

5.18 PARAQUAT (057)

RESIDUE AND ANALYTICAL ASPECTS

Paraquat, a non-selective contact herbicide, was first evaluated in 1970 for toxicology and residues. The 2003 JMPR evaluated paraquat toxicologically under the Periodic Review Programme and recommended the current ADI of 0–0.005 mg paraquat cation/kg bw and ARfD of 0.006 mg paraquat cation/kg bw. The 2004 JMPR evaluated paraquat for residues under the Periodic Review Programme, concluded that the definition of residue for compliance with MRLs and for estimation of dietary intake was paraquat cation. It withdrew the previously recommended maximum residue levels for rice and polished rice due to insufficient data provided to the Meeting. The current Meeting received information on previously submitted and additional residue trials on rice and the US label.

Results of supervised trials on crops

The NAFTA calculator was used as a tool in the estimation of the maximum residue level from the selected residue data set obtained from trials conducted according to GAP. As a first step, the Meeting reviewed all relevant factors related to each data set in arriving at a best estimate of the maximum residue level using expert judgement. Then, the NAFTA calculator was employed. If the statistical calculation spreadsheet suggested a different value from that recommended by the JMPR, a brief explanation of the deviation was supplied. Some common factors that may lead to rejection of the statistical estimate include when the number of data points in a data set is < 15 or when there are a large number of values < LOQ.

Rice

Paraquat is registered for weed control in rice production in the USA by pre-plant or pre-emergence broadcast application at a maximum rate of 1.12 kg ai/ha, with no PHI specified.

When used in a pre-plant or pre-emergence treatment, paraquat is not sprayed directly onto the crop, the time between the application and harvest is sufficiently long, and paraquat is strongly adsorbed to soil with negligible dissociation, with little paraquat cation expected to be found in rice grain or straw at harvest. As agreed by the 2004 JMPR, the Meeting evaluated data from trials of pre-plant and pre-emergence application against any GAP available to the Meeting, regardless of the country or region.

A total of 14 trials on rice conducted in Guatemala, Italy and the USA were provided to the current Meeting. Paraquat was applied prior to flooding in these trials. Rice grain and straw samples were collected at harvest.

Three trials were conducted in Guatemala in 1983 in which paraquat was applied as a pre-emergence treatment at rates of 0.60 and 1.0 kg ai/ha. The residues in de-husked rice in one trial conducted in accordance with US GAP were below the LOQ of 0.05 mg/kg. The residues in rice grain were not analysed.

Two trials were conducted in Italy in 1993, in which paraquat was applied at a rate of 0.92 kg ai/ha to the seed bed 5 days before rice was sown. Rice grain samples taken at harvest did not contain residues of paraquat at levels above the LOQ of 0.05 mg/kg (2).

Six residue trials were conducted in the USA in 1978 and 1982 in which paraquat was applied as a pre-emergence treatment at rates of 0.56 or 1.12 kg ai/ha. In trials conducted in compliance with the maximum US GAP, the residues were below the LOQ of 0.01 mg/kg (3).

Three new residue trials were conducted in the USA in 2007 in which paraquat was applied as a pre-emergence treatment at a rate of 1.12 kg ai/ha. The residues of paraquat in rice grain samples taken at harvest were < 0.01 mg/kg (2).

No trials were conducted at rates higher than the maximum allowed in US GAP for rice.

The residues in rice grain from trials in compliance with maximum US GAP in rank order were: < 0.01 (5), < 0.05 (2) mg/kg.

The Meeting estimated a maximum residue level of 0.05(*) mg/kg and STMR of 0 mg/kg for rice grain, taking into consideration readily achievable LOQ of analytical methods used in enforcement of MRLs.

As the residues from all the trials matching GAP were below the LOQs, the NAFTA calculator was not used.

Rice straw

In two trials conducted in Italy in 1993, rice straw samples taken at harvest did not contain residues of paraquat at levels above the LOQ of 0.05 mg/kg (2).

In three residue trials conducted according to maximum US GAP in the USA in 1978 and 1982, the residues were < 0.02 mg/kg (2) and < 0.03 mg/kg. However, in one trial with the application rate of 0.56 kg ai/ha (one half of the maximum rate), the residues in duplicate straw samples were < 0.03 and 0.04 mg/kg. In comparison with the results of other trials, sample contamination was suspected but without any concrete evidence.

In three new residue trials in the USA in 2007, the residues of paraquat in rice straw samples taken at harvest were < 0.01 mg/kg (3).

The residues from trials in compliance with US GAP in rank order were: < 0.01 (3), < 0.02 (2), 0.04 and < 0.05 (2) mg/kg.

The Meeting estimated a maximum residue level of 0.05 mg/kg, STMR of 0.02 mg/kg and highest residue of 0.04 mg/kg for rice straw.

As the residues from seven out of eight trials matching GAP were below the LOQs, the NAFTA calculator was not used.

Residues in animal commodities

The addition of new maximum residue levels for rice grain and straw at 0.05 mg/kg would not affect the animal dietary burden calculated in 2004 in which much higher residue levels in cotton seed and maize forage were used in calculation. The Meeting concluded that there was no need to change the previous recommendations for animal commodities.

DIETARY RISK ASSESSMENT

Long-term intake

Since the STMR for rice is estimated by the current Meeting to be 0 mg/kg, no new IEDI calculation was conducted. The Meeting confirmed the previous conclusion that the IEDIs were 2–5% of the maximum ADI of 0.005 mg/kg bw and that the intake of residues of paraquat resulting from uses considered by the 2004 and the current JMPR was unlikely to present a public health concern.

Short-term intake

Since the STMR for rice is estimated by the current Meeting to be 0 mg/kg, IESTI was not calculated for rice (IESTI of 0 µg/kg bw/day). The Meeting concluded that the short-term intake of residues of paraquat from uses on rice was unlikely to present a public health concern.