



Herbicide products containing glyphosate are currently labeled in the United States and around the world for many purposes (Franz et al. 1997; Giesy et al. 2000). Glyphosate (N-(phosphonomethyl) glycine) is a non-selective systemic herbicide, first commercialized in 1974.

Formulations of glyphosate have been extensively tested for a wide range of potential environmental effects and have proven safe for a wide range of organisms, including honey bees. Both glyphosate and glyphosate formulations were assessed to be practically nontoxic to honeybees during the U.S. Environmental Protection Agency review of glyphosate for reregistration (EPA 1993). A field study in which honeybee hives and blooming vegetation were oversprayed with the original Roundup® herbicide at 6 lb glyphosate a.e./acre supports this conclusion (Giesy, et al., 2000).

Regarding honey bees Giesy et al., 2000, states:

“Honey bees are not affected by glyphosate formulations, either by ingestion or direct overspray, at maximum use rates. The majority of other beneficial arthropods are unaffected by Roundup.” No chronic assessment has been conducted for honeybees because of the large safety margin in the acute assessment and the expected rapid decline in environmental exposure to this species.” No acute or chronic effects were observed for adult honeybees or for brood production. These findings were further supported by the results from direct feeding trials in the field. No effects to bees were observed as a result of direct RU exposure in sucrose syrup from a hive feeder.”

The US EPA 1993, states:

“The guidelines require acute toxicity testing to honeybees on the technical when a herbicide is registered as a general use herbicide. Given the multitude of use patterns for which this chemical is registered, acute honeybee toxicity studies are required. Based on these data, glyphosate is considered practically nontoxic on the basis of acute contact toxicity, as well as on acute oral toxicity.”

Typical agricultural applications of glyphosate and honeybees.

Glyphosate and glyphosate-based formulations have been extensively tested in the laboratory and in the field to evaluate potential toxicity to honeybees. The results from these studies with glyphosate and Roundup herbicides demonstrate no acute and chronic adverse effects to honey bees under good agricultural practices (Giesy et al., 2000). Three decades ago, field studies were conducted on two continents to investigate the potential for acute and chronic effects of glyphosate and a glyphosate-based formulation on honey bee hives (Ferguson, 1987; Ferguson, 1988; Burgett and Fisher 1990). In the study by Burgett and Fisher (1990), blooming vegetation adjacent to the hives (1.5 acres) was treated at a high application rate (6.8 kg a.s./ha). No acute or chronic effects were observed to adult honey bees or for brood production over 42 days of post-application observations. These findings were further supported by conducting high-dose feeding trials with a glyphosate-based formulation in the field. No effects were observed to honey bee adults or brood, over 42 days of observation, at a concentration that was two to three orders of magnitude above environmentally realistic field exposure levels, to the hives. Additionally, a brood study performed in Australia found

not impact on larval and adult bees after six days of exposure to 5 mg a.s./kg sucrose solution and concluded that glyphosate could be used safely around hives (Ferguson, 1987; Ferguson, 1988). These finding of no effect on bee brood and adult bees is supported by a recently completed bee brood study conducted to meet current EU testing requirements for glyphosate Annex 1 renewal (Thompson, 2012). This study was conducted by Dr. Helen Thompson, an internationally respected bee testing expert, formerly of the Food and Environment Research Agency (Fera) in the United Kingdom. The results from this study were presented at the Agro section of the American Chemical Society meeting in Indianapolis in September of 2013 (Levine et al. 2013) and were also recently published in a peer-reviewed scientific journal (Thompson et a., 2014). The weight of evidence from the acute and chronic studies demonstrate that honey bee adults and larvae are not affected by glyphosate or glyphosate-based formulations in the field.

## References

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<sup>i</sup> The term “original Roundup herbicide” refers to the original single active ingredient Roundup® herbicide formulation (also known as MON 2139).