Pesticides – risks for environment and our health

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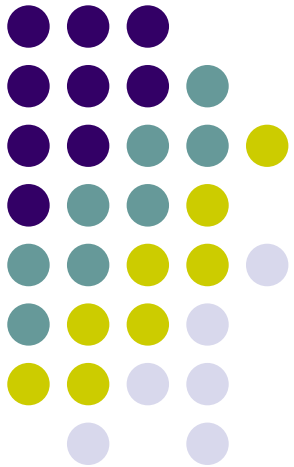

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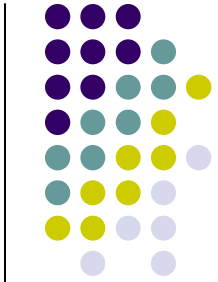
Main threats:

- Bioaccumulation and biomagnification
- Risks for workers, consumers and public

Examples of pesticide treatment in European Union

- Pesticides and food in EU
- EU legislative
- Atrazine water contamination in Czech Republic

The danger of bioaccumulation & biomagnification



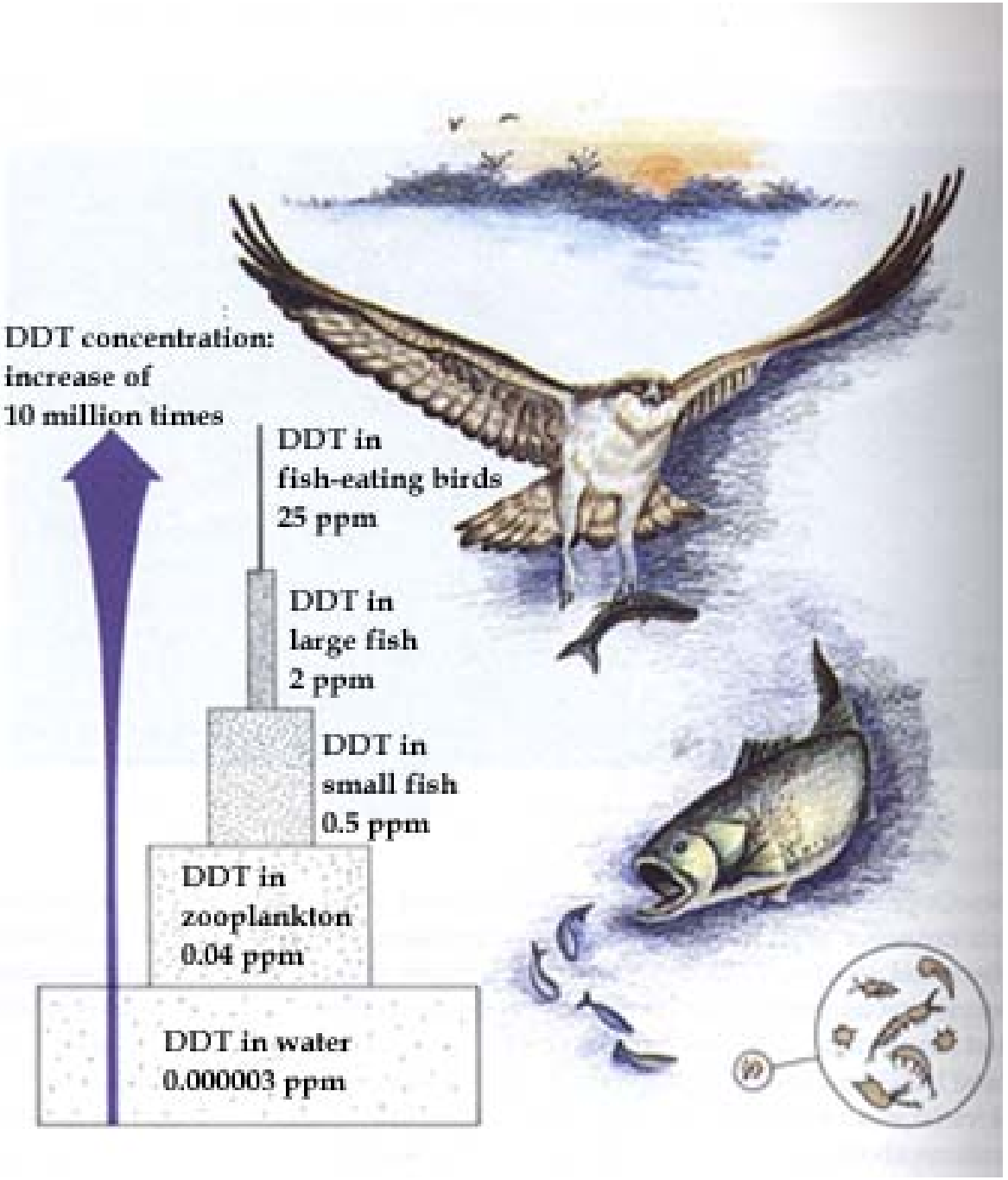
- Pesticides move through the various trophic levels in an ecosystem
- Bioaccumulation refers to how pollutants enter a food chain.
- Biomagnification refers to the tendency of pollutants to concentrate as they move from one trophic level to the next.

