California AGRICULTURE

Progress Reports of Agricultural Research, published by the University of California College of Agriculture, Agricultural Experiment Station

Vol. 2, No. 4 SPECIAL PROGRESS REPORT April, 1948

ORGANIC PHOSPHATE INSECTICIDES

Results Obtained in 1947 with Phosphate Insecticides by the Division of Entomology and Parasitology at Berkeley and Davis

The following reports cover experimental results obtained by various workers in the Division of Entomology with phosphate insecticides in 1947. They are, for the most part, preliminary in nature and should not be construed as final recommendations for the control of the pests concerned.

Much additional information is needed, in most cases, particularly on the toxicity of these chemicals to man and the possibility of a poisonous residue remaining on sprayed food stuffs.

It is known that some of the phosphate insecticides are readily absorbed through the skin and concentrates and solutions in oil should be handled with extreme care. Although the phosphate compounds are usually nontoxic to plants at concentrations which will kill insects, certain species and varieties of plants have shown a susceptibility to injury by these compounds.

E. O. ESSIG, *Chairman of the Division*

IN OCTOBER 1946, J. T. Thurston of the Technical Industrial Intelligence Division of the U. S. Department of Commerce published his report entitled "Organic Chemical Intermediates for Insecticides, Fungicides and Rodenticides," FIAT Final Report 949, Office of Military Government for Germany (US). This report sets forth certain technological advances in insecticide synthesis which were developed in Germany up to the end of the war.

Of the five insecticides described in the Thurston Report, two were phosphate compounds. The first of these was known under the German trade name of Bladan and contained 70% hexaethyl tetraphosphate and 30% of a wetting agent. It is now offered for sale under a number of trade names.

It is believed that the German process of synthesis, and modifications of it used in the United States, do not produce hexaethyl tetraphosphate, but rather a mixture of organic phosphates. One of these has been identified as tetraethyl pyrophosphate and it composes about 20% of the total yield.

Tetraethyl pyrophosphate has shown high toxicity to insects, and methods have been devised for its synthesis. The yield of tetraethyl pyrophosphate is believed to be about 40%. The commercial, so-called 100% hexaethyl tetraphosphate therefore probably contains about 20% of tetraethyl pyrophosphate, together with 80% of other organic phosphates and the commercial so-called 100% tetraethyl pyrophosphate probably contains about 40% of this chemical, together with 60% of other organic phosphates. In the following reports the initials HETP are used to represent the commercial hexaethyl tetraphosphate containing about 20% tetraethyl pyrophosphate; and the initials TEPP are used to represent commercial tetraethyl pyrophosphate containing about 40% of this compound.

The second insecticide described is now known in the United States under the common name parathion. The chemical name for parathion of 0, o-diethyl 0, *p*-nitrophenyl thiophosphate. The yield of this chemical in commercial manufacture is said to be 90% to 95%. The name parathion is used in these reports to designate this 90% to 95% material.

The information developed to date by the experiments with organic phosphates has some immediate practical application and, therefore, is made available in this form before completion of the research and formal publication of results.

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