

# Relevant Lizard Species for the Risk Assessment of Plant Protection Products in Northern and Central Europe

Oliver Körner, Nicolá Lutzmann, Gernot Vogel, Christian Dietzen and Jan-Dieter Ludwigs

RIFCON GmbH, Zinkenbergrweg 8, 69493 Hirschberg, Germany (E-Mail: [oliver.koerner@rifcon.de](mailto:oliver.koerner@rifcon.de))

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 (e.g. SANCO 11802/2010/rev July 2010) 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 successfully established for birds and mammals. The major routes of exposure in that case are diet and drinking water. In order to provide a scientific basis for reptile risk assessment, a detailed literature survey on habitat use and the biology of lizards occurring in North and Central Europe (geographical zones according to SANCO/6896/2009 rev 1) was conducted. The study focused on the habitat use of the different species, but also evaluates the different diets as a source of exposure. The data obtained may allow the determination of relevant species at risk and how they can be linked to potential exposure in agricultural practice.

**Table 1: Habitat and diet preferences of lizard species occurring in Northern (N-EU) and Central Europe (C-EU)**

Species	N-EU	C-EU	Habitat	Diet
<b>Turkish Gecko</b> <i>Hemidactylus turcicus</i>	--	SL	Agricultural areas, shrubland, rocky areas, salt marshes, coastal areas, cliffs, caves	Arthropods
<b>Common Wall Gecko</b> <i>Tarentola mauretanica</i>	--	SL	Rocky areas, cliffs, stone walls, ruins, houses	Arthropods
<b>Slow Worm</b> <i>Anguis fragilis</i>	DK, SE	AT, BE, CZ, DE, LU, NL, SL	Field margins, garden/parks, vineyards, grasslands, rocks/walls, forests and forest edges, marshes, bogs	Annelids, gastropods, reptiles, arthropods
<b>Eastern Slow Worm</b> <i>Anguis colchica</i>	EE, FI, LT, LV	CZ, HU, PL, RO, SK		
<b>Sand Lizard</b> <i>Lacerta agilis</i>	DK, SE, EE, LT, LV	AT, DE, CZ, HU, NL, BE, LU, UK, PL, RO, SL, SK	Vineyards, grasslands, garden/parks, orchards, field margins, riparian zones, forests and forest edges, arable lands	Arthropods, reptiles, gastropods
<b>Balkan Emerald Lizard</b> <i>Lacerta trilineata</i>	--	RO	Bushy areas, sand dunes, boundary walls, orchards, abandoned cultivated land	Arthropods, mammals, birds, reptiles
<b>Eastern Green Lizard</b> <i>Lacerta viridis</i>	--	DE, AT, CZ, PL, RO, HU, SI	Woodland and field edges, scrubland hedgerows, cultivated land, orchards	Arthropods, gastropods, mammals, reptiles
<b>Western Lizard</b> <i>Lacerta bilineata</i>	--	DE, AT, SL, UK	Vineyards, field margins, rocks/walls, garden/parks, riparian zones, forest edges	Arthropods, mammals, birds, reptiles, gastropods, fruits
<b>Meadow Green Lizard</b> <i>Darevskia praticola</i>	--	RO	Traditional meadows, glades, clearings	Arthropods, annelids, gastropods
<b>Common Wall Lizard</b> <i>Podarcis muralis</i>	--	AT, DE, BE, NL, SL, SK, HU, RO, CZ, LU, UK	Vineyards, field margins, rocks/walls, riparian zones, grasslands, garden/parks, bogs, forests and forest edges	Arthropods, reptiles, fruits, gastropods
<b>Italian Wall Lizard</b> <i>Podarcis siculus</i>	--	SL	Grassland, roadside, hedgerows, scrubland, woodland edges, vineyards, orchards, meadows, coastal dunes	Arthropods, fruits, gastropods
<b>Dalmatian Wall Lizard</b> <i>Podarcis melisellensis</i>	--	SL	Dry woodland, scrub, pastures, overgrown areas	Arthropods
<b>Balkan Wall Lizard</b> <i>Podarcis taurica</i>	--	HU	Grassland, garden/parks, forest edges	Arthropods, fruits, gastropods
<b>European Common Lizard</b> <i>Zootoca vivipara</i>	DK, EE, LT, LV, FI, SE	BE, CZ, DE, IE, LU, HU, NL, AT, PL, RO, SL, SK, UK	Forests and forest edges, bogs, field margins, grasslands, garden/parks, marshes, lakes/rivers riparian zones	Arthropods, annelids
<b>Horvath's Rock Lizard</b> <i>Iberolacerta horvathi</i>	--	DE, AT, SL	Rocks/walls, riparian zones, forests and forest edges	Arthropods
<b>Blue-throated Keeled Lizard</b> <i>Algyroides nigropunctatus</i>	--	SL	Open woodland, scrubland, hedges, walls, olive groves	Arthropods
<b>Racerunner</b> <i>Eremias arguta</i>	--	RO	Rocky areas, thin vegetated areas	Arthropods
<b>Snake-eyed skink</b> <i>Ablepharus kitaibelii</i>	--	HU, RO, SL	Grassland, scrubland, forest edges	Arthropods, annelids, gastropods

