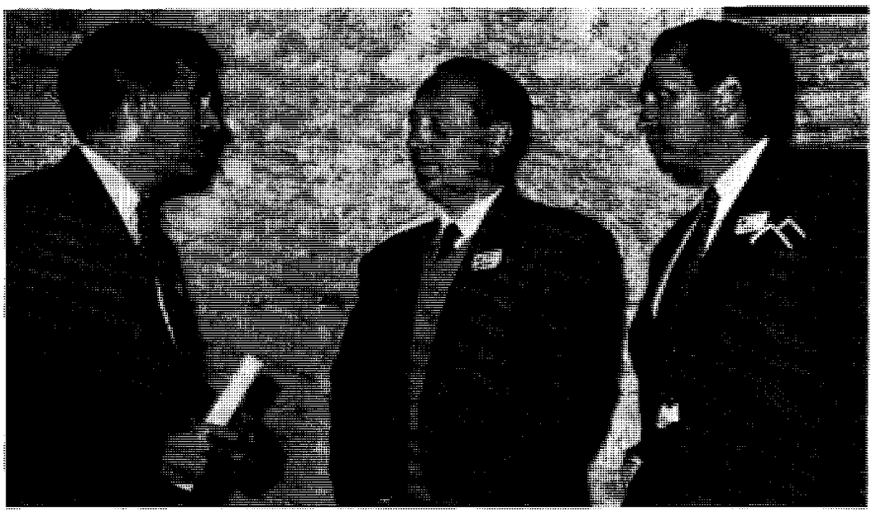
groups remain unsubstituted, such as monobutyl phosphite, and compounds whose substituted halogen radicals are easily hydrolyzed to release a halide acid. The acidity of these agents approaches that of strong inorganic acids. The irritation is produced by the presence of hydrogen ions and is not a specific action of the phosphorus atom, said Anderson.

Determination of Aldrin. A number of analytical methods have been developed for the determination of aldrin residues of the order of 0.1 p.p.m. in agricultural crop materials. The two approaches of most immediate promise for the determination of microgram quantities of aldrin are the phenyl azide photometric method and the combustion chloride ion titration method, according to a report by A. E. O'Donnell, M. M. Neal, and coworkers at Shell Development.

The determination of 0.08 p.p.m. or less of aldrin in many plant materials is possible, based on the analysis for chlorine. In this test, the insecticide is separated from the plant matrix by solvent extraction and then treated chromatographically to remove biological extractives and naturally occurring halogen.

Before the photometric method could be used, a detailed investigation was necessary to overcome its critical deficiencies. The reliability of the method has been improved, and the determination of 0 to 40 micrograms with a standard deviation of 1 microgram has now been made possible. The modified method is applicable to the determination of 0.05 p.p.m. or less of aldrin in a wide variety of plant materials when the insecticide is first separated and purified as in the chlorine method. A number of common chloride-containing insecticides interfere in the over-all chlorine method, but no appreciable interference in the photometric method has been found with any of the insecticides tested.



Chatting in between sessions of the Division of Agricultural and Food Chemistry are: (left to right) L. W. Hazelton of Hazelton Laboratories, H. H. Anderson of the University of California School of Medicine, and J. A. Noone, NAC Association

Residual Pesticides Give Excellent Control, Despite Poor Application

Spreading properties of liquid formulations compensate for inadequate coverage

KANSAS CITY.—A pesticide is effective because of its ability to enter into the required biological reactions and also because of a hydrophile-lipophile balance that permits the pesticide to penetrate to the reaction site, said Lloyd L. Isenhour of Rohm & Haas, speaking before the ACS Division of Agricultural and Food Chemistry. With such a toxicant, adequate dispersement must be achieved without interference with the desired properties of the pesticide.

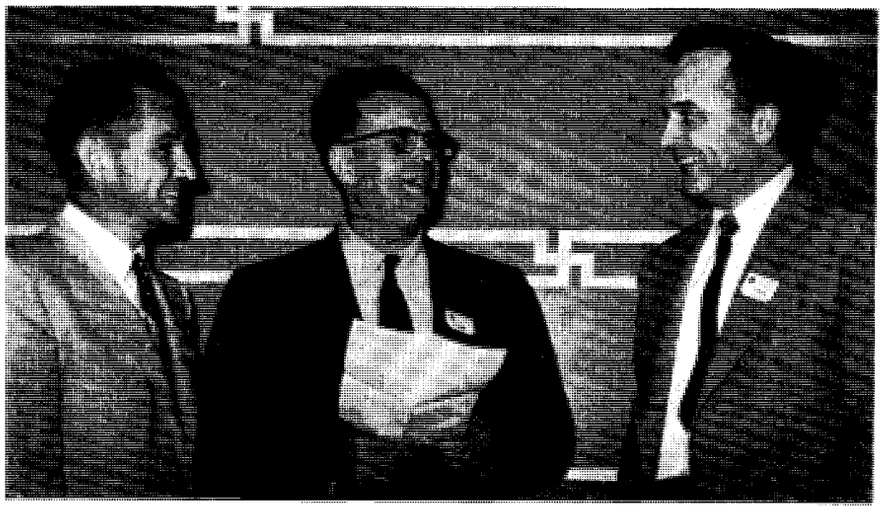
Residual pesticides, acting as surface, systemic, or subcuticular toxicants, give excellent pest control, frequently in spite of inadequate application techniques. This creates bad habits in commercial practice, Isenhour emphasized. At present, there is increasing commercial use of liquid formulations. Their spreading properties, as compared to dry dusts, compensate to some extent for poor distribution and coverage.

