

Monitoring of pesticides (2015-2016 campaign) in the main waterways of Western Lombardy region (Italy) by LC/MS-MS according to D.M. 260/2010 and D.l.g. 172/2015

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INTRODUCTION

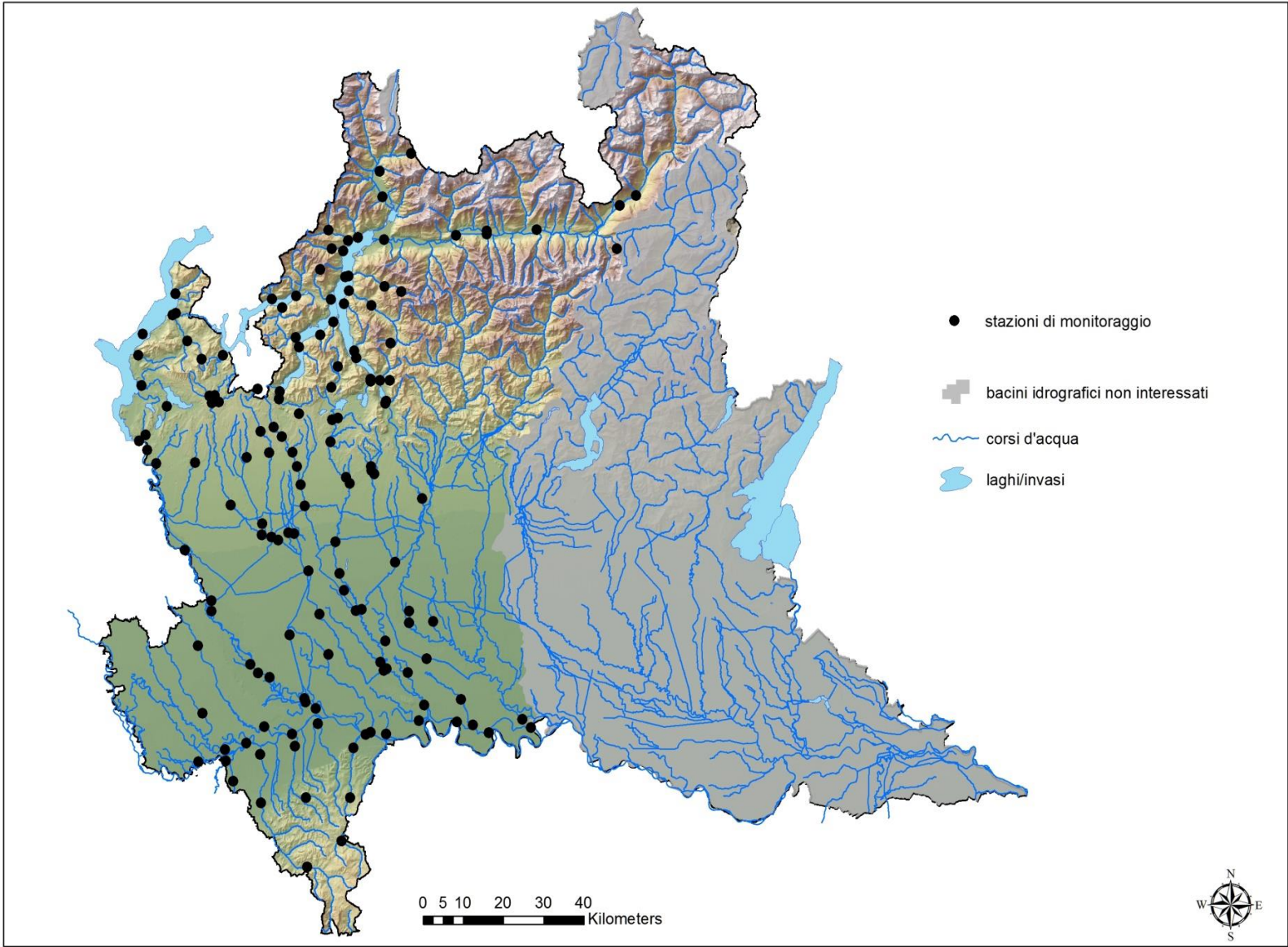


Figure 1. Sampling points in the main streams of the western district of Lombardy region (Italy), taken during 2016.

