

primary endocrine effects due to imidacloprid.

#### C. Aggregate Exposure

1. *Dietary exposure.* Assessments were conducted to evaluate potential risks due to chronic and acute dietary exposure of the U.S. population and selected population subgroups to residues of imidacloprid. These analyses cover all registered crops including rotational crops; uses pending with EPA in the 2003 work plan including dry beans, peas, bushberries, lingonberry, junberries, salal, carrots, turnips, okra, cranberries, artichoke (globe), watercress, beet roots, leaves of root and tuber vegetables, stone fruit, mamey sapote, guava, feijoa, jaboticaba, wax jambu, starfruit, passion fruit, acerola, strawberry, cucumber (greenhouse), and tomato (greenhouse), this import tolerance petition on bananas; and active and proposed section 18 uses on blueberries, cranberries, table beets, strawberries, turnips.

Novigen Sciences, Inc.'s Dietary Exposure Evaluation Model (DEEM™), which is licensed to Bayer, was used to estimate the chronic and acute dietary exposure. This software uses the food consumption data from the 1994–1998 Department of Agriculture (USDA) continuing surveys of food intake by individuals (CSFII) 1994–1998.

The endpoint for acute dietary risk assessments is based on neurotoxicity characterized by decreases in motor or locomotor activity in female rats at 42 mg/kg bwt/day, the LOAEL from an acute neurotoxicity study. Based on an uncertainty factor (UF) of 10x for inter-species and 10x for intra-species the acute reference dose (aRfD) = 0.42 mg/kg bwt/day. EPA has determined that an additional UF for FQPA (reduced to 3x) applies to all population subgroups for acute risk. Application of the additional 3x safety factor results in an acute population adjusted dose (aPAD) 0.14 mg/kg bwt/day or a margin of exposure (MOE) of 300. For chronic dietary analyses, EPA has established the reference dose (RfD) for imidacloprid at 0.057 mg/kg/day based on a NOAEL of 5.7 mg/kg bwt/day from a rat chronic toxicity carcinogenicity study and uncertainty factors of 10x for inter-species and 10x for intra-species. EPA has determined that an additional UF for FQPA (reduced to 3x) applies to all population subgroups for chronic risk. Application of the additional 3x safety factor results in a chronic population adjusted dose (cPAD) of 0.019 mg/kg bwt/day. Results from the acute and chronic dietary exposure analyses described below demonstrate a

reasonable certainty that no harm to the overall U.S. population or any population subgroup will result from the use of imidacloprid on currently registered and pending uses.

i. *Food.* Acute and chronic (tier 3) risk assessments were made using the results of field trials conducted at maximum label application rates and the shortest pre-harvest intervals. For some of the vegetable crops, these residue data were collected at 1.5x or greater than the maximum label rate of 0.5 lb active ingredient/acre per season. In addition, no adjustments were made to account for dissipation of residues during storage, transportation from the field to the consumer, washing or peeling. Therefore, the actual dietary exposure will be less than that presented here. For the chronic analysis, mean field trial residues were calculated. For the acute Monte Carlo analysis, the entire distribution of residue field trial data was used for the “non-blended” and “partially blended” foods as determined by EPA's HED SOP 99.6. For the foods considered as “blended” by EPA's HED SOP 99.6, mean field trial residue data were used. As allowed in EPA's draft guidance for submission of probabilistic human health exposure assessments one half limit of detection (LOD)/LOQ values were used for all non-detected values (values below the sensitivity of the method). Bayer's acute Monte Carlo dietary exposure assessment estimated percent of the aPAD and corresponding MOE for the overall U.S. population, (all seasons), and various subpopulations. In this analysis, the exposure for the total U.S. population was equal to 7.73% of the aPAD at the 99.9<sup>th</sup> percentile. The most highly exposed population subgroup, children (1–6 years), had an exposure equal to 16.42% of the aPAD at the 99.9<sup>th</sup> percentile. Therefore, the acute dietary exposure estimates are below EPA's level of concern for the overall U.S. population as well as the various subpopulations. Bayer's chronic dietary exposure estimated the percent of the cPAD for the overall U.S. population (all seasons) and various subpopulations. In this analysis, the exposure for the total U.S. population was equal to 1.4% of the cPAD. The most highly exposed population subgroup, children (1–6 years), had an exposure equal to 3.0% of the cPAD. Therefore, the chronic exposure estimates are below EPA's level of concern for the overall U.S. population as well as the various subpopulations.

ii. *Drinking water.* EPA, as published in the **Federal Register** of April 10, 2001 (66 FR 18554) (FRL–6777–6), calculated acute and chronic DWLOCs and compared them with the EECs for

surface and ground water. Based on this comparison, they determined that acute exposure and chronic exposure would not be expected to exceed the aPAD and cPAD, respectively. It is not expected that the additional exposure from the minor crops pending in EPA's 2003 work plan would significantly change EPA's water assessment.

#### 2. Non-dietary exposure—i.

*Residential turf.* Bayer has conducted an exposure study to address the potential exposures of adults and children from contact with imidacloprid treated turf. The population considered to have the greatest potential exposure from contact with pesticide treated turf soon after pesticides are applied are young children. Margins of safety (MOS) of 7,587 - 41,546 for 10-year old children and 6,859 - 45,249 for 5-year old children were estimated by comparing dermal exposure doses to the imidacloprid NOAEL of 1,000 mg/kg/day established in a 15-day dermal toxicity study in rabbits. The estimated safe residue levels of imidacloprid on treated turf for 10-year old children ranged from 5.6 - 38.2 µg/cm<sup>2</sup> and for 5-year old children from 5.1 - 33.5 µg/cm<sup>2</sup>. This compares with the average imidacloprid transferable residue level of 0.080 µg/cm<sup>2</sup> present immediately after the sprays have dried. These data indicate that children can safely contact imidacloprid-treated turf as soon after application as the spray has dried.

ii. *Termiticide.* Imidacloprid is registered as a termiticide. Due to the nature of the treatment for termites, exposure would be limited to that from inhalation and was evaluated by EPA and Bayer. Data indicate that the MOS for the worst case exposures for adults and infants occupying a treated building who are exposed continuously (24 hours/day) are  $8.0 \times 10^{-7}$  and  $2.4 \times 10^{-8}$ , respectively - and exposure can thus be considered negligible.

iii. *Tobacco.* Smoke Studies have been conducted to determine residues in tobacco and the resulting smoke following treatment. Residues of imidacloprid in cured tobacco following treatment were a maximum of 31 ppm (7 ppm in fresh leaves). When this tobacco was burned in a pyrolysis study only 2% of the initial residue was recovered in the resulting smoke (main stream plus side stream). This would result in an inhalation exposure to imidacloprid from smoking of approximately 0.0005 mg per cigarette. Using the measured subacute rat inhalation NOAEL of 5.5 mg/m<sup>3</sup>, it is apparent that exposure to imidacloprid from smoking (direct and/or indirect exposure) would not be significant.