**Habitat:** Several species inhabit vineyards and orchards, but also the field margins of cultivated areas, forest and adjacent areas. In addition, garden, parks and semi-aquatic habitats like riparian areas, marshes and bogs are utilized.

**Food:** The basic food of lizard comprises arthropods (mainly arachnids, hymenopterans, coleopterans and grasshoppers), but also gastropods, annelids and smaller lizards.

Based on the available literature, only a few lizards species utilize agricultural land in Northern and Southern Europe. Most lizards are found in vineyards and orchards, but some also occur in gardens, parks, grassland and forest edges. This may result in the uptake of PPPs via food, dermal absorption and inhalation following applications to these areas. A high number of species are found both in field margins and areas where no PPP use or drift is expected (e.g. forests). Field margins are generally characterized by a high diversity of different structural elements (hedges, trees, deadwood, rocks and walls) and have almost 100% vegetation cover resulting in interception values of up to 90% (FOCUS Groundwater GD, 2011). Accordingly, it is likely that uptake via inhalation or dermal contact resulting from direct exposure to the spray or drift will be very limited. The major route of PPP exposure appears to be via the diet (including food and water intake). For a limited number species, there is a potential for secondary poisoning resulting from the consumption of small vertebrates exposed to PPPs. However, most lizards may consume contaminated arthropods from crop fields treated with PPPs. It was not possible to assess the contribution of soil ingestions. However from literature there is no indications of soil ingestion in autochthonous species. Unfortunately, most of the work on lizards reported in the literature was conducted in typical reptile habitats (e.g. sun-exposed structures such as rocks, walls or deadwood) rather than in farmland (e.g. cereal or vegetable fields). This may result in a potentially biased data set suggesting that reptiles have a low affinity for arable land. It will therefore be necessary to conduct appropriate generic field studies in a range of crops before any firm conclusions can be drawn regarding the potential for native reptiles to be exposed to PPPs applied to these areas.

Böhme (1986) Handbuch der Reptilien und Amphibien Europas; Günther (1996) Die Amphibien und Reptilien Deutschlands; Gasc, Cabela, Crnobrnja-Isailovic, Dolmen, Grossenbacher, Haffner, Lescure, Martens, Martinez Rica, Maurin, Oliviera, Sofianidou, Veith and Zuiderwijk (1997) Atlas of Amphibians and Reptiles in Europe; Grillitsch and Tiedemann (2001) Atlas zur Verbreitung und Ökologie der Amphibien und Reptilien in Österreich; Fryday and Thompson (2009) Exposure of reptiles to plant protection products; Laufer, Fritz und Sowig (2007) Amphibien und Reptilien Baden-Württembergs; The IUCN Red List of Threatened Species. <http://www.iucnredlist.org>

Many thanks to Kerstin Schlechter and Doro Scholl for their helping hands. Sincere thanks are given to all members of the RIFCON team for fruitful discussions.

