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National Academy of Sciences
Committee on effects of herbicides in Vietnam

PERSISTENCE OF HERBICIDES 'ORANGE' AND 'WHITE'
IN A FOREST SOIL

Preliminary record of an experiment at Los Bangs, Philippines

OBJECT

To determine the rate of disappearance of 2,4,5-T, 2,4-D and picloram applied as defoliation agents 'Orange' and 'White' on a forest soil during the dry season.

TREATMENTS

(i) Agent 'Orange' a 50/50 mixture of technical grade n-butyl esters of 2,4,5-T and 2,4-D applied at 2.7 gal (US) product in 30 gal (US) diluent/ac equivalent to 11.7 lb 2,4,5-T a.e. + 11.4 lb 2,4-D a.e./ac. The 'Orange' was formulated as an emulsifiable concentrate (e.c.) and then diluted with water.

(ii) Agent 'White' (Dow Chemical product Tordon 101) containing 2.0 lb 2,4-D a.e./gal (US) and 0.54 lb picloram a.e./gal (US) both as the tri-isopropanolamine salt applied at 2.8 gal (US) product in 32 gal/ac (US) equivalent to 5.6 lb 2,4-D (a.e.) + 1.5 lb picloram (a.e.)/ac. The product is an aqueous concentrate and was diluted with water for spraying.

'Orange' was formulated as an emulsifiable concentrate using an adjuvant consisting of 60 parts Atlox 3404, 90 parts Atlox 1186 and 850 parts kerosene by weight. The concentrate was prepared by mixing one part of the adjuvant with two parts 'Orange' by volume. On adding water a satisfactory emulsion was immediately formed with gentle stirring. In the laboratory test some settling out of oily components occurred during overnight storage, but these disappeared readily on stirring. For spraying a knapsack sprayer was partly filled with water to which the 'Orange' e.c. was added and mixed. The remaining water was then poured into the sprayer which was thoroughly shaken to ensure complete dispersion. The same procedure was used for diluting 'White'.

Approximately half the total dose of each product was applied during the evening of 18th January 1972 (overcast, cool); the remainder the following morning (sunny, warm). The time taken to spray each plot was measured by stop-watch to allow the normal dosage to be adjusted to take

into account variations in speed of walking caused by the difficult terrain. The doses given above are those calculated to have been actually applied.

LAYOUT AND SITE

One plot 15 x 30 m was treated with 'Orange' and an adjacent plot of the same size treated with 'White'. Plots were unreplicated due to site restrictions. For spraying each plot was marked out into nine 2-yd strips, the width of the spray swath. The site near Los Banos kindly provided by the University of the Philippines, College of Agriculture, was located in a clearing in the forest reserve. The clearing, which did not exceed 1 ha has probably been subjected to shifting cultivation and the vegetation was now dominated by grasses and herbs with a few bushes and bananas. There was a heavy litter layer overlying a heavy tenacious red clay soil. The plots were situated on a 20° slope facing south east.

MANAGEMENT

Before spraying, two thirds (10 x 30 m) of each plot was cleared of vegetation to expose the litter layer. On the remaining third the vegetation was slashed and left on the plot providing a dense cover of wilting freshly cut trash up to 20 cm deep. After spraying the plots will be left to regenerate and no further management is proposed.

SAMPLING

Before spraying, 5 soil cores were taken from each plot to 25 cm depth to provide blanks for the chemical analysis of residues. In addition a pit 50 cm deep was dug in each plot and a core extracted from the 50 - 75 cm soil layer. The internal diameter of the corer orifice was 4.6 cm.

After spraying, during the afternoon of 19th January, 5 cores to 25 cm depth were taken at random in each quarter of the cleared part of each plot, i.e. 20 cores per plot. Each core was placed in a plastic bag, stored in a refrigerator within 4 hours (0°C) and the arrangements made that they should be moved to a 'deep freeze' within 36 hours. Subsequent sampling is intended at approximately 3, 9 and 27 weeks after spraying. At each date 20 cores should be taken as above in each plot, but the core depth should be increased to 75 cm, (underlying rock permitting) each core being sub-divided into 3 x 25 cm sections. If the tenacious nature of the soil does not permit using the corer to this

depth, the deeper sampling should be undertaken by extracting samples from the face of dug pits.

RESIDUE ANALYSES

Levels of each herbicide in each core section will be estimated by Dr. T. Yoshida, Microbiology Section, IRRI, in consultation with Dr. R. J. Hance of WRO, by appropriate chemical methods. There may be a problem of expressing residues in terms of absolute levels in each column, since core samples varied greatly in weight on account of variable bulk density.

SPRAY DEPOSIT ANALYSES

During each spray operation 10 Whatman chromatographic paper strips (45.7 x 7.6 cm) each with a receiving area of 268.3 cm² were placed at random in each plot. The sprayed papers were collected up within a few minutes of herbicide application, folded and rolled and those from each plot were stored together in separate double plastic bags. These were transferred to a refrigerator within a few hours and hopefully to a deep freeze within 24 hours. The samples from each plot for each application should be extracted and analysed for deposit level of the respective herbicides.

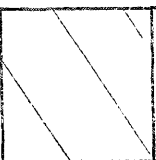

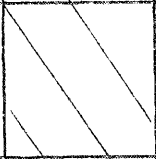
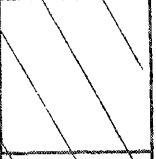
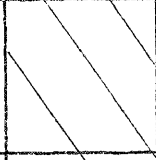
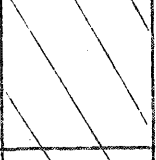
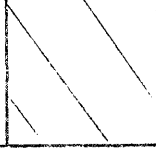
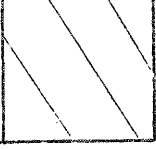
J. D. FRYER

January 1972

CODE FOR LABELLING SAMPLES

'Orange'

'White'

5 samples (16-20) (d)		5 samples (16-20) (d)	
5 samples (11-15) (c)		5 samples (11-15) (c)	
5 samples (6-10) (b)		5 samples (6-10) (b)	
5 samples (1-5) (a)		5 samples (1-5) (a)	

(Shaded areas are those on which vegetation cut but not removed)

CODE:

- LB - Site Los Banos
- C - Control (pre-spraying samples)
- TO - Treated 'Orange'
- TW - Treated 'White'

(a-d) equal quarters a = bottom d = top of plot
 i.e. LBTO 1 (a) equivalent to Los Banos Treated 'Orange'
 1 (a) (first sample of sub-plot a)