I. Overview of Subject/Issue

I.

Overview of Subject/Issue

Historically, plants have served humankind as sources of foods, medicines, oils, biocides, waxes, and other useful substances. However, it was not until the early 19th century that active compounds were isolated in a pure form from plants, and late in the 19th century that the chemical structures of natural plant compounds could be determined. A revolution in chemical technology has occurred in the last 50 years. New technologies have enabled the isolation, identification, and subsequent synthesis of biological compounds. Although some chemical compounds found in plants cannot be synthesized today because of technical or economic constraints, an increasing number of chemical compounds are being produced in the laboratory.

Despite these capabilities, renewed interest has developed in using naturally produced chemicals from plants—botanochemicals—as sources of new food proteins, medicines, biocides, and other materials. The rapid escalation of petroleum prices has encouraged Government and industry to consider plants as renewable sources of botanochemicals that could reduce the demand for petroleum resources. Similarly, concern for adequate food supplies, especially in less developed countries, has drawn attention to new technologies for extracting high-quality protein from tropical legumes for livestock feed and human consumption. Better understanding of the ecologically disruptive and persistent effects of some synthetic biocides has stimulated work on extracting biocidal compounds from plants—e.g., insecticides from the neem tree. Because plant-derived biocides are biodegradable, they rarely persist for long periods; their impact, although perhaps initially as disruptive to the ecosystem as a synthetic substance, is temporary.

While only a small proportion of all higher plants has undergone chemical testing, statistically the probability is high that many unscreened plants contain important substances for human use. The greatest reservoirs of unscreened plants, however, are in tropical regions, where changes in land use are leading to the permanent loss of some of these resources before they can be assessed. As a result of the disappearance of tropical species, there is a sense of urgency to increase screening efforts and investigate commercial potential of tropical plant chemicals.

The objective of the OTA exploratory workshop was to provide a basis for general discussion of opportunities, constraints, and potential impacts of new crop and new plant product development rather than to carry out a comprehensive investigation of potential commercial plant products. The subjects chosen for discussion, therefore, represent only a small sample of plant products with commercial potential. An effort was made to include examples of different types of products, including low cost/large demand and high cost/small demand products; products suitable for development both in the United States and in less developed countries; and plants that have had little previous commercial use—namely, arid/semiarid land plants and marine plants. In addition to papers on specific plant products, papers on the existing data bases on plant-derived drugs and on ecological characteristics of minor economic plant species were presented. Short summaries of each of the papers follow.