Recent discoveries of RNA interference (RNAi) and related silencing pathways have started to revolutionize the pharmaceutical and agricultural industries. Although the commercialization potential of RNAi technologies has been explored to a greater extent in the medical field, RNAi may be easier to integrate into pest control practices. Efficient delivery mechanisms, RNA stability, and RNA toxicity to the target organism remain as the major technical challenges for in vivo RNAi applications. However, for pest control purposes, RNA toxicity to the target organism is a desired trait rather than a potential barrier. Although RNAi-based genetic controls have yet to be commercialized, they are likely to become an important component of the pest management repertoire and to complement existing control practices including synthetic pesticides and GM-based Bt traits. However, it is critical that the technology is used in a manner that is both sustainable and environmentally safe. In addition to technical challenges, the lack of a formalized/standardized ecological risk assessment (ERA) procedure remains as a major regulatory obstacle to integrate RNAi crops into sustainable pest management practices. An essential component of the ERA of RNAi plants involves in vivo RNAi toxicity testing under a defined worst-case scenario of exposure. The studies described here are designed to answer questions directly pertaining to the risk of in planta RNAi to non-target arthropods that are at greatest risk of exposure because of a shared environment and common molecular targets.