Each year, more than 130.000 tons of pesticides are widely used in Italy. The highest consume of pesticides takes place in the Padan plain area thus leading to a stronger contamination of soils and waterways respect to other places [1]. The FDW 2000/60/CE requires that member States must provide “the necessary protection for the bodies of water identified with the aim of avoiding deterioration in their quality in order to reduce level of purification treatment required in the production of drinking water”. ISPRA national report on pesticides, 2016 edition, for the Italian 2013-2014 monitoring campaign, reported that on 1284 points analyzed, 63.9% are contaminated by pesticides. Among them, 41.2% have concentrations higher than those allowed in drinking water. In groundwater 31,7% of points are contaminated with 9% above the drinking water limits. The present work aims to anticipate the **partial results of 2015-2016** monitoring campaign in West Lombardy water-ways according to 2008/105/CE, reporting results on 154 sampling points (Figure 1). The main pesticides we are interesting in are:

- 2,4D-(2,4-dichlorophenoxyacetic acid)
- 2,4,5-T
- Acetamiprid
- Aclonifen
- Azimsulfuron
- Bensulfuron Methyl
- Bentazon
- Chloridazon
- Cycloxidim
- Dimethoate
- Diuron
- Fenitrothion
- Fenthion
- Imidacloprid
- Isoproturon
- Isoxaflutole
- Linuron
- MCPA
- Mecoprop
- Nicosulfuron
- Quinclorac
- Rimsulfuron
- Thiachloprid
- Ampa
- Glyphosate

RESULTS AND DISCUSSION

The data collected during 2015-2016 campaign were detected and quantified by direct injection of water samples (LOQ=0,005-0,05 ug/L, depending on pesticide) by LC/MS-MS Q-Trap ABI SCIEX 6500 with ESI ionization source and MRM positive and negative acquisition mode, depending on the structure of the analyte. These data show that, about polar pesticides, on 122 monitoring points, **41% are positive (\geq LOQ) for Glyphosate and 58,2% for Ampa**. With regard to the rest of pesticides, on 99 sampling point, **31% are positive (\geq LOQ) for Bentazon and 21% to Imidacloprid and MCPA, 18% for Quinclorac, less than 10% for Bensulfuron Methyl, Diuron, Cycloxidim and Azimsulfuron. The rest of pesticides reported above results less than their LOQ .**

