

## GUIDANCE FOR PLANNING ENVIRONMENTAL MONITORING OF PESTICIDES IN WATER

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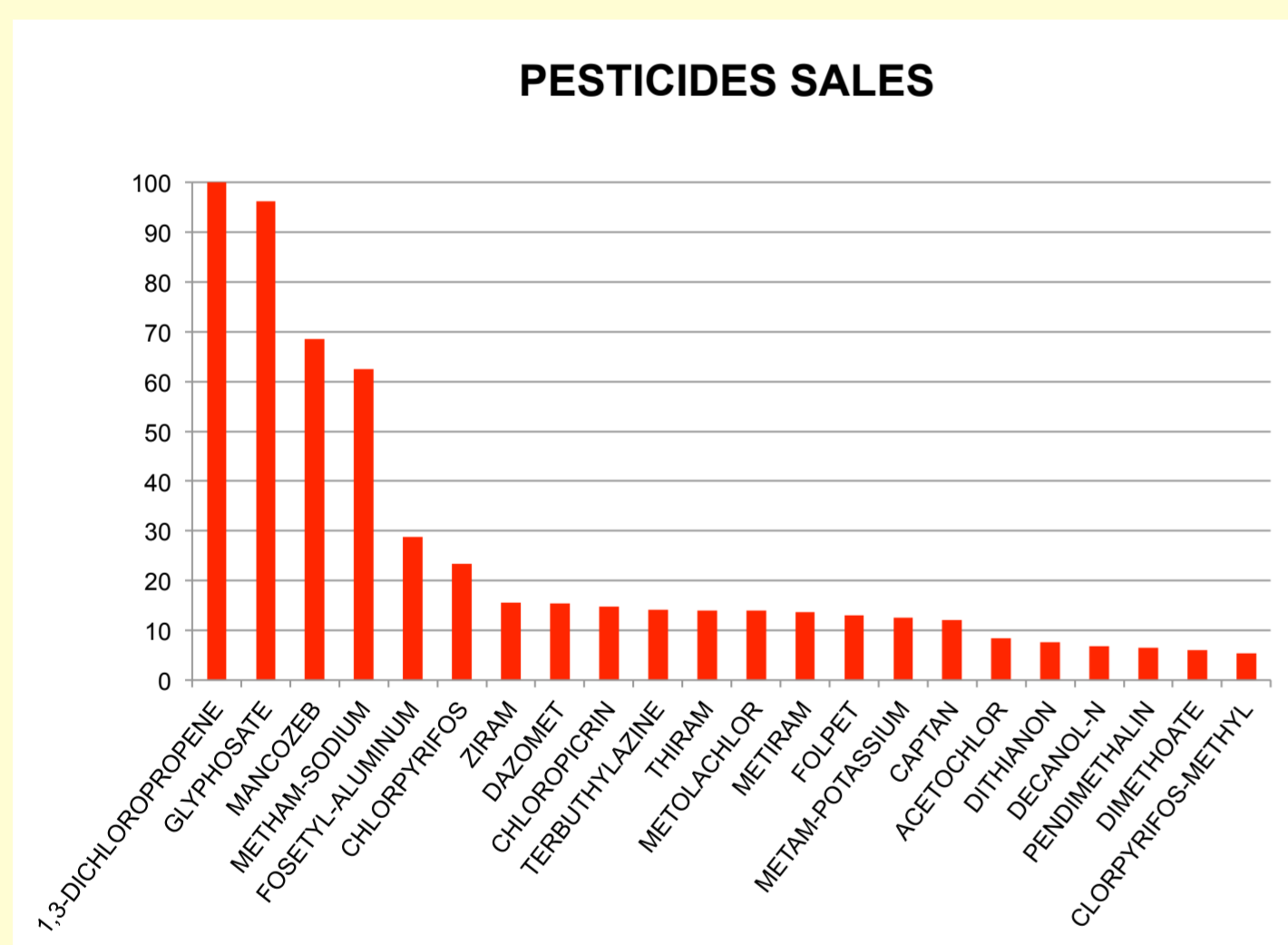
As part of the national monitoring of pesticides in water, ISPRA plays a role of coordination and guidance versus Italian Regions and their Environmental Agencies. Beside the substances identified as relevant by the European and Italian legislation in the field of water policy, the selection of priority substances for the monitoring should take into account other elements: the quantities released to the environment on the basis of sales statistics, the characteristics determining the behaviour of the substances in the environment and their (eco)toxicological properties, the water monitoring data and the results from the application of exposure prediction indices. The following table reports an extract of the selected priority substances.

