

Investigations relating to the persistency of herbicides

Experimental procedures for sampling and
determination of residues

John Fryer and I have been discussing with Hance and other staff at the Weed Research Organization what steps in procedures and techniques can be taken to limit the number of soil and leaf litter samples which can be analysed for herbicide residues at I.R.R.I. and yet at the same time allow a reasonable programme of field work to be undertaken.

At the outset it must be re-emphasized this evaluation must have a high degree of uncertainty since prior knowledge of the problems involved in the tropics is restricted and experience for temperate conditions either makes prediction uncertain or not possible because of totally different conditions e.g. mangrove swamps.

On the basis of experiments in England, statistical evidence indicates that for the size of plot envisaged in the investigations there should be at least 20 cores or samples per plot. If a similar sampling rate was adopted for the programme outlined in 'Preliminary Proposals for Studies on the Persistence of Herbicides in Forest and Mangrove Soil' than, allowing for subdivision of the cores, the number of analyses required without bulking would be in excess of the number which I.R.R.I. could be reasonably asked to undertake.

The proposals for the reduction in the number of analyses are as follows:

I(a) Sampling. For the initial sample to determine the rate of deposition of the spray, 20 Whatman chromatographic paper strips (45.7 x 7.6 cm) should be placed in their aluminium holders at random on the plot. Immediately after spraying each strip should be folded and rolled with the receiving surface on the inside and secured with a rubber band. The 20 papers should then be placed in a double plastic bag and transferred as soon as possible to a deep freeze. Also prior to spraying, surface soil samples - say five per plot - should be taken by means of cylindrical tins, of known diameter and depth, and sealed and transferred to a cold store. These tins would not be chemically analysed but

used to determine the total weights and the water content of the soil so that the herbicide reaching the soil surface can be expressed as p.p.m. on a dry weight basis.

Since with the orange agent it is possible to incorporate an oil soluble dye, the analysis of the amount of deposit per cm^2 could be obtained by elution with an appropriate organic solvent and the amount in solution determined with a colorimeter.

For agent white with its water soluble components, the papers should be extracted and analyzed by G.L.C. procedures for 2,4-D or picloram. The alternative of using the dye tartrazine which is water soluble is being examined.

In the mangrove experiments, since the soil surface will be wet, a narrow strip of wood should be placed between the aluminium holder and the soil surface.

I(b) Bulking. As the aim is to measure the mean initial rate of deposition, it seems pointless to analyse each of the paper strips. Bulking into two lots of 10 would probably suffice and bulking into four lots of five ample.

II(a) For all samples subsequent to establishing the initial level of deposition, the procedures will be dependent on the type of experiment and the type of agent. In the mangrove area on each occasion there will be 20 surface samples by tin and 20 soil cores to a depth of 75 cm. With agent orange there will be no division of the core but with agent white, with its greater mobility in the soil, it is proposed that each 75 cm core will be divided into two.

For the surface sampling using an open ended tin, it will be necessary to punch a very small hole in the bottom of the tin to allow the air to be expelled when the tin is pushed into the soil and to stop the moment any water or mud exudes through the hole. The bottom of the tin should then be wiped dry in situ and the hole covered with sealing tape, of which there is a large amount in the accessories brought to Saigon with the first soil sampler. To withdraw the tin without loss of contents, the simplest procedures would appear to be to push in a narrow spade adjacent to the tin and (i) put a hand over the bottom of the tin