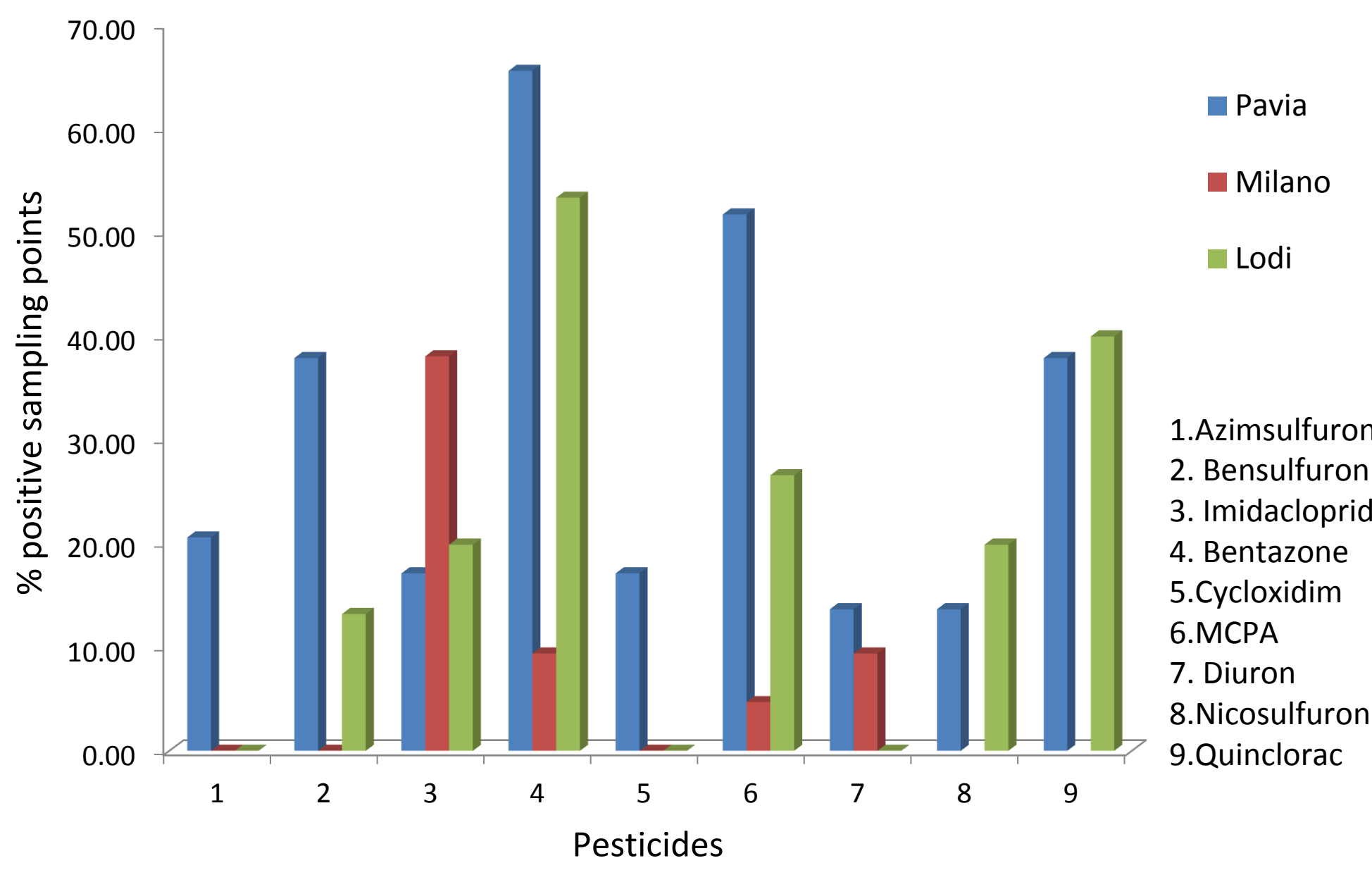


Figure 2. Distribution of crops pesticides in the southernwest-Lombardy provinces.

As shown in Figure 3, the points with the greatest pesticides concentration are located in the southern-west provinces (Milano, Lodi and Pavia). Indeed, this area is mainly devoted to the cultivation of rice and maize. For this reason Bentazon, Imidacloprid and Quinclorac are widely diffuse (Figure 2) and more abundant.

The results relative to Glyphosate and AMPA instead show a widespread distribution throughout all the monitored areas (Figure 4 and 6). These polar pesticides have maximum concentrations both in agricultural areas (Pavia, Milano, Lodi) and in highly populated ones (Varese, Monza). AMPA is probably due to other contributions than degradation of Glyphosate (Figure 5).

