Guide to Chemicals Used in Crop Protection*

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In the search for new chemicals for crop protection the breadth of literature coverage is almost overwhelming. The extent of this may be illustrated by setting boundaries from theoretical aspects of chemical reactions on the one hand to marketing research on the other. In between there are countless aspects such as biochemistry and physiology of plants and animals, selective toxicity, residues, methods of analysis, regulations for registration, etc. It is obvious that no simple method is possible. An adequate one now requires an elaborate indexing and retrieval system. This aspect has been adequately discussed in other papers in this symposium.

The pesticide literature must be divided into special interest areas. The manner of treatment varies with the particular use and interest. For current coverage at the development and applied level, one is often forced to attempt to scan the numerous company, applied, and research publications, as well as general testing reports. In Canada the results of herbicide evaluation has for several years been published in two sections—one for western and the other for eastern Canada. Last year for the first time a similar publication for fungicide and insecticide evaluation across Canada was published by the National Committee on Pesticide Use in Agriculture for the organizing department, the Canada Department of Agriculture. It is intended to issue it annually.

In between the very specialized technical references on the one hand and the applied annual references on the other, there is a need for a publication that will fill as much of the gap in between as is reasonable. It should be produced in such a way that its preparation is reduced to a minimum in time and cost. Supplements can be added readily and revisions or new editions prepared more frequently than is common with texts.

The pesticides listed should be largely those currently in use. However, this should not exclude some that perhaps are almost off the market but can be used as basic references. It should also include a number that are very close to reaching the marketable stage even though they may not have been officially registered by the appropriate government departments.

In order that the publication is not unwieldy, pertinent characteristics and properties of each compound should be listed within approximately two pages. This will therefore exclude the large mass of testing data. There are other sources for this material, an example of which was cited.

If possible, the item should be headed by the common name of the material, followed by its chemical structure, empirical formula, and molecular weight. Then should follow the chemical name or names, including trade names. A brief historical statement might occasionally be in order and then a summary of the chemical synthesis, if it is not too involved, as well as some patent references.

A listing of some of the pertinent physical and chemical properties would seem to be important, such as solubilities in a number of solvents, boiling or melting point, and chemical reactivity or stability. Equally important is a summary of some biological properties including comparative toxicities and rate of degradation and, if possible, a statement on mode of action. The inclusion of information concerning antidotes may be of value for some particular chemicals.

Finally, literature references to macro and micro methods of assay should be listed with a brief summary of the principle involved in the assay. If chemical, biochemical, and bioassay methods have been developed they should be listed along with any special precautions that may be necessary in extracting the material from biological material or soil.

It was largely to fill the gap cited above that the "Guide to Chemicals Used in Crop Protection" was initiated by Hubert Martin, with the fourth edition appearing in 1961 just after his retirement.** A supplement to the fourth edition should be published in August. The cut-off date for material was July, 1963, and owing to unforeseen circumstances, its publication was unfortunately delayed much longer than expected. From this experience it is hoped that the time interval will be greatly reduced for the next edition.

The present supplement is in two parts—one contains additions or corrections to be made to chemicals listed in the fourth edition, and the other lists 98 new compounds with descriptions as outlined above. It will be mailed to all who returned the acknowledgment card from the fourth edition. Contained as part of the page *before* the index this time (so as to be less likely missed) is a tear-out portion to be returned after filling in the sender's address in a specific area. When the next edition is published, the date and price will be filled in on the return cards and mailed to the original sender. It is hoped that this will expedite notification of the next edition and save numerous enquiries.

The format of the supplement follows that of the fourth edition with minor changes such as the addition of molecular weight and adoption of *Chemical Abstracts* reference style, as illustrated in Fig. 1. Corrections or additions were

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obtained from industry and my own gleaning of the literature. The latter is of necessity limited so that in the future it is hoped industry will forward more material and thus assist in making the revision more complete.