In order for biomagnification to occur, the pollutant must be:

- long-lived
- mobile
- soluble in fats
- biologically active

What are the differences between perzistant pollutants and short-lived pollutants?

- If a pollutant is short-lived, it will be broken down before it can become dangerous.
- If it is not mobile, it will stay in one place and is unlikely to be taken up by organisms.
- If the pollutant is soluble in water it will be excreted by the organism. Pesticides that dissolve in fats may be retained for a long time.
- If a pollutant is not active biologically, it may biomagnify, but we really don't worry about it much, since it probably won't cause any problems.


DDT concentration:
increase of
10 million times
DDT in
fish-eating birds
25 ppm
DDT in
large fish
2 ppm
DDT in
small fish
0.5 ppm
DDT in
zooplankton
0.04 ppm
DDT in water
0.000003 ppm

Pesticides - risks for workers

- WHO estimates that each year 3 million workers in agriculture in the developing world experience severe poisoning from pesticides, about 18,000 of whom die.
- Around 1,350 pesticides are applied to food crops worldwide,

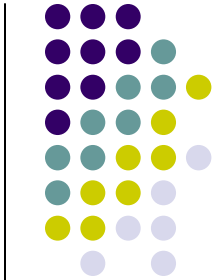
Potential health effects of pesticides:

- Cancer risks: non-Hodgkin lymphoma, leukemia, prostate cancer, multiple myeloma, and soft tissues sarcoma
- Respiratory problems, memory disorders, dermatologic conditions,cancer,depression, miscarriages, and birth defects.
- Endocrine disruptors – group of chemicals which cause subtle biochemical and physiological changes during the embryonic and early postnatal stages of development, usually through mimicking and/or interfering with hormones.

Pesticides – risks for consumers

- Many food crops, including fruits and vegetables, contain pesticide residues after being washed or peeled.
- Chemicals that are no longer used but that are resistant to breakdown for long periods may remain in soil and water and thus in food.
- There are tolerances based on the toxicity of the pesticide and its breakdown products , but we can't say for sure that there is ever a "safe" level of pesticide residues in food.
- Many pesticides are 'poisonous' in immediate terms, what we term acutely toxic, as opposed to chronic effects that may take years before they turn into noticeable symptoms.
- Studies of traces in food products in **Armenia** – present in ½ of the samples, most in meat, milk, dairy, vegetable oil, eggs and rice

The public



- Spolana – in 1960s **2,4,5-T (trichlorophenolate) production used also later for Agent Orange used by US Army in Vietnam war**
- **PCDDs/Fs contamination of workers, people in Vietnam, as well as soldiers; surrounding of factory heavily contaminated**
- China – 500,000 poisoned each year, 500 die
- Children – susceptible, brain cancer, leukemia,birth defects when exposed to p. (when ridding schools of rodents, insects). Exposure in the uterus may have negative effects on a fetus – growth and behavioral disorders or reduced resistance to p. In the USA – birth defects associated with conceiving when p. concentrated in surface water. In Canada – use of garden pesticides – 7times higher risk of leukemia
- 70% increase risk of Parkinson´s disease
- 95% of pesticides used on residential lawns considered carcinogens

