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

to cotton. Elimination of all herbicides is not the answer to our problems, said White; instead fair and proper regulation of hazardous chemicals should ultimately benefit all farmers.

Credit. Special credit terms granted during periods of initial expansion may lead chemical manufacturers and suppliers into the banking business without benefit of security or interest, warned J. A. Walker, Standard Oil of California. Seasonal credit extended for three or four months may stretch into a year; the customer is in effect then operating on the supplier's capital. Agricultural chemical suppliers should establish a sound written credit policy to be clearly understood by management, sales, and the customer. Walker suggests carrying out the policy by determining if the customer's credit is good credit, having an understanding as to when payment is due, and asking for payment when due. Such a positive policy will maintain better customer relations in the long run, which is an important function of credit.

Production Records. Would you have adequate research and production control records if you became involved in product liability litigation? If not, you may tie your lawyer's hands, said J. D. Conner, NAC Association counsel. He stressed the importance of recording all observations on any factor which might become relevant in future liability action, regardless of how obvious it might seem to a technical observer. Data at all stages of plant growth are necessary to parallel farm conditions. All variables which possibly could affect any performance or safety characteristic of the product should be recorded; for example, foliage condition at time of application, rainfall, or temperature. Appraisal of data should be reduced to writing for possible legal reference. Research performed by other agencies should always be evaluated by the manufacturer prior to marketing a product, Conner said.

Contamination or adulteration of a product might be charged in spite of careful research and development. Conner feels that the best record for the defending lawyer in this case is proper product identification by batch numbers and retained samples. Absolute uniformity throughout the batch isn't essential but greater weight will be given to evidence based upon probable high uniformity. Lawyers recommend control tests covering all factors where even a slight deviation might affect the performance characteristics of the product—procedures and results should be clearly recorded.

Research Grants. R. D. Lewis, director of Texas Agricultural Experiment Station, pointed out the importance of research on chemicals as related to other agricultural projects. Of 324 active projects carried out by his station, 219 relate to chemical's utilization. Grants in aid are provided for 123 studies on use, value, and significance of antibiotics, insecticides, herbicides, defoliants, and fungicides. Such industrial grants make possible research beyond the capacities of federal or state funds. Research directed toward use of chemicals should be continued, but Dr. Lewis emphasized the need for fundamental research to learn the underlying phenomena, mode of action, and functions of chemicals in agricultural applications. This better understanding, he feels, might be useful evidence to convince those who would outlaw all pesticides.

Relative Hazards. Some pesticides may be hazardous, but their benefit far outweighs the danger when properly used, said F. C. Bishopp of the Pink Bollworm Research Center. In 1951, 14 deaths were claimed to be the result of DDT. However, Federal Security Agency statistics list 20 accidental deaths from aspirin, 117 from kerosene and petroleum products, 87 from lye, and 466 from barbiturates during 1949. Comparing these figures, Dr. Bishopp stated that prohibiting use of effective pesticides by law is not warranted.

Insect damage has been estimated at from $4 to $10 billion annually. Dr. Bishopp believes that our increasing population demands maximum yield from every acre of land. Virtual elimination of many insect-borne diseases led Dr. Bishopp to regard DDT and other insecticides developed following its discovery by Mueller as among the greatest gifts of science to man.

Industry

Brea Starts Up New $13 Million Ammonia Plant in California

Brea Chemicals Inc. fired up the boilers of its new $13 million ammonia plant at Brea, Calif., March 26. This was the first step in getting the big chemical plant into operation, which by June should be producing 235 tons of ammonia per day for agricultural purposes.

Brea plans to market and distribute the product as aqua ammonia. Economies of marketing, storage, and application prompted Brea's decision to become the first major ammonia producer to market the aqua ammonia product.

H. R. Fifer, vice president in charge of marketing, told visitors at the press preview that Brea had decided on the aqua ammonia route as its major marketing effort for the following reasons: It provides an easy, safe, economical system of handling agricultural nitrogen from producer to consumer. The storage problem with aqua ammonia is not so

An operator lights the first boiler at Brea Chemical's new ammonia plant in California. Watching are Homer Reed (left), Brea president; Robert S. Ogilvie, plant superintendent; Robert S. Ray, manager of manufacturing; and Jack Tielrooy, manager of development