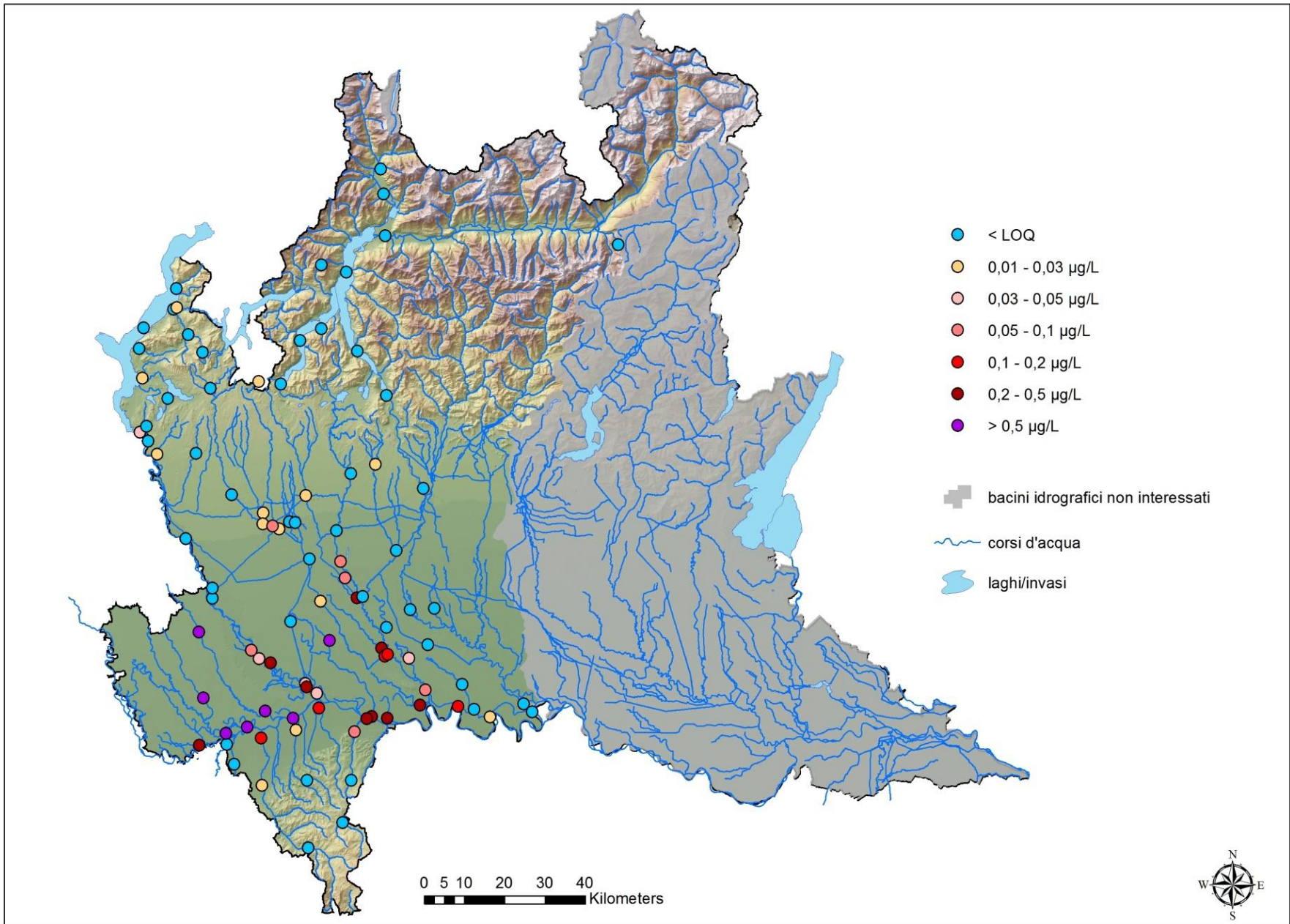


Figure 3. Distribution of total monitored pesticides in the Western - Lombardy region.

