SESSION 3

DISCUSSION

When presenting his paper, Mr. Greenham referred to an obvious correction - substances which were naturally liquids did not necessarily have to be dissolved before penetration could occur in the non-vapour state.

Discussion and comments were as follows:

Development of resistance to 2,4-D. The remarks in the paper referred to resistance developing where reproduction was vegetative, e.g. Lemna and possibly skeleton weed. With Senapes and Lemna the time required to develop resistance was of the order of four days. Nevertheless, work at U.S.D.A., Beltsville, had shown that grain from wheat plants treated in the two-leaf stage differed in respiration from untreated grain.

Mr. Preston discussed briefly an experiment in which tomato plants were exposed throughout the greater part of their growing period to very low concentration of 2,4-D ester vapour. The plants exhibited typical hormone response, but the dose rate was insufficient to prevent flowering, fruit setting and seed formation. It was found that plants grown from this seed exhibited obvious differences in leaf structure, and subsequently in the fruit size, shape and structure from the original Potentate parent. Also, the resistance of these F1 plants to hormones was shown to have been modified to varying degrees from plant to plant, the highest increase in resistance observed was approximately one hundred fold.

Volatility of esters correcting incomplete coverage. This was certainly possible, but controlled experiments were necessary to ensure that vapour injury to adjacent susceptible plants could be prevented.

Diurnal variation of effectiveness to 2,4-D in annuals and perennials. So far diurnal variation in effectiveness had been shown to occur only in annuals. Some spray operators claimed that poor performance of sprays was due to their application at unsuitable times. With skeleton weed the position was obscure. It was probable that poor translocation could account for unsatisfactory results although the reasons for this were unknown.

Translocation of T.C.A.: The observation that T.C.A. was translocated upwards in the xylem but was not translocated metabolically in the phloem, was not necessarily explained by the fact that T.C.A. was a protein precipitant and readily coagulated the phloem. Some substances did not have the correct chemical structure for phloem translocation. Arsenic acid was a rapid poison yet was translocated in the phloem.

Effect of starch reserves on 2,4-D toxicity: Little was known about this matter, although one of the first effects of 2,4-D was to hydrolyse starch. The effect of food reserves generally on 2,4-D toxicity had not been properly investigated.

Differential translocation of amines and esters: This could not be answered properly, as most experiments were performed on the basis of percentage kill, and not on depth of kill. There was certainly no combination between 2,4-D and sugars in the phloem. Trials with a glucoside derivative of 2,4-D had not been promising.

Interaction between 2,4-D and T.C.A. or chlorate: In some tests T.C.A. caused a hormone response similar to 2,4-D. The Oxford workers had claimed that there was antagonism between the two. Nevertheless some Australian work had shown that T.C.A. could synergise 2,4-D. In some cases chlorate might synergise 2,4-D for contact toxicity by acting as a penetrating agent. Oxidising substances such as hydrogen peroxide did not increase the remote toxicity of 2,4-D to bean plants. Possibly under similar conditions T.C.A. in small quantities acted as a penetrating agent.

Anti-auxins: Phenoxyacetic acid was an anti-auxin; it was regarded as having a single point attachment to the growth substrate. It thus antagonised the two-point attachment of 2,4-D or other auxins.

Discussion on papers by Levi and Robinson:

Rates of application at Griffith: T.C.A. was usually applied at 50 to 150 lb. per acre. M.H. applied at 16 lb./acre inhibited growth of paspalum for about 4 months and prevented flower stalk production.

Use of Sodium Chlorate: This chemical applied at 130 lb./acre in January, gave good control of paspalum in the Sydney district.

Failure of herbicides: Many failures were due to ignorance on the part of farmers concerning the way in which herbicides acted and in the way in which they should be applied. Thus on a lush

growth of paspalum, T.C.A. applied at 200 lbs./acre gave poor results. When the organic matter on the soil, which would absorb the T.C.A. was removed by fire or cultivation, good results were obtained at 10 lb./acre. One speaker remarked he had found previous cultivation to have little influence on the effect of T.C.A.

Lateral movement of soil sterilants: The actual lateral movement on level soil was probably small, but neighbouring trees could be killed if their roots were below the treated area.

Where the soil was sloping, run-off could cause trouble and, under such conditions, a trench should be dug on the lower side of the treated area.

Arsenicals as sterilants: Arsenites gave better results than arsenates in dry areas of N.S.W. The latter were used more as translocated poisons.

2,4-D as a soil sterilant: This herbicide had been largely overlooked for soil sterilization, yet in terms of cost and effectiveness it was competitive with other sterilants. M.C.P.A. might be preferable to 2,4-D as it was not so readily decomposed in the soil. Nevertheless a factor militating against the repeated use of 2,4-D and M.C.P.A. was the consequent building up of a bacterial flora (capable of decomposing these substances.

Novel use of M.H.: The partial control of paspalum by M.H. in irrigation canals should be regarded as novel. The plant was useful in stopping soil erosion, but if it grew excessively and seeded it was a nuisance. Investigation was necessary, however, to extend the period of control following this treatment.

2,4-D treatments followed by immersion: It was stated that certain grasses were more susceptible to an application of 2,4-D if subsequently immersed in water. This effect could depend on the type of grass and on its respiration. Thus the effects of 2,4-D on rice and barley differed: the former could respire anaerobically, the latter could not.

T.C.A. and rainfall: Excessive rain after T.C.A. application could spoil results.

Use of herbicides in orchards: T.C.A. and chlorate should not be used in orchards, as some unfortunate experiences had been recorded. With present knowledge it was very risky to use 2,4-D in vineyards.