| Substance     | Sales <sup>1</sup> | Water policy legislation | Water monitoring |                         | Exposure prediction                 |                                    | Hazard  |
|---------------|--------------------|--------------------------|------------------|-------------------------|-------------------------------------|------------------------------------|---|
|               |                    |                          | Samples (number) | Detection frequency (%) | Surface water priority <sup>2</sup> | Ground water priority <sup>3</sup> |   |
| Glyphosate    | HV                 |                          | 2797             | 16,7                    | 9,47                                | YES                                | Eye Dam. 1; Aquatic Chronic 2   |
| Chlorpyrifos  | HV                 | P                        | 20025            | 1,21                    | 7,38                                | NO                                 | Acute Tox. 3; Aquatic Acute 1; Aquatic Chronic 1  |
| Ziram         | MHV                |                          | -                | -                       | 7,78                                | YES                                | Acute Tox. 2; Acute Tox. 4; STOT RE 2; STOT SE 3; Eye Dam. 1; Skin Sens. 1; Aquatic Acute 1; Aquatic Chronic 1; ED <sup>4</sup> |
| Terbutylazine | MHV                |                          | 22287            | 11,61 <sup>5</sup>      | 6,41                                | YES                                | Acute Tox. 4; STOT RE 2; Aquatic Acute 1; Aquatic Chronic 1 <sup>(6)</sup>  |
| MCPA          | MV                 | X                        | 14216            | 5,08                    | 9,38                                | YES                                | Acute Tox. 4 *; Skin Irrit. 2; Eye Dam. 1; Aquatic Acute 1; Aquatic Chronic 1   |
| Propizamide   | MLV                |                          | 11253            | 2,03                    | 4,08                                | YES                                | Carc. 2; Aquatic Acute 1; Aquatic Chronic 1   |
| Endosulfan    | MLV                | PP                       | 6333             | 0,03                    | 7,29                                | NO                                 | Acute Tox. 2; Acute Tox. 2; Acute Tox. 4; Aquatic Acute 1; Aquatic Chronic 1; ED; PBT <sup>7</sup>                              |
| Imidacloprid  | MLV                | WL                       | 7293             | 24,80                   | 9,69                                | YES                                | Acute Tox. 4; Aquatic Acute 1; Aquatic Chronic 1  |
| Carbendazim   | LV                 |                          | 3648             | 18,61                   | 9,25                                | YES                                | Muta. 1B; Repr. 1B; Aquatic Acute 1; Aquatic Chronic 1; ED  |
| Diuron        | 0                  | P                        | 14481            | 4,25                    | 9,49                                | YES                                | Carc. 2; Acute Tox. 4; STOT RE 2; Aquatic Acute 1; Aquatic Chronic 1; ED  |

