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BOOK REVIEW

JAN KUTERA, „*Agricultural Utilization of Wastewaters*" PWRL, Warsaw 1978 (in Polish: „*Wykorzystanie ścieków w rolnictwie*"), 491 pages, List of Contents in English and in Russian.

The book summarizes 25 years of author's experience in utilization of effluents in agriculture and summarizes the extensive experimental work and practical knowledge of land disposal in Poland. The author heads Wrocław Division of the Institute of Irrigation of Meadows which specializes in applied research, development and design of agricultural disposal of industrial and municipal wastewaters.

The book is aimed at design engineers and students of the art and this duality of purpose is stressed throughout the four major parts of the book.

The first part of the book presents principles of the art, stressing wastewater characteristics and methods of evaluation of the fertilizing potential of effluents from various industries. Unfortunately, the permissible concentration of various chemicals are not given exactly due to the wide variation of reported data.

Sanitary evaluation of waste treatment in agriculture proves that it is the best method for eutrophication control and an ideal biological pollutants screen. The necessary sanitary conditions for land disposal sites are specified. Subsequently emphasis is on the selection of adequate wastewater pretreatment technology.

Physical, chemical and biological processes in irrigated soils are investigated and methods of preventing soil exhaustion are presented. The permanent fertility of soils can be maintained if all parameters are optimized.

Significant portion of the text is devoted to sludge application in order to increase the fertilizer value of the soil. Land application of municipal sludge should be regarded as a method of the least expensive disposal. Sludge is a typically organic fertilizer covering only 20% of N, P demand. This, coupled with the lack fo potassium leads to the farmer's small interest in sludge as a fertilizer. The need for mechanization of the application process and transport is stressed — hydrotransport being the preferred solution. This part of the book, devoted to waste treatment technology is treated superficially and lacks precise addressing of the processes to the selected groups of wastes. The reason lies partly in the wide scope of available processes. The need still remains to evaluate the extent to which the wastes should be treated prior to land disposal. It seems that inadequate emphasis was given to the earthen basins and the low-efficiency pretreatment methods fitting the rural environment, such as algal ponds, oxidation ponds, lagoons, barried landscape water renovation systems (BLWRS), etc.

The second part of the book is devoted to the technology of agricultural use of municipal sewage effluents. Criteria for selection of appropriate wastewater doses are given, based on indicative concentration of basic components. Principles of land site selection are outlined, based on several conditions: year — round application mode, efficiency of treatment, efficiency of crop production, reserve fields location, etc. It is pointed out that green meadows are best suited for accepting effluents due to the highest crop yields and ratio of protein yield to nitrogen use. The permissible dose rates are outlined for individual crops and various application systems; taking into account the protection of ground water system the depth of soil penetration should not exceed 75 cm.

The third part of the book is devoted to industrial wastes utilization and starts with classification and methods of preparatory treatment. Food and agricultural industry wastewaters are preferred here as they are difficult to treat otherwise.

Sugar industry wastes and sludge are exhaustively discussed, the retention of 80% of water in a closed cycle is demonstrated based on the Polish practice. Potato processing industry wastewaters are much better fit for agricultural disposal due to high nutrient content, indicating at the same time the removals of 97% BOD, 98% TKN and 98–99% P_2O_5. The fermentation industry wastewaters (breweries, distilleries and yeast plants) are very difficult to treat conventionally while good removals are attained through land disposal. Full discussion of applicability of dairy industry wastewaters is presented, with dose rates and yields given, based on numerous full scale case studies. The discussion includes also wastewaters from other branches of agricultural industry, such as fruit and vegetable, egg-poultry, meat processing, fat, fish and fodder plants. The case studies are presented for textile wastewaters, tannery, phenol, pulp and paper, fertilizer and saline wastewaters.

The original Polish optimization procedures for linen industry and cellulose-paper industry are quoted.

The importance of maintaining the proper BOD Nitrogen balance in wastewaters is stressed. Author concludes that theoretically all wastewaters are applicable for agricultural disposal, particularly in the mild climatic zones where there is no danger of increase of the soil salinity content.

The fourth part of the book contains technical and economical principles of agricultural wastewater treatment and presents a series of technical designs, stressing typical, time-tested solutions, automation retention requirements and principles and practice of field maintenance. Economic use of land disposal sites is of paramount importance — author stresses the need for installing adjoining fodder drying facilities.

The book is supplemented by a collection of almost 400 up to date references — over 60% of them are domestic which documents the advancement of this century-old science in Poland. In summary: the book is very well written — perhaps the best one on the subject so far. The certain shortcomings in chapters devoted to the wastewater treatment technology are offset by excellent presentation of factual case study data on application rates, crops selection and rotation, crop yields, application modes and pertinent design information on agricultural utilization of industrial and municipal effluents.

Due to the extensive use of graphs and tables the book is practically accessible to non-Polish readers as well.