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# Relevant Snake Species for the Risk Assessment of Plant Protection Products in Southern Europe

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According to the new data requirements under the EU regulation 1107/2009, reptiles come into question regarding risk assessments of plant protection products (PPP). Although no specific data requirements on reptiles are stipulated in the respective EU documents some toxicity data are available in the open literature. These data are intended to be used in the risk assessment. One potential approach for reptile risk assessment may be the way how it is established for birds and mammals (EFSA 2009; i.e. the major routes of exposure are diet and drinking water). In order to provide a scientific basis for reptile risk assessment, a detailed survey of the IUCN red list on habitat use of all snakes occurring in the in the European Union registration zones was conducted and additional own observations were integrated. The poster presents only the snake species of the southern zone (according to SANCO/6896/2009 rev 1) which occurring in "agricultural habitats". Species with no indication of using "agricultural habitats", island species (e.g. Canary islands, Samos, Madeira) and extreme area-restricted endemic species are not listed. A complete list of all species and their potential occurrence in "agricultural habitats" is provided at www.rifcon.de.

**Table 1: Snake species occuring in habitats with potential PPP exposure in EU Southern Zone**

| | Relevant snake species | | Distribution in Southern Zone | Habitats with potential exposure to PPP |
|---|---|---|---|---|
| Smooth snakes | *Coronella* | girondica | ES, FR, IT, PT | dry hedgerows[1], orchards[1] (olives[2]), plantations[1] |
| | | austriaca | BU, ES, FR, GR, IT, PT | vineyards[2] |
| Dwarf snakes | *Eirenis* | collaris | BU | cereals[2] |
| | | modestus | GR | fallow agricultural land[1], cultivated areas[1], olives[2], vineyards[2] |
| Whip snakes | *Dolichophis* | jugularis | CY, GR | vineyards[1], agricultural land[1] |
| | | caspius | BU,GR | vineyards[1], olives[2] |
| | *Hemorrhois* | hippocrepis | ES, IT , PT | arable land[1] (cereals[2], sunflower[2]), pastures[1], vineyards[1,2], orchards (almond[1], citrus[2], olive[1], pome fruit[2]) |
| | *Hierophis* | gemonensis | GR, IT | vineyards[1], olives[1], cereals[2] |
| | | viridiflavus | ES, FR, IT, MT | cultivated areas[1], vineyards[2], olives[2] |
| | *Platyceps* | collaris | BU | cultivated fields[1] |
| | | najadum | BU, CY, GR | vineyards[1], olives[2] |
| False smooth snakes | *Macroprotodon* | brevis | ES, PT | cereals[2], sunflower[2] |
| Montpellier snakes | *Malpolon* | monspessulanus | ES, FR, IT, PT | cultivated land[1], cereals[2], sunflower[2], orchards (olives[2], citrus[2]), pome fruit[2] |
| Rat snakes | *Elaphe* | quatuorlineata | BU, GR, IT | hedgerows[1], traditionally cultivated land[1] |
| | *Rhinechis* | scalaris | ES, FR, PT | field edges[1], hedges[1], vineyards[1,2], olives[1], cereals[2], sunflower[2] |
| | *Zamensis* | lineatus | IT | field edges[1], traditionally cultivated land[1] |
| | | longissimus | BU, ES, FR, GR, IT | road embakments[1], field edges[1], traditionally cultivated land[1], tea plantations[1] |
| | | situla | BU, (CY?), GR, IT, MT | field edges[1], vineyards[1], olives[1] |
| True vipers | *Vipera* | ammodytes | BU, GR, IT | traditionally cultivated land[1], vineyards[1] |
| | | aspis | ES, FR, IT | hedges[1], pastures[1], rare in arable land[1] |
| | | berus | GR, BU, IT | hedgerows[1], field edges[1], |
| | | seoanei | ES, FR, PT | agricultural land[1] |
| Eurasian water snakes | *Natrix* | maura | ES, FR, IT, PT | cereals[2], sunflower[2], orchards (citrus[2], pome fruit[2]), vineyards[2] |
| | | natrix | BU, CY, ES, GR, FR, IT, PT | citrus orchards[2], cereals[3], root crops[3] |
| Worm snakes | Typhlops | vermicularis | BU, GR | olives[2], vineyards[2] |

[1] IUCN 2011 http://www.iucnredlist.org/, [2] own data, [3] Wisler *et al.* 2008

Based on the IUCN red data list and data recorded during the last years, some lizard species are utilizing agricultural land in southern EU. Most of these snake species have been found in orchards (particularly: olives) and vineyards, but also in arable crops, gardens, parks or grassland. Nevertheless, this is related to available data, and does not result from surveying all crops. Inhabiting crops may result in dermal absorption of PPPs and the ingestion of PPPs contaminated food items. A high number of species and specimens are also found in field margins, where potential exposure due to drift of PPP uses can be expected. Field margins are generally characterized by a high diversity of different structures (such as hedges, trees, deadwood, rocks and walls) and provide high vegetation cover resulting in interception values of up to 90% (FOCUS Groundwater Guidance, 2011). Consequently, dermal exposure (or inhalation) in reptiles caused by drift in field margins is considered less likely to be of great concern. The major route of PPP contamination appears to be dietary exposure in agricultural habitats with snakes feeding on PPP contaminated food items. Most of the snakes listed in Table 1 are carnivorous (fishes, amphibians, reptiles, birds, small mammals), but both *Eirenis*-species feed mainly on insects and should be considered as insectivorous. It is important to note that most research on reptiles have been conducted rather in "natural habitats" (see above) than in farmland. This review, and more specific studies on the occurrence and possible risk of snakes in agricultural habitats in the EU, as the recent studies on a Eurasian water snake (*Natrix natrix*) in agricultural habitats in Switzerland by Wisler *et al*. (2008) can be a start to assess the risk of PPP to reptiles in Southern Europe.

IUCN Red List of Threatened Species. http://www.iucnredlist.org/ (last access at 18 November 2011); Wisler, Hofer and Arlettaz (2008) Snakes and Monocultures: Habitat Selection and Movements of Female Grass Snakes (*Natrix natrix* L.) in an Agricultural Landscape, Journal of Herpetology, Vol. 42, p. 337-346.

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