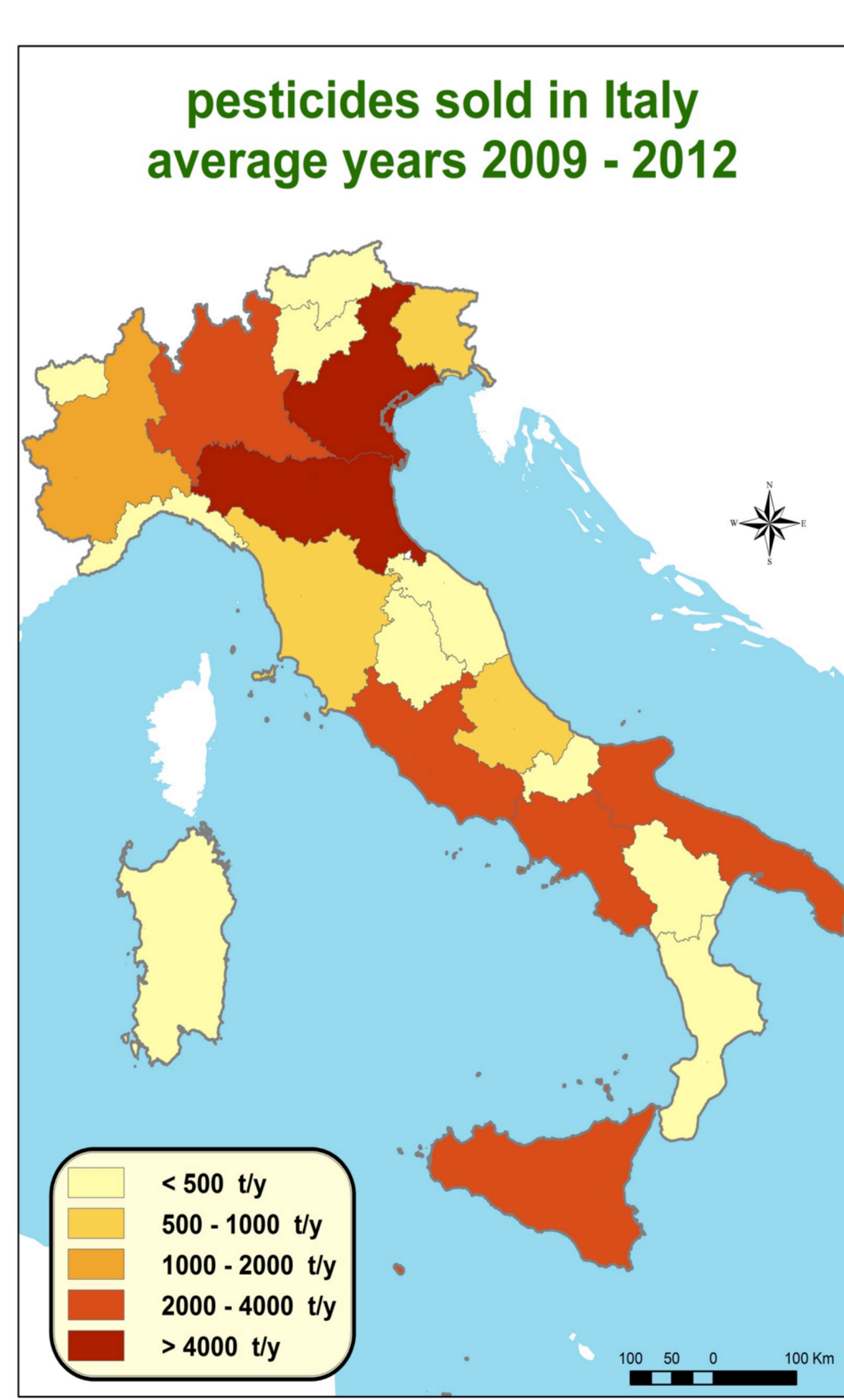
1 HV: high volume (≥1000 t/y); MHV: medium-high volume (≥500 t/y <1000 t/y); MV: medium volume (≥100 t/y <500 t/y); MLV: medium-low volume (≥10 t/y <100t/y); LV: low volume (<10 t/y)  
2 Normalized EURAM index  
3 EPA California methodology  
4 Endocrine disrupter  
5 Detection frequency of its metabolite desethyl-terbutylazine: 12,48%  
6 Opinion of the ECHA Committee for Risk Assessment  
7 Persistent, Bioaccumulative and Toxic

### Sales

Sales are the best available estimation of used quantities and released to the environment. The Italian sales data are provided by the National Institute of Statistics (ISTAT). Based on the national average sales from 2009 to 2012, about 300 pesticides were sold above 1 t/y. For the most sold substances the quantities exceed 1000 t/y. For confidentiality reasons, the sales are normalized according to the most sold pesticide.



pesticides sold in Italy average years 2009 - 2012



### Water police legislation

A list of priority substances (P), presenting a significant risk to or via the aquatic environment, is set in the contest of the Water Framework Directive, 2000/60/EC. The directive also establishes a subset of priority hazardous substances (PP) subjected to cessation or phasing out of discharges, emissions and losses.

Italian legislation (DM 56/2009) identifies other pesticides (pointed out with X in the table) not belonging to the EU list of priority. Moreover, the substances in the Watch List (WL) in the contest of the Water Framework Directive are identified since they are emerging contaminants for Union-wide monitoring.