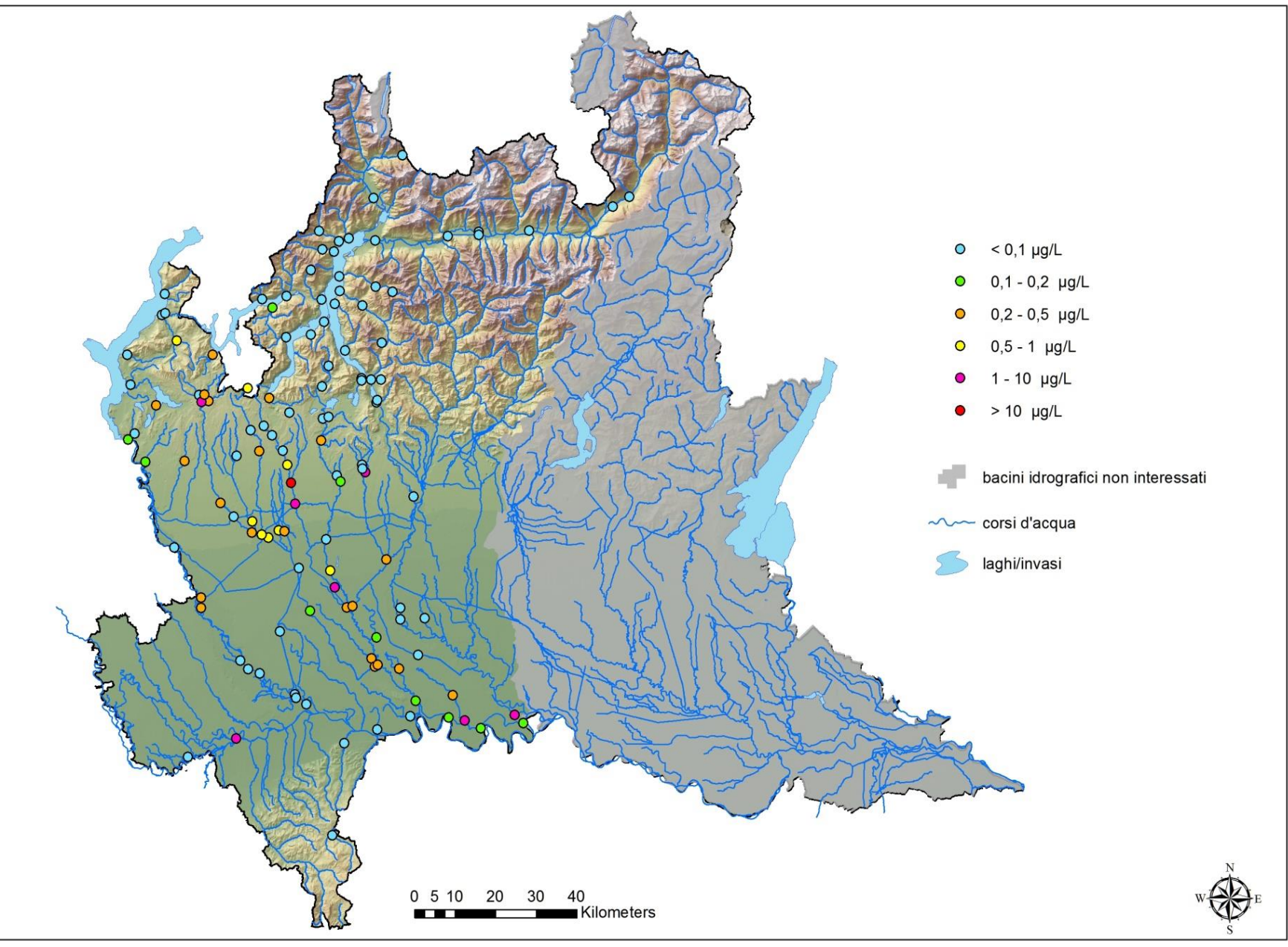


Figure 4. Concentration maximum reported for Glyphosate in points monitored.