In technical circles, much discussion has centered around the need for improving toxicant penetration through formulation. More emphasis, he said, should be placed on not interfering with the basic penetrating properties of the toxicant itself. Past reports on pesticides have given only minor attention to the water solubility of toxicants. This factor, just as much as lipid solubility, is important in classifying the activity of a pesticide.

Chemical Formulations. The effectiveness of insecticides in the field is dependent not only on the inherent toxicity of chemicals but also upon their preparation before application, said N. F. Hardman of Stauffer Chemical. The chemical properties of diluents, either liquid or solid, may be such that reaction with toxicants occurs with reduction of effectiveness. Furthermore, wetting agents, dispersing agents, and adhesive agents must be compatible with toxicants and diluents.

The physical properties of diluents are equally as important. Diluents and surfactants in spray formulations may

J. D. Wilson (center) of the Ohio Agricultural Experiment Station discusses his report on the field performance of fungicides with N. F. Hardman (left) of Stauffer Chemical and R. M. Thomas of Mathieson at Agricultural and Food Chemistry session



enhance the effectiveness of toxicants by increasing the wetting of the pest and by increasing the rate of penetration into the pest.

The residual effectiveness of a toxicant is dependent not only upon its chemical stability to heat, radiation, moisture, and the surface applied but also upon loss by volatilization, wind, and water. Loss by chemical breakdown and volatilization proceeds at increased rates as the subdivision of particles is increased. However, the initial effectiveness is usually higher when the particles of toxicant are smaller, said Hardman.

Fungicide Formulations. Because few fungicidal compounds are capable of giving a maximum of disease control in their initial states, they must be properly formulated for field use, said J. D. Wilson of Ohio Agricultural Experiment Station. Virtually all of our present-day fungicides are insoluble in water and many are also nonwettable. Thus, fungicide powders must be made dispersible, and any nonmiscible liquids must be made emulsifiable. It is also essential that insoluble powders be finely ground to permit a maximum of adhesion and coverage.

The exact nature of a fungicide formulation will, of necessity, be determined by a number of important factors. What will be the most practical percentage of active ingredient? Should the fungicide be prepared for use as a powder or liquid? Will it be applied in a dilute or concentrated formula? Will there be need for any type of wetting, adhesive, or suspending agent? What will be the required physical and chemical characteristics of any diluents, carriers, or conditioning agents? Finally, the manufacturer or processor should consider the possibility that an insecticide formulated as a wettable powder or emulsifiable concentrate may be added to the fungicidal formulation. If this is done, will the two mixtures be physically and chemically compatible?

Public Understanding Is Key to Future of Ag Chemicals Industry

Fair and adequate legislation, good public relations, and sound credit policy are necessary to continued growth

HOUSTON.—Understanding the benefits obtained from proper use of pesticides will be the major factor in their widespread acceptance by agriculture. Tell the remarkable story that agricultural chemicals have written during recent years, urged Paul Mayfield, president of the National Agricultural Chemicals Association, as he led off its spring meeting here March 24 to 26. Increased yields of many products to feed the nation's growing population since introduction of new type organic pesticides in 1945 were cited as an outstanding example.

Mayfield stated that the Association had gone on record for legislation to establish limits for the quantity of pesticide residues on raw agricultural products. He feels that this amendment, the Miller Bill, will serve to strengthen the Federal Food, Drug, and Cosmetic Act and bring regulations on the use of chemicals in agriculture up to date. It will provide a new and specific method of limiting the residues in foods to amounts which are not detrimental to the public health. Under the proposed bill, manufacturers must furnish data substantiating claims for a product together with toxicity and residue data. Limitations will be established by the Department of Health, Education, and Welfare based on these data to guide those using the chemical on foodstuffs.

Cotton Damage from 2,4-D. Texas Commissioner of Agriculture, John C. White stated that complaints of cotton damage reported against users of 2,4-D in Texas rice fields have decreased from 2000 during 1948 and 1949 to only 112 last year. White credited cooperative efforts among farmers, chemical companies and agriculture colleges for progress toward solution of application problems. He announced new regulations, issued by his office under the Texas Herbicide Act, prohibiting use of 2,4-D in seven South Texas counties. Recent hearings have given cotton farmers an opportunity to voice reports of damage from aerial application of the herbicide on adjacent rice fields. Air application of all herbicides was outlawed in two small "hot spot" areas in these counties where rice and cotton farms are closely mingled. White stated that the regulation permits use of 2,4,5-T, which is reportedly about one tenth as harmful

John C. White, Texas Commissioner of Agriculture, explains 2,4-D ban in seven Texas counties

J. A. Walker, credit manager, Standard Oil of California, outlines the fundamentals of a sound credit policy for agricultural chemical suppliers

Paul Mayfield, president, NAC Association, points out need for correctly informing the public of the benefit and limitations of agricultural chemicals