Atrazine, experience from Sweden and EU

Karin Hanze, Accra, Ghana, December 1, 2010

Atrazine main uses

- **Sweden**

Non-agriculture use:

- railways
- hard surfaces at industrials sites, parking sites, paths etc.
- a non intended use under paved roads.

Agriculture maize

No longer registered since Sept 1989

- **EU**

Likely the same non-agriculture use as in Sweden (today biocide)
In EU review process:
the intended use was for **maize** and **sorghum** only.
EU- not registered

- **USA**

Still registered at least in maize, sugar cane, but also other uses

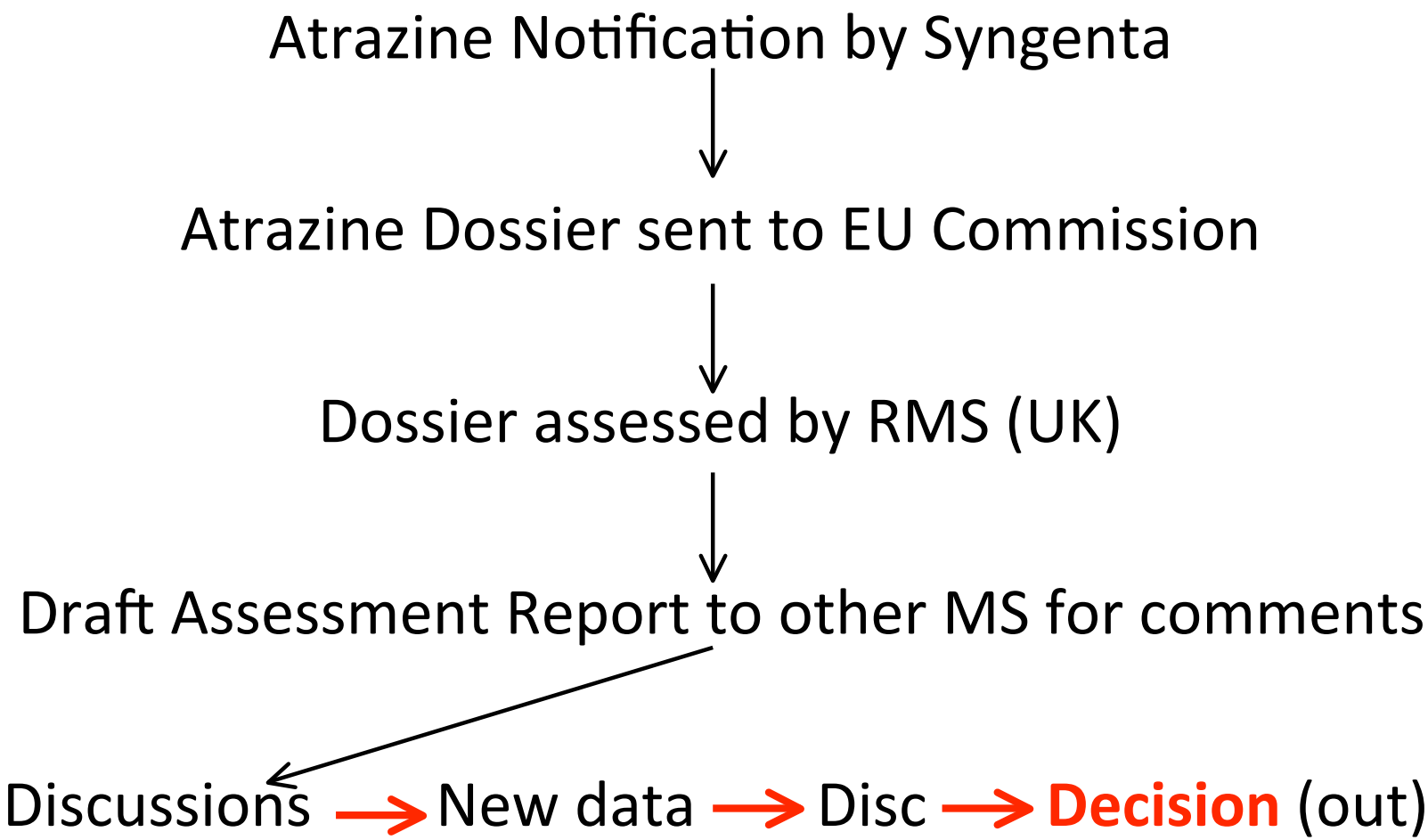
Reasons for **no** registration /inclusion

- **Sweden** 1989
  No models available
  Expert judgement based on data on degradation and adsorption properties
  +
  Occurrence in groundwater and surface water (not yet much good data in Sweden)

  + internationally assumed to be a problematic substance

- **EU** 2003/March 2004
  Identified safe use not clear➔
  In particular, available monitoring data were insufficient to demonstrate that in large areas concentrations of the active substance and its breakdown products will not exceed 0,1 µg/l in groundwater. (legal text)

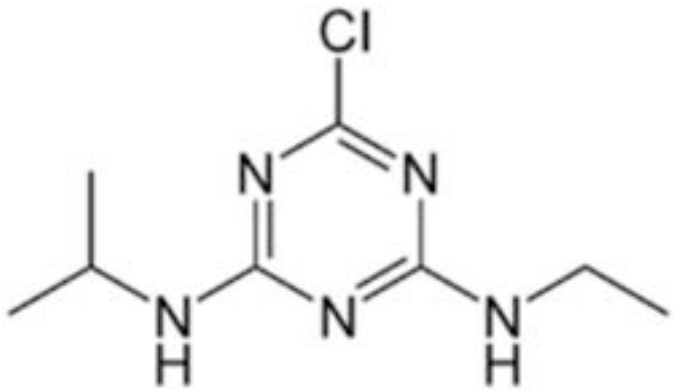
EU review procedure



Chemical group

- Atrazine belongs to the triazine group
  Others are simazine, terbuthylazine, metribuzine ….