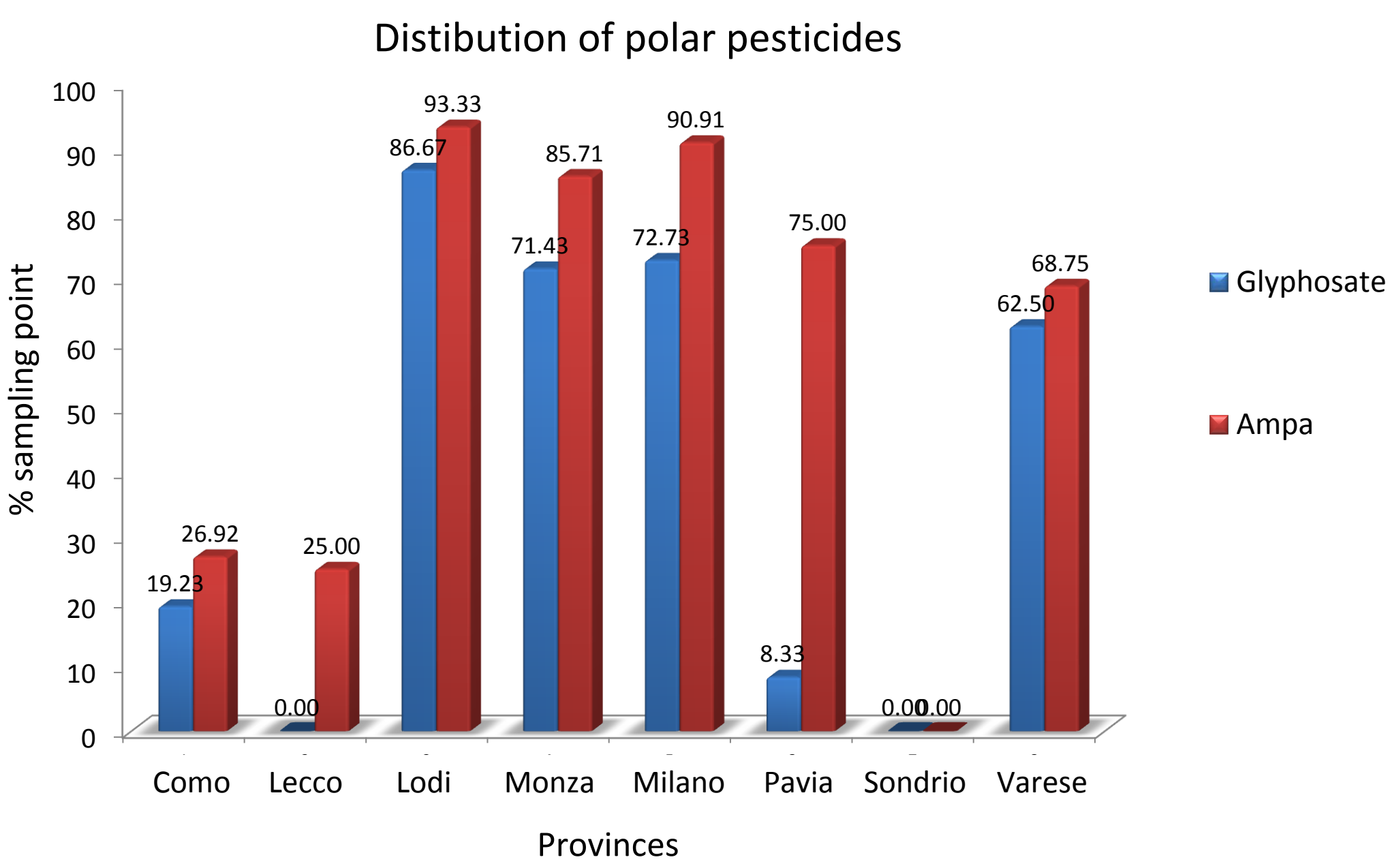


Figure 5. % of positive samples to Glyphosate and Ampa in each province of Western-Lombardy

