

PARAQUAT

Explanation

Paraquat was reviewed at the 1970, 1972, 1976 and 1978 Meetings.* At the 1972 Meeting a minimum residue limit (MRL) for soybeans of 0.1 mg/kg was recommended. Further information has subsequently become available that indicates the desirability of reconsidering this particular recommendation.

RESIDUES IN FOOD

The majority of the existing MRL proposals for paraquat in raw agricultural commodities are at a value of 0.05 mg/kg, which is at or about the limit of determination of the residue analytical method (FAO/WHO, 1973 and 1977). These MRLs derive from pre-plant, pre-emergence and inter-row weed control uses of the herbicide, which becomes strongly bound to soil and is thereby rendered unavailable to plants. The MRLs of 0.1 mg/kg and above, including the existing value for soybeans, were generally required to cover direct spraying of the crop shortly before harvest for desiccant and/or harvest aid purposes.

USE PATTERN

Paraquat is applied to the mature soybean crop (seed moisture level 30-40 percent or when 70 percent or more of pods are brown) at rates of 140 to 400 g a.i./ha. The crop will normally be ready to harvest 5 to 10 days later. This use pattern reduces yield losses through disease and weathering in the field, facilitates mechanical harvesting and produces a cleaner seed with lower humidity and better germination and vigour.

The use of paraquat on soybeans shortly before harvest was developed originally on 'determinate' varieties, where maturity is reached uniformly throughout the crop. More recently, use has spread to 'indeterminate' varieties, whose growth and maturation are less uniform and where seed moisture content near harvest can be greater than is the case with 'determinate' varieties.

RESIDUES RESULTING FROM SUPERVISED TRIALS

Data on residues of paraquat in soybeans from plants sprayed close to harvest from trials conducted in the USA, Brazil, Colombia, Yugoslavia and Zimbabwe are summarized in Table 1. They show that, under most conditions, residues are below the MRL of 0.1 mg/kg proposed by the 1972 Meeting. However, in a few cases notably Texas 1978 and Brazil 1981, levels up to 0.3 mg/kg have been found. These levels were associated with the spraying of indeterminate varieties when the seed moisture content was greater than 30 percent.

NATIONAL MAXIMUM RESIDUE LIMITS REPORTED TO THE MEETING

The following national MRLs have been established for soybean:

	<u>mg/kg</u>
Australia	0.1
Brazil	0.1
Israel	0.1
USA	0.05

* See Annex II for FAO and WHO documentation.

TABLE 1. Paraquat residues in soybean

Country	Year	Application rate (kg a.i./ha)	Pre-harvest interval (days)	Paraquat residue (mg/kg)
USA ^{1/}				
Louisiana	1967	0.28	3	0.01, 0.02
		0.56	3	0.03, 0.03
Mississippi	1967	0.28	3	<0.01, 0.02
		0.56	3	0.04, 0.05
Arkansas	1968	0.14	6	<0.01, <0.01
		0.42	6	<0.01, 0.02
Louisiana	1968	0.14	6	<0.01, <0.01
		0.42	6	0.02, 0.06
Mississippi	1968	0.14	6	<0.01, 0.02
		0.42	6	0.02, 0.03
Delaware	1978	0.28	8	0.09, 0.15
		0.28	11	0.10, 0.10
		0.28	36	0.12, 0.12
Georgia	1978	0.28	10	<0.04
Illinois	1978	0.28	7	0.02, 0.03
		0.28	15	0.01, 0.02
Nebraska	1978	0.28	14	0.05, 0.06
Texas	1978	0.28	5	0.29, 0.30
Delaware	1979	0.56	19	<0.01, 0.03
Florida	1979	0.28	13	0.02, 0.03
		0.28	15	0.02, 0.03
Georgia	1979	0.28	12	<0.01, <0.01
Indiana	1979	0.28	6	0.06, 0.08
		0.28	7	0.03, 0.05
		0.28	8	0.03, 0.04
Iowa	1979	0.28	10	0.07, 0.08
Mississippi	1979	0.28	6	0.01, 0.02
Nebraska	1979	0.28	8	0.07, 0.09
Ohio	1979	0.28	7	0.01, 0.08
		0.28	26	0.07, 0.09
S. Carolina	1979	0.28	17	<0.01, 0.02
		0.28	31	<0.01, <0.01
Texas	1979	0.28	6	0.03, 0.05
Virginia	1979	0.28	11	0.09, 0.13
		0.28	16	0.03, 0.07
		0.28	17	0.03, 0.05
		0.28	28	0.05, 0.07

Country	Year	Application rate (kg a.i./ha)	Pre-harvest interval (days)	Paraquat residue (mg/kg)
Colombia ^{2/}	1970	0.15	10	<0.05, <0.05, <0.05
		0.2	10	<0.05, <0.05, <0.05
		0.3	10	<0.05, <0.05, <0, 05
		0.4	10	
	1971	0.4	7	<0.05, <0.05
Zimbabwe ^{2/}	1973	0.56	7	<0.05, <0.05
Yugoslavia ^{2/}	1977	0.92	8	<0.05
		1.10	8	<0.0 5
		1.30	8	<0.05
Brazil ^{2/}	1981	0.4	4	<0,05
		0.8	4	<0.05
		0.37	5	0.11
		0.4	5	0.16
		0.4	10	0.08

^{1/}Data from Chevron Chemical Company

^{2/}Data from Imperial Chemical Industries Limited

EVALUATION

APPRAISAL

Some additional data on residues of paraquat on soybeans arising from use to harvest for desiccation purposes have been received and reviewed. Apart from two samples from Texas in 1978, all residues were below 0.2 mg/kg, but several were above the current recommended maximum residue level (FAO/WHO, 1973) of 0.1 mg/kg. On the evidence provided, the Meeting agreed that a limit of 0.2 mg/kg would be appropriate to cover present usage of paraquat on soybeans.

RECOMMENDATION OF RESIDUE LIMITS

It is recommended that the MRL on soybean be revised as follows:

<u>Commodity</u>	<u>Limit (mg/kg)</u>
Soybean	0.2

REFERENCES

Chevron Chemical Company. Residue data submitted to the Meeting by ICI Ltd.
1968-79 (Unpublished)

Imperial Chemical Industries Limited. Residue data submitted to the Meeting by ICI
1970-81 Limited.(Unpublished),