was put on the market in 1993. Nowadays, fiproles' market share has hugely increased worldwide (Jeschke et al 2011).

In which Member States is fipronil authorised?

Slovakia, Hungary, Spain, Bulgaria, Czech republic, Belgium and the Netherlands currently authorise fipronil-containing seed dressing. For more detailed information on their specific uses, see EFSA report on fipronil, p36 (EFSA, 2013).

Why are Member States going to vote on fipronil?

The story is very similar to that of neonicotinoids:

- After a first risk assessment, fipronil was authorised at EU level in 2007. Before this period, fipronil was individually authorised by Members States, which made their own risk assessment.
- Due to new scientific and technical knowledge and monitoring data, the EU Commission asked EFSA for a reassessment of the risks that fipronil poses to bees.
- The European Food Authority's (EFSA) reassessment, published on May 27, 2013 (EFSA, 2013) has acknowledged that fipronil poses high risks for bees and that data is missing in the fipronil authorisation dossier.
    - EFSA identified that fipronil poses a high acute risk to bees through exposure to dust produced from the sowing of treated corn seeds.
    - EFSA shows that several data gaps impede a full assessment of potential risks, meaning that the assessment cannot ensure that fipronil has no unacceptable risks to bees. E.g. Data on ingestion of contaminated nectar and pollen, on exposure to guttation water, honeydew or metabolites are not available. For an overview of the concerns identified see the EFSA report on fipronil p 30 and 31 (EFSA, 2013).This document clearly shows that many parts of the risk assessment could not be completed, because currently there is no data to evaluate the risks. At the moment, products containing fipronil are thus on the market, despite of the fact that their risks cannot be fully assessed.
- Knowing that, the Commission proposes to ban some uses of fipronil. Member States have now to agree on this ban.

What do scientific publications and official dossiers say on fipronil?

- **Fipronil coated seeds are most of the time used preventively.**

  This means that even without knowing if insect pests are present, a treatment is applied (Bonmatin, 2009). Preventive uses of pesticides are contrary to the directive 2009/128/CE on Sustainable use of pesticides.

- **Fipronil based pesticides are broad-spectrum and spread in the whole ecosystem.**

  It affects a variety of pest insects, but also beneficial insects. It generates excess of neuronal stimulation on insect central nervous system, leading to excessive muscle contraction (El Hassani et al, 2005). More over, fipronil is found in the whole environment and food chain: air, water, soil, plants, animals (Nature et Progrès, 2012).

- **Fipronil and its metabolites[1] enter into the plants.**

  Fipronil, *per se*, is slightly systemic in comparison to neonicotinoids. However, when mixed with co-formulant (systemicity enhancers), the systemic characteristic is higher (Dicekman et al, 2010). The consequence of a high systemicity is that plants absorb the chemical molecule. Root uptake of organic molecule is function of the octanol-water partition coefficient, water solubility, molecular weight and dissociation constant (Sur et al, 2012).

Table 1. Physic-chemical characeristics of fipronil, and some neonicotinoids.

Active Substance	Molecular weight g/mol	Water Solubility	Octanol/water partition coefficient log Pow	Dissociation constant pKa
Fipronil	437,15	3,78	3,75	0
Imidacloprid	255,7	610	0,57	14
Thiamethoxam	291,71	4100	-0,13	0
Thiacloprid	252,72	184	1,26	0
Clothianidin	249,7	340	0,905	11,1

Source: EU DAR (Draft Assessment Report).

- **Even fipronil photo-metabolites[2] are found in plants.**
  Fipronil based pesticides are expected to be used in the absence of light (e.g. seed treatments). They are thus not expected to produce photo-metabolites. However, desulfynil-fipronil photoproduct was found in pollen loads (Chauzat, 2006). Dust drift is mentioned as one main cause explaining the presence of desulfynil-fipronil in the environment (Nature et Progrès, 2012).

- **Fipronil residues and metabolites persist in soils.**

  The plant absorbed less than 5% of the fipronil contained in seed dressing (DAR – France, 2004; 2006). See also EFSA report on fipronil, p49 (EFSA, 2013).
  Fipronil has high moderate persistence in soil. Its DT_{50} = 32-346 days. This means that half of the quantity of fipronil that reaches the soil still remains after one month to one year (EFSA, 2006). Fipronil metabolites are even more persistent in soil. For more information see EFSA report on fipronil, p49 (EFSA, 2013).

[1] Metabolites are formed as part of the biochemical process of degrading chemical compounds.
[2] Photo-metabolites (or photoproducts) are metabolites formed in presence of light.

- **Fipronil and its metabolites are extremely toxic for bees.**

  Regent ® for example is 6 475 times more toxic than DDT for bees. Regent ® is even more toxic than Cruiser ® (thiomethoxam, neonicotinoid) that is currently ban, which is 5 400 more toxic than DDT (Bonmatin, 2009). This is important to raise awareness to the fact that 4,2 ng of fipronil kill a bee (oral toxicity), i.e a dose of 42 ppb or ng/g[3]. For more information on acute toxicity, chronic toxicity of fipronil and its metabolites on bees see EFSA report on fipronil, p7-9 (EFSA, 2013).

- **Fipronil residues and metabolites are found in food sources for pollinators at very low doses, which are still lethal for bees.**

  Fipronil and its metabolites can reach the pollen of sunflower and maize due to the Regent TS ® formulation (Bonmatin, 2003). This insecticide has been suspended in France in 2004 following the outcome of Bonmatin, 2003.

- **Fipronil has sublethal effects for bees.**

  Fipronil causes disorders of the foraging activity and homing failure (EFSA report on fipronil, p9 (EFSA, 2013).
  Under semi-field conditions, bees foraging in sunflower treated with Regent TS® show abnormal foraging behaviour, increase in grooming, short flights and immobility (CST, 2005).
  Under semi-field and laboratory conditions, bees show an increase of the foraging period and homing time to the hive, due to a decrease in orientation performance (ACTA, 2006).
  Fipronil has also shown to act synergistically with pathogens and increase bee mortality (Vidau et al., 2011).

For more information on fipronil

Please check our website: http://bee-life.eu/en/dossier/11/

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European Beekeeping Coordination

4, Place Croix du Sud 1348
Louvain la Neuve
+32 (0)10 47 34 16
info@bee-life.eu
www.bee-life.eu

3 As for neonicotinoids, the problem of fipronil is that tiny doses of this molecule kill bees. Some years ago these concentration could not even be detected. Nowadays, the limit of detection is 0.07 ng/g and the limit of quantification: 0.2 ng/g (Dr. Bonmatin, CNRS – Presentation at the Colloquium 'L'abeille, indicateur des écosystèmes', held in Brussels, on 6 of June 2013).

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