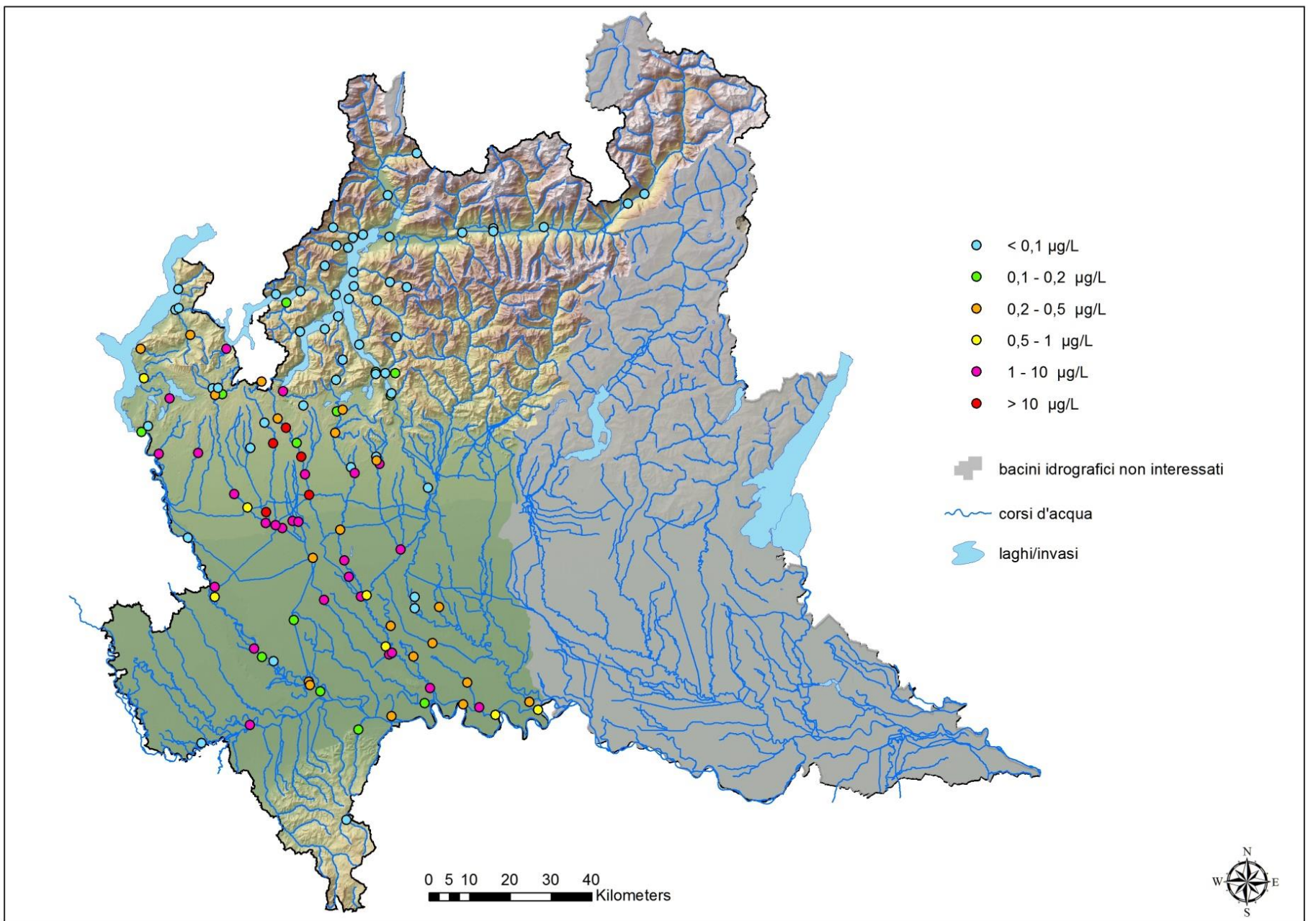


Figure 6. Concentration maximum reported for AMPA in points monitored

CONCLUSIONS

A) The pesticide monitoring plan in the western Lombardy for the 2015-2016 year, shows that among 25 pesticides, 10 were detected with a concentration \geq LOQ: Glyphosate and its metabolite AMPA, Azimsulfuron, Bensulfuron methyl, Imidacloprid, Bentazon, Cycloxidim, MCPA, Nicosulfuron, Quinclorac.

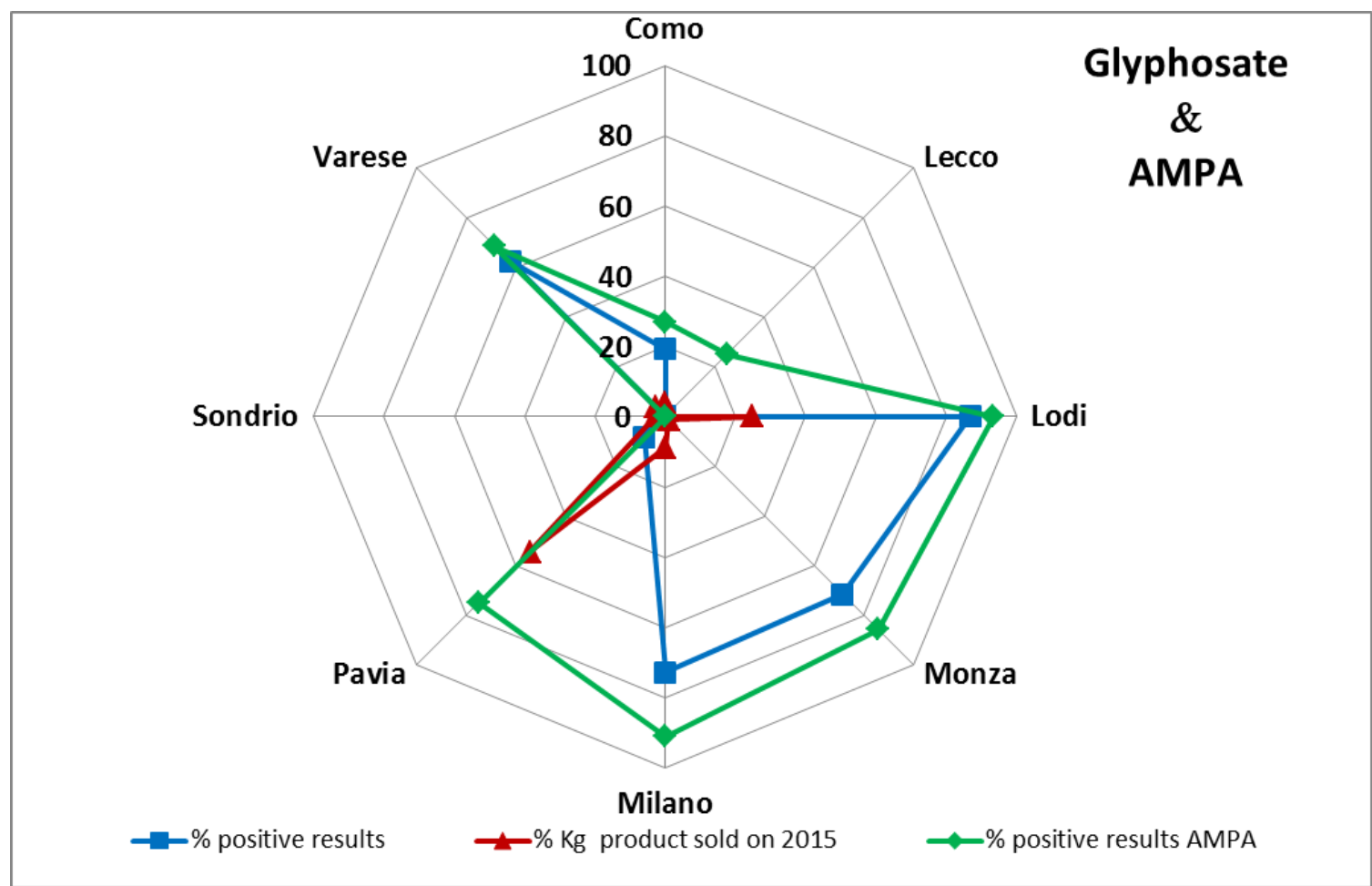


Figure 7. Distribution of polar pesticides and % Kg of sold product on 2015 in Lombardy

B) The greatest contribution to pollution is due to the presence of polar pesticides, Glyphosate and AMPA, widely diffuse in all the monitored provinces, which instead the other pesticides are localized only in provinces of Lodi, Pavia and South Milan.