- Chemical structure



Mode of action of atrazine

1. Atrazine is a selective herbicide, i.e. can be used in some crops at pre-emerged stadge, maize, sorghum, sugar cane

2. Inhibition of photosynthesis

3. Development of atrazine-tolerant weeds

Intended use of atrazine at time of assessment in Europe

- North Europe
  One dose: 0.75 kg active substance/ha maize in before or early after emergence of maize

- South Europe
  One dose: 1.0 kg active substance/ha in maize and sorghum before or early after emergence of plants

Which concerns existed when starting assessment of atrazine in EU?

- Monitoring of groundwater in several European countries indicated concentrations as high as 1 µg/l (also including metabolites)
- Monitoring of surface water in Europe as high as 3 µg/l
- Atrazine in air samples, Germany (also Sweden)
- Indications to have endocrine effects, carcinogenic

Main types of exposure assessments of A.S. in EU today

- 1. Exposure of operator (farmer) (2 EU models)
- 2. Exposure of consumers through residues in food and drinking water (models, food basket)
- 3. Exposure of terrestrial organisms (assumptive calculations according to a guidance document)
- 4. Exposure of aquatic organisms (models)

EU exposure models to calculate concentrations in ground / surface water

- Groundwater - four single models
- Surface water

  1. A combination of a simple model of spray drift (excel sheet) + a model for surface run off (PRZM) calculates data exported to a model (TOXWA) calculation surface water concentrations. South EU
  2. A combination of a simple model of spray drift (excel sheet) + a model for drainage (MACRO) calculates data exported to a model (TOXWA) calculation surface water concentrations. North EU

Assessment of Atrazine in water

- Contamination of
  1. groundwater from percolation through the soil profile. In EU assessment one of the models was used for atrazine for the 9 EU scenarios, 5 scenarios failed
  2. surface water For the assessment of atrazine only spray drift was used. Models and guidance document for proper assessment were not ready.

Groundwater quality criteria

- In EU (and Sweden) the limit value is 0.1 µg/l (life time) for all active substances and for relevant metabolites. Only ”one safe use” is needed for acceptance at EU level. Up to each member state to prove ”no safe use”.

- In US the criteria is set for each substance based on toxicity data. For atrazine it is 3.0 µg/l (life time, safety factor 1000).

Aquatic environment -

- Toxicity endpoints for aquatic organisms, algae, water flea (*Crustaceae),* fish

compared with

- Estimation of concentration of a substance in surface water e.g. model estimation or monitoring.
- Acute and long term effects are assessed

Aquatic Risk from Atrazine

- Risk indicated for algae and aquatic plants spray drift up to 5 m from water body
  and
- Long term effects to fish from spray drift 1 m from water body.

  Reduce risk by risk mitigation through longer distances to water bodies at spraying

Assessment on Health aspects

- Acute and long term toxicity
- Operator exposure – Acceptable using using PPE of gloves, and coveralls (mixing and loading) + boats during spraying (using mounted tractor spraying
- Residues in food and water: residues in maize

Groundwater assessment EU

- Based on input data chosen by Syngenta, 5 out of 8 European maize scenarios indicated concentrations less than 0.1 µg/l atrazine at 1 meter depth → identified safe use

  BUT several member states did not agree on the choice of input data → question sent to the Scientific Expert Group agreed with the protesting MS

Selection of safe areas GW?

- Arguments were also raised that certain areas should be safe and that it was important to identify them in the countries that wanted to keep using atrazine. The main reason is crop economy.

Today: Monitoring data Atrazine

- Atrazine + its metabolites most frequently found in groundwater in Europe and in US. Concentrations usually below 1 µg/l. Both from agricultural use (maize) and from other uses, not possible to distinguish between them.
- Atrazine + metabolites also found in surface water
- Highest values seemingly in GW

Today 2010: Effects of concern

- Endocrine effects – amphibians. This issue has been discussed a lot, not least in US. ←→ Not yet clear

- Report on high incidences of breast cancer in areas in north Italy, where drinking water is contaminated.

- Discussions on atrazine have been going on since mid 1990s. No final decision in US. Main issues, groundwater contamination, cancer and endocrine effects. No evidences from EU assessment

Decision on Atrazine
EU

- In particular available monitoring data were insufficient to demonstrate that in large areas concentrations of the active substance and its breakdown products **will not** exceed 0,1 µg/l in groundwater. (legal text)

- Or more simply: No safe use can be guaranteed