The data for the new materials was largely supplied, or at least abstracted, from information received in answer to a request from industry. Some came *via* the Pesticide Technical Information Office of our department in Ottawa, having originally been obtained from industry. The format and details varied greatly. Some was of the type aimed at the agricultural extension specialist. This therefore required a great deal of concentration and necessitated either looking elsewhere for the remainder of the pertinent material for the Guide format or, if not available, unfortunately resulted in incomplete outlines. Since industry has most of the pertinent material or references for its own compounds, the preparation of a special outline of its new products under the headings of the Guide format, with appropriate literature references and summaries of analytical methods, would greatly facilitate the speed of material required in this sort of publication.

Compounds are listed alphabetically according to their common names. Where none is yet available, the chemical name is listed. A cross-reference index including trade, common, and chemical names assists in locating the listings. It is unfortunate that even chemical nomenclature is not always consistent. However, the greatest confusion is over the adoption of common names and the multitude of common names for formulations. It is to be hoped that the time interval for a selection of a common name will be greatly reduced and that it will truly be a common name for both sides of the Atlantic.

Complications occasionally arose when, for example, the Canadian branch of an American company was licensed to handle a European product, while another American company handled it in the United States. Somewhat similar confusion also arose when the same chemical was produced by more than one company under different trade names. Then there were instances when the data sheets from the parent company and the subsidiary in another country differed slightly in some details. Which should one choose without offending the other?

Bis-(methyl-Hg)-sulfate

$(CH_3Hg_O)_2SO_2$

$C_2H_6O_4HgS$

mol wt 326.6

Other names:	Cerewet, Aretan-nieuw (Farbenfabriken Bayer AG) Ceresan Universal-Feuchtbeize (1.2%).
History:	Introduced as experimental fungicide against seed-borne diseases in 1958 by Farbenfabriken Bayer AG. Protected by W. German Pat. 1,003,733, U.S. Pat. 2,917,526.
Manufacture:	Reaction of Grignard compounds or metal organic compounds with mercuric salts.
Physical properties:	White crystalline powder; soluble in water; insoluble in organic solvents; recrystalline from methanol; v.p. $< 10^{-5}$ Torr; mp 260°C; when heating slowly decomposition starts earlier.
Biological properties:	Effective against seed-borne diseases of cereals, beets, potatoes and flower bulbs. Acute toxicity to rats: oral LD_{50} 50 mg/kg; i.p. LD_{50} 13.75 mg/kg.
Formulations:	0.8 and 1.2% Hg as Bis-(methyl-Hg)-sulfate.
Analysis:	The substance is digested by wet combusion with sulfuric and nitric acid. When completely digested, the solution is diluted with water, mixed with urea to decompose the nitrous acid and precipitated with hydrogen sulfide for the gravimetrical determination of mercury, or potentiometrically titrated with potassium iodide solution for the volumetrical determination of mercury. (Leverkusen method).

Fig. 1.—Sample page of Guide.

Toxicity reporting tends to vary somewhat, *i.e.*, between animal species and mode of dosage. In order to reduce errors of comparison, the species and mode were always included when available. It is remarkable how the values can vary depending on these two factors.

The manner of collecting the pertinent data on revisions and new compounds needs streamlining to assist in keeping information more up-to-date and more complete. Some suggestions have been made which largely involve industry. Any additional ways of improving the preparation and usefulness of the Guide will be welcomed.

Some Pesticide Information Problems in the Pesticides Regulation Division and Their Possible Solution*

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The Pesticides Regulation Division is responsible for the enforcement of the Federal Insecticide, Fungicide, and Rodenticide Act which among other things requires that all economic poisons (pesticides) be registered with the U. S. Department of Agriculture prior to shipment in interstate commerce. Exports and imports of pesticides are also subject to certain requirements of the Act. Copies of the regulations for the enforcement of the Act and published interpretations of these regulations are available upon request. Pesticides (defined in the Act itself as economic poisons) include insecticides, fungicides, herbi-

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