C) Monitoring data are consistent with the sales data (Figure 8) for all “crops” pesticides, but for polar herbicides, instead commercial data are less representative (Figure 7).

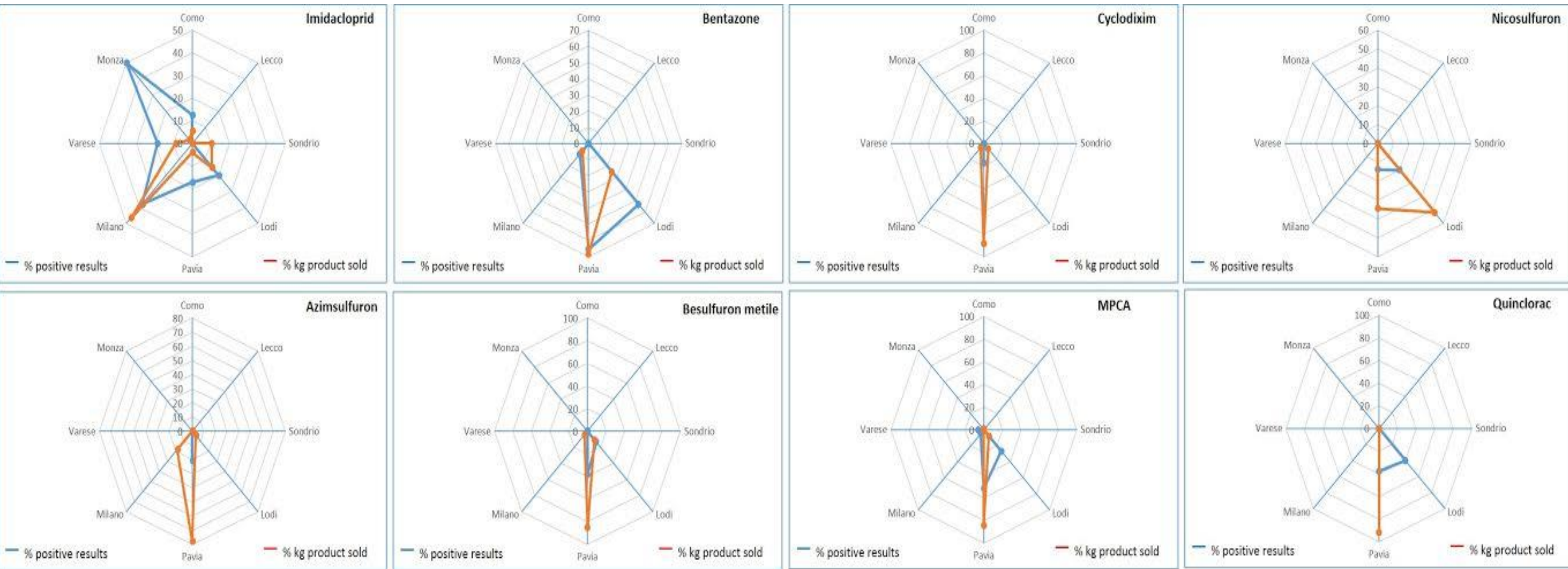


Figure 8. Distribution of sales “crops” pesticides determined in western Lombardy and % Kg of sold products on 2015-2016 in Lombardy.

REFERENCES:

- [1] ISPRA, Rapporto nazionale pesticidi 2013-2014, edizione 2016
- [2] Busetto M, Frattini V. “Rilevazioni di glifosate e del suo prodotto di degradazione l’acido amminometilfosfonico (AMPA) nei corsi d’acqua della provincia di Monza-Brianza» Il Bollettino n.4, 2010
- [3] M. Busetto, L. Colzani, D. Daverio, M. Paleari “Presenza del glifosato e del suo metabolita acido amminometilfosfonico (AMPA) nei corsi d’acqua della Lombardia occidentale. I) Indagine Analitica” Il Bollettino n.4, 2015.