

INTRODUCTION.

The work described in this investigation constitutes part of a general programme of work being carried out at the Imperial College of Tropical Agriculture where a number of chemicals are being screened to determine their potential value as herbicides for use in the tropics. The final test of the value of any chemical as a herbicide is naturally in the field. The work reported in this paper, therefore, was of a very preliminary nature, carried out under greenhouse conditions with the hope of determining the factors, both agronomic and climatic, which effect the response of crop plants to the chemical in question.

The chemical under trial 4-(2,4-dichlorophenoxy) butyric acid is one of the homologous series of substituted phenoxy alkylcarboxylic acids originally studied by Wain and others for their growth promoting properties. The accepted abbreviation for this material is 2,4-DB and it will be called this throughout this report.

By the process of α -oxidisation these compounds are degraded in the plant either to the active acetic acid derivative or to a non-active phenol residue, depending on the number of methylene groups in the side chain (Synerholm & Zimmerman, 1947). This has been verified in the case of the flax plant by Fawcett, Ingram & Wain (1954).

The herbicidal activity of 2,4-DB, therefore, depends upon the fact that it has an odd number of methylene groups in its side chain and is degraded in the plant by α -oxidisation to the active acetic homologue.

The agronomic importance of these compounds was first recognised by Wain, who has demonstrated clearly the value of certain

higher homologues of many phenoxy carboxylic acids in selective weed control (Wain, 1954, 1955). Selectivity is dependent on the plant's ability to 'commit suicide' by degradation within its tissue and it is fortunate for agriculture that many crop plants are unable to do this. Considerable opportunity for successful use of these compounds has been found with plants of the family Umbelliferae in temperate regions, and promise is also shown with some important leguminous crops, notably peas and clover (Carpenter and Soundy, 1954).

Work is only beginning with the use of butyrics with tropical crops. Parker (1958) reports the successful use of 2,4-DB and other chemicals for the control of weeds in groundnuts but, as yet, knowledge of the use of these compounds in the tropics is lamentably small.

The experimental work was divided into two parts. First the tolerance of sixteen tropical crops to three widely differing applications of 2,4-DB was assessed and details of effective weed control recorded. This work is reported in Part I of this paper. Secondly, resulting from the results obtained in Part I, the response of groundnuts, Arachis hypogaea, L. to five applications of 2,4-DB applied under several imposed cultural conditions was investigated. This work is reported in Part II. All the work was carried out in a greenhouse, roofed alternately with glass and aluminium affording reduced sunlight; and the same variety of St. Vincent bunch groundnuts was used throughout.