meaning the reduction of availability or solubility and consequently of toxicity of arsenic due principally to reaction with soil constituents.)

Heavy leaching tends to reduce the concentration of available arsenic in the soil.

Repeated cropping of chlorate-treated soils resulted in continued loss of toxicity. Toxicity to the first crop was highest in Stockton adobe clay, second in Fresno sandy loam, third in Columbia fine sandy loam, and lowest in Yolo clay loam. By the seventh crop toxicities had shifted so that Fresno sandy loam stood highest, Columbia fine sandy loam second, Yolo clay loam third, and Stockton adobe clay lowest. Although fertility governs largely the initial toxicity of chlorate in soils, some other factor controls the change in toxicity with time and cropping.

The general relation of toxicity to fertility was confirmed. Soils giving marked deviations from the expected results proved in nearly every case to have come from arid regions and consequently, to be high in total salts.

Leaching and species susceptibility are known to affect chlorate toxicity. Under ideal conditions a schedule of dosages of from 1/2 to 4 pounds per square rod should give effective control of susceptible species, the dosages between these limits being fixed by the fertility of the soil. Under average conditions and against resistant species it should be doubled.

When chlorate dosage runs above 8 pounds per square rod the cost approaches that of carbon disulfide. Considering the loss of crops and the permanent effects of the saturation of the replaceable base complex with sodium, it seems desirable to use carbon bisulphide under these conditions.

A number of chemicals, including arsenic, chlorate, and carbon bisulphide, have proved useful in weed control. In a comprehensive program all should be used, each being applied under the conditions where it is most effective and economical.

RESEARCH WORK IN DENMARK

By G. H. Siegumfeldt
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Such institutions as the Danish State Experimental Stations, Danish State Plantbreeding Laboratorium, the Danish State Pathological Experimental Station, The Danish State Seed Testing Station and the Royal Danish Academy of Agriculture, all have a good standing in the international agricultural research work and within the country these institutions cooperate very closely with the practical work carried on by the common farmer.

Spread over the country are scientifically educated agriculturalists engaged with local experiments, agricultural evening courses keeping the farmers informed of anything new that might have been developed and supervising the farmers in their doings and keeping in close touch with the research

work done by the respective institutions. This is also supported by the Government.

In developing a high standard of dairy products in Denmark it became a necessity to find a nutritive fodder for the dairy cows, as owing to climatic conditions it is necessary that they be stabled during the winter months. From investigations made on this subject it soon became evident that beets were readily adapted to the Danish climatic conditions as being a field crop of great importance and economical value for the country. As the dairy products produced to some extent soon had to depend upon this crop, the Government in the beginning of the century started a special institution for research work on rootcrops.

This institution, in connection with the Danish State Experimental Stations, has, in the past years, been the backbone in our efforts to develop better varieties of beets as they carry out permanent tests and comparative trials of beet varieties every fourth year issuing a report upon their results. This is of great importance to beet breeders as only strains authorized by this Institution can be sold as first class strains in Denmark.

Fifty years ago the first sugar factory in Denmark was erected by the late C. Erhard Frederiksen, owner of some big country estates. He was also interested in breeding sugar beets which work was later continued by his son the late V. Erhard Frederiksen. Being a pupil of Professor W. Johannsen, the founder of applied heredity and creator of the theory of pure lines, V. Erhard Frederiksen of course started his sugar beet breedings upon these theories. He soon came to the conclusion that it was possible in this way to improve the sugar content and yield of sugar beets to a certain extent.

Erhard Frederiksen, as far as known, was the first to start experiments with combined crossings of sugar beets. This method is now followed by almost all sugar beet seed establishments in Europe. Unfortunately Erhard Frederiksen died when he was still very young.

This is the history of the sugar beet research work in Denmark.

Since the death of Erhard Frederiksen his theories have been carried ahead and cross-breedings to produce the commercial seed as an F_1 Generation, have shown better results than the original pure lines. Experiments with triple crossings, where three or four pure lines, through double crossing have influence on the commercial seed have also been carried out.

Some experiments with X-ray treated seed have been made but I am unable to report the results.

Fortunately, or unfortunately, we in Denmark have no waste-laying diseases on sugar beets. Fortunately for the farmers and the country, unfortunately for the technologists, who are handicapped in participating in research work regarding resistance to these diseases. We have to carry on such experiments in foreign countries, but even at that we are trying also to participate here, as in Denmark. We have excellent climate, especially suited for growing sugar beetseed.

I admire the efforts American Sugar Beet Technologists have made to save and help an industry so important to the country. In these few years they certainly have made history.