Armenia

- traces of or organochlorine pollutants found in 85-97% samples of breast milk – low, but chronic exposure may cause increase in morbidity rates
- main source of contamination in Armenia: farms in the Ararat valley

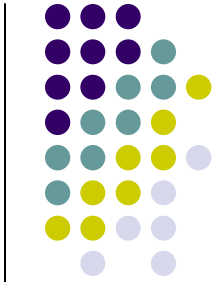
Pesticides & food in EU

- Over 25% of fruits, cereals and vegetables tested in the EU contain two or more different pesticides and over 5% of fruits, cereals and vegetables tested in the EU contain 5 or more different pesticides.
- Grapes, citrus fruits and potatoes are the three **most** intensively sprayed food crops in the EU and all receive over 6 kg/ha of synthetic pesticides.

Pesticides regulation in EU

- Major directives regulating pesticides in the EU:
- Pesticide Prohibition (Directive 79/117 EC) – prohibition of DDT and Aldrin, mercury compounds. Member states could authorize these ingredients in some cases till 1990, when many other pesticides banned. 25 prohibited, but not the prodution and export to third countries.

- Pesticide Authorisation (Directive 91/414 EC) – aims to abolish trade barriers within the EU.
- After years of discussion, in 2006, EC – new drafts on pesticide regulations – the directive from 1991 revised for a greater safety (very slow and gradual process,any substance approved before legal until the approval period of 10 years expires). 22 substances likely to be outlawed. Member states develop National Action Plans similar to programmes in Denmark and Sweden (agri products with 6times less residue than the EU average and increase of water quality), further step – to establish ICP and IPM as a mandatory procedure. MRL will undergo a common assessment to make sure consumers are protected.



- Since 1990s, the Czech Republic worked towards membership in the EU – efforts to harmonize its legislation with that of the EU. All 3 conventions (Stockholm Rotterdam and Basel) were ratified.
- All foodstuffs intended for human or animal consumption in the European Union (EU) are subject to a maximum residue level (MRL) of pesticides in their composition in order to protect animal and human health.
- The maximum pesticide residue level in foodstuffs is 0.01 mg/kg. This general limit is applicable „by default“ – for example in all cases where an MRL has not been specifically set for a product or product type.
- **Risk assessment** is the responsibility of the EFSA (European Food Safety Authority), which decides on each intended new MRL.
- Products are not subject to the set limits if they are intended for sowing or planting, authorised tests on active substances, manufacture of non-food products, or export outside the EU.

Exceptions to the limits

- Certain substances may be authorised even if they exceed their MRL, if they meet the following conditions:
- the products are not intended for immediate consumption;
- controls are in place to ensure that these products are not made available to the consumer;
- the other Member States and the Commission are informed of the measures.

- **Checking of MRLs i**s based on Community and national multi-annual programmes updated every year. These checks entail taking samples, analysing them and identifying the pesticides and respective present pesticide levels.

- Prior to this Regulation, each Member State applied its own maximum residue limits for pesticides
- Previous European legislation set different limits for different kinds of product: fruit and vegetables, cereals, foodstuffs of animal origin and plant products, including fruit and vegetables
- Now regulation repeals all these directives, proposing harmonised **maximum limits for all foodstuffs** instead. It includes the same level of protection for animal feedingstuffs. It is the first time that a common limit of this type is established at European level for all types of pesticide, without distinguishing between categories of food.

Atrazine – case of water contamination in Czech Republic

- Its use is controversial due to its effects on nontarget species, such as on amphibians, and because of widespread contamination of waterways and drinking water supplies.
- In the Czech Republic was used about 150 t per year.
- In EU was Atrazine banned in 2004 because of its persistent groundwater contamination.
- Atrazine caused also wide water contamination in Czech Republic – e.g. contamination of drinking water in Třebechovice in 2005 or in Velké Březno in 2003.
- It is still one of the most widely used herbicides in the world.

Thank you for your attention.

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