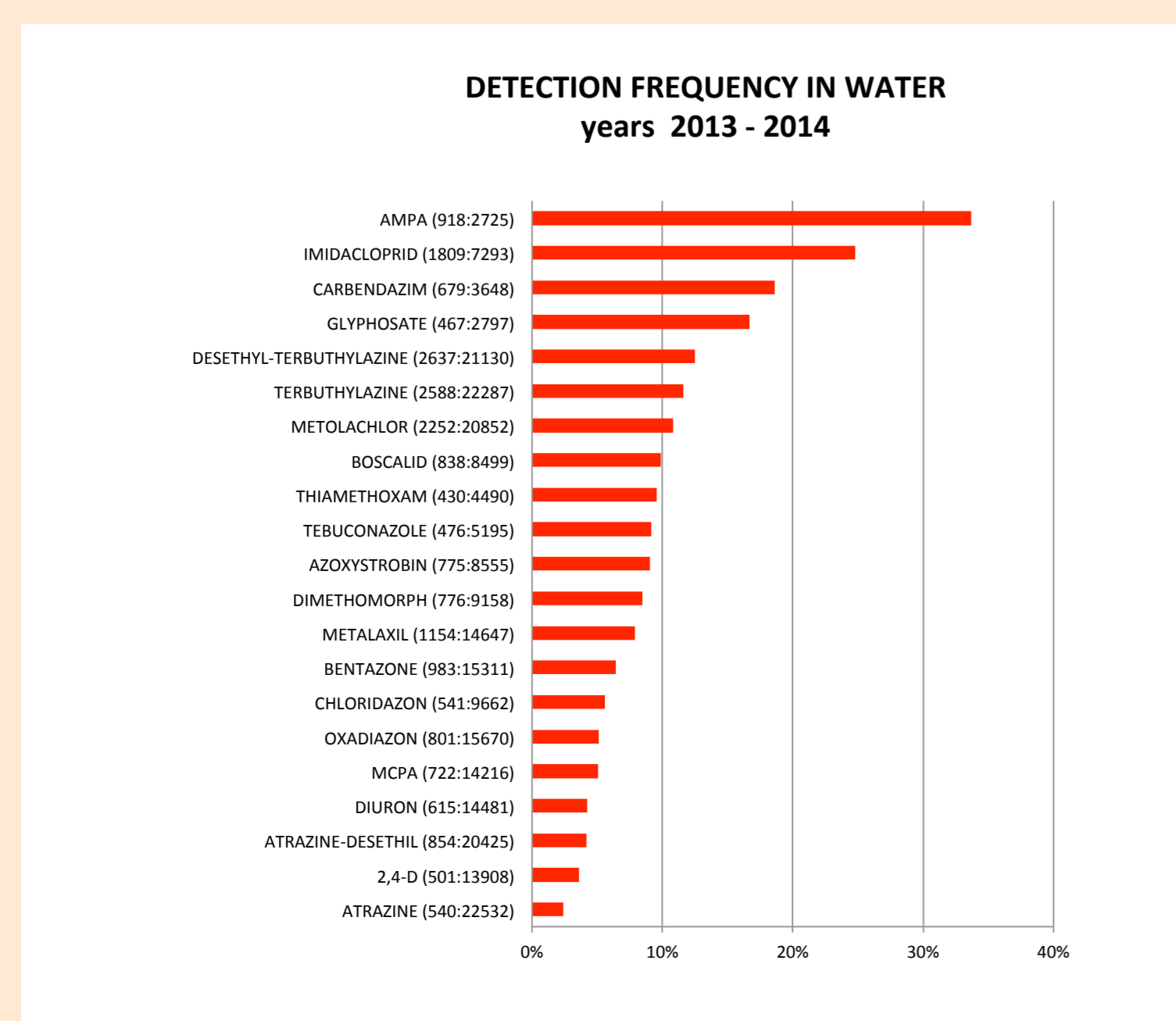
### Hazard

The hazard and the potential effects on human health and environment are based on harmonized classification adopted at Community level (Regulation (EC) No 1272/2008).

Besides, the substances having Persistent, Bioaccumulative and Toxic (PBT), Very Persistent and Very Bioaccumulative (vPvB), and Endocrine Disrupters (ED) properties were taken into account. These substances for which effect threshold cannot be established, although no longer authorized in EU, could be present into the environment as a consequence of the past use.

### Monitoring

The detection frequency of the most found substances in surface water and groundwater is based on monitoring carried out in the years 2013-2014. Monitoring is useful in order to highlight no longer sold substances that are still present in the environment due to a historical contamination. In brackets the detection frequency is indicated as ratio between the number of samples with residues and the total number of samples.



### Exposure prediction

The environmental distribution is based on the results from the application of exposure indices.

✓ for the potential **freshwater** contamination: EURAM index, proposed in the contest of European COMMPS procedure, was applied to elaborate a qualitative list of potential contaminants. The evaluation is carried out considering a unit quantity sale and the index is normalized between 0 and 10.

|             | Environmental fate parameter         | SNV                       |
|-------------|--------------------------------------|---------------------------|
| mobility    | Water solubility                     | > 3 ppm                   |
|             | Soil adsorption coefficient          | < 1900 cm <sup>3</sup> /g |
| persistence | hydrolysis half-life                 | > 14 d                    |
|             | Aerobic soil degradation half-life   | > 610 d                   |
|             | Anaerobic soil degradation half-life | > 9 d                     |

✓ for the potential **groundwater** contamination: methodology of California Department of Pesticide Regulation was applied. It establishes specific numerical values (SNVs) for water solubility, soil adsorption coefficient (Koc), hydrolysis half-life, aerobic and anaerobic soil metabolism and field dissipation of pesticides. If at least one of mobility parameters and one of persistence are above SNVs then the substance is considered as a potential contaminant.

