

KOUL, O. 2005. *Insect Antifeedants*. CRC Press, Boca Raton, FL. xii + 1005 pp. ISBN 0-415-33400-4. Hardback. \$189.95.

There has been much interest in recent years in manipulating the behavior of pest insects to protect crop plants (Foster & Harris 1997). Pheromones have been most widely studied for this purpose and have enjoyed considerable commercial success. Another fruitful avenue, and relatively unexploited from a commercial standpoint (except for neem-based products), is the use of antifeedants to change the feeding behavior of insects. Plants have evolved a tremendous array of allelochemicals that act as feeding deterrents to herbivores. It is these allelochemicals that have been extensively studied as plant protectants during the past two decades. This book brings together much of the literature on the discovery, identification, and chemistry of insect antifeedants of plant origin, information that is widely scattered in entomological and chemical journals.

The format of the book is a compendium with six introductory chapters and 900 pages of bioefficacy and chemical data pertaining to individual compounds with insect antifeedant activity. There are references after each of the introductory chapters although many of the references are relatively old (many pre-1990). References for the bioefficacy data in the monograph section are placed on the page where each chemical is described. There is an excellent index at the end of the book that includes the scientific names of plants, greatly facilitating the task of locating chemically characterized antifeedants in a plant of interest.

The first chapter begins with a brief overview of semiochemical terminology and definition of the term antifeedant as "a peripherally mediated behavior-modifying substance (i.e., acting directly on the chemosensilla in general and the deterrent receptors in particular) resulting in feeding deterrence" (Isman 1994). This definition purposefully excludes compounds that reduce feeding after ingestion, either through sub-lethal effects or direct action on the central nervous system. The author continues with a discussion of coevolution and the myriad classes of defensive compounds (allomones) that plants have evolved, ending with a short history of the study of plant-produced antifeedants with activity against insects.

The second chapter begins with a brief description of the chemosensory system, the system upon which antifeedants act. Although little is known about the mechanisms of action of antifeedants on insect sensory neurons, some information about neuronal specificity and sensitivity has been gleaned through electrophysiological studies. The author goes on to describe several specific cases where the mechanism of action of antifeedants on the chemosensory system is known.

The third chapter describes the many types of bioassays that are performed to test the efficacy

against insects of suspected antifeedants. This chapter is quite complete in content but tends to overdo the methodological details of some of the bioassays.

In the fourth chapter the author attempts to summarize the structure-activity relationships of the major classes of antifeedants (limonoids, quassinoids, mono-, sesqui- and diterpenes, coumarins, isoflavonoids, alkaloids, maytansinoids, ellagitannins, and aristolochic acids). Slight changes in functional group and stereochemistry can cause significant changes in bioactivity so the author does not attempt to generalize structure-activity relationships beyond what is necessary to help guide systematic search for and modification of bioactive compounds.

In the fifth and sixth chapters, the author describes the current state of commercialization of antifeedants and the many practical reasons for their lack of commercialization, with the exception of neem-based products. The major roadblocks to commercialization are the lack of technology to produce large quantities of commercial-grade antifeedants and consequently the costly and labor-intensive nature of their production. Few studies of antifeedants have moved beyond the laboratory to the field, but it is expected that problems such as insect desensitization (habituation) to the deterrent and rapid environmental degradation will be encountered. The author ends on the hopeful note that antifeedants will find a place in integrated pest management programs targeted against specific combinations of crop plants and pest insects (Isman 2002).

The last chapter contains bioefficacy monographs on more than 800 antifeedant compounds. Each compound, listed alphabetically, has chemical data such as molecular formula, weight, and structure and occasionally other useful data such as melting and boiling points, optical rotation, and mammalian LD₅₀. The source of the compound is described by scientific name of the plant, including author, common name, if any, and family. Common name and plant family cannot be searched in the index but scientific name can. The final section of each monograph is the activity profile where the author lists all the insects against which this particular compound has been tested and found effective as a feeding deterrent. Details in this section include the testing method, compound concentration or dosage, and efficacy, which the author has standardized to EC₅₀ (effective concentration that deters feeding in 50% of the population), if the data allowed it.

This book would be a welcome addition to the library of any scientist or student interested in the chemistry of plant-insect interactions, or the potential use of antifeedants for pest manage-

ment, either conventional or organic. Its best feature is the monograph section because many biological and chemical details on antifeedant compounds are collected from disparate literature sources. There is no other source that I know of that provides this information in one location. The first six chapters describe nicely much of the basic information amassed over a quarter century of research on insect antifeedants and are a bonus in a compendium such as this. The English usage in the introductory chapters is a little cumbersome but the advantage of having general background information and chemical details on antifeedants in one book outweighs any negative aspects.

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