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Fifty Years of Success - President's Address

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As announced earlier, this is the 50th anniversary of our Society. With this in mind, I will be reviewing some changes which have occurred during the past 50 years as well as making comments regarding the present and future.

First, let us review the origin of the Society. The Third Annual Meeting of the Sugar Beet Round Table convened in January, 1937, in Fort Collins, Colorado. At this meeting, steps were taken to organize the American Society of Sugar Beet Technologists. Hence, the Society was formed and the First General Meeting was held in Salt Lake City, Utah, January 11-13, 1938. The president was A. W. Skuderna, and 140 of the 144 members were present according to the records. Presently the membership is approximately 550.

The constitution and by-laws were adopted officially at the First General Meeting. Article II stated, that, "The objective of this Society shall be to foster all phases of sugar beet and beet sugar research, and to act as a clearing house for the exchange of ideas resulting from such work." Article II was expanded in 1976, but the original purpose remained and has benefited the beet sugar industry greatly through the past fifty years. The Society has fostered a unique closeness of cooperation among federal, state, and private researchers which in turn contributed to a cohesiveness among all elements of the industry and helped it to survive through some critical times.

Why is cooperation and exchange of knowledge important? Progress is made through new ideas. New ideas evolve through a process of gathering bits of knowledge over a period of time from many sources. Add to this the power of reasoning, and then a new idea may appear. One may not even remember where the bits originated as we are constantly building on the knowledge of others. The more

bits of knowledge a person can gather, the more likely he is to create new ideas. The value of the Society in contributing to this process through the exchange of knowledge cannot be over-emphasized.

By scanning the proceedings of the Society for the first meeting, one must conclude that, indeed, much progress has been made since then. A presentation by H. B. Walker, an agricultural engineer from the California Experiment Station, discussed the high intensity of hand labor required for beet culture at that time. He stated that, "Apparently, there is but one clear path to travel in combatting these handicaps, that is, to reduce, if not overcome entirely, stoop labor in sugar beet production by the substitution of machine methods." E. M. Mervine, and S. W. McBirney, two USDA researchers, reported on attempts to get uniform spacing of seeds at one seed per inch of row, and mentioned the possibility of mechanical blocking and thinning. At this time it was not uncommon to have seeding rates over ten pounds per acre, and this was with multigerm seed. Where are we today? The proportion of North American beet acreage planted to stand is extensive and increasing, and an additional proportion is mechanically thinned. No hand labor at all is used in a portion of this acreage. What a contrast from crawling the beet rows to thin the beet crop! Our goal now should be the elimination of hand labor throughout all beet growing areas.

There were several ingredients that made this success possible: improvements in beet drills, particularly the metering devices, the introduction of herbicides, and precise sizing of seed, but there was another of prime importance. That ingredient was the discovery of the monogerm seed character, one germ per seedball, and incorporating it into the germplasm of commercial varieties. To review the history of this development, Dr. V. F. Savitsky found five plants in a seed field of Michigan Hybrid 18 growing in Oregon in 1948 which appeared to possess the monogerm character. Progenies from two of the plants were

determined by Dr. Savitsky to have the true monogerm character, and they were given the numbers SLC-101 and SLC-107. Seeds of these were released to all North American sugar beet breeders in 1951. Because these lines, as such, were not suitable for commercial use, the plant breeders began immediately to incorporate the gene for the monogerm character into commercial varieties adapted to their respective areas. By the mid 1950's, seeds of monogerm varieties were made available to beet growers on a limited basis, and ten years later the conversion was almost complete. The dream of a single seedling growing from one seedball had come true. This led to simplification of hand thinning, to mechanical thinning, and finally to planting to stand. Without monogerm seed, how costly would it now be to get crews to block and thin to single seedlings as was done fifty years ago, and would we still be growing sugarbeets? I doubt it!

I should mention that the wife of Dr. V. F. Savitsky, Dr. Helen, was working at his side during the studies with the monogerm character and until his death in 1965, then continued alone until her death this past year. Both were deeply devoted to sugarbeet research. Because of their contributions, the directors of the Beet Sugar Development Foundation thought that they should be honored in a fitting way. As a result, a Savitsky Memorial Award is being established through the Foundation. This will be a cash award to be given to persons selected for their outstanding research or developments within the beet sugar industry throughout the world. Funding for the award will be from the earnings of a perpetual trust to be established from solicited contributions. Hopefully, all in the beet sugar industry will donate generously to the trust so that sufficient earnings can be generated to give monetary significance to the award as well as prestige.

Returning to the theme of mechanization of the beet crop, hand topping and loading of beets have been eliminated during the past fifty years through the combined efforts of researchers, engineers, beet growers, and

machinery manufactures. Developmental work on mechanical harvesting equipment was started at the beginning of the period and today there is an assortment of multi-row harvester in use. Machines have not only eliminated hand labor from beet harvesting, but also they have greatly reduced the time required for harvest. However, a problem has been created. Beets going into factories and into piles for storage must be quite free of trash and soil. Hence, harvesting and piling equipment has been designed to remove the trash, and in so doing, the roots are handled severely causing extensive bruising, breakage, and skinning. Such injuries increase respiration and provide entries for rotting organisms, both of which cause substantial losses of sucrose during root storage. Limited research has been done with equipment to reduce damage during harvest, but much more is needed, and sometime in the future, capital expenditures need to be made to reduce this source of loss.

Another event of major importance which I want to discuss relates to the processing quality of the roots. Nitrogenous fertilizers became increasingly plentiful after World War II, and as supplies became more abundant the market became very competitive. A large supply of inexpensive fertilizers became available to farmers. They knew that nitrogen fertilization could give increased yields of crops, but with the oversupply, a philosophy developed that, "if a little is good, more is better." The rates of fertilization kept increasing for beets and the other crops in the rotations. Not only were the beets being over fertilzied, but high residuals of nitrogen accumulated in the soils. The harmful effects of excessive nitrogen available to growing beets are well documented: lowered sugar content, increased content of non-sugars, and lowered extraction percentages.

This is a complex problem varying from area to area, farm to farm,, and even from field to field, and it can be solved only with beet growers and processors working together. It affects the profits of both in a delicate

balance with beet growers striving for maximum profit per acre and the processors striving for maximum profit per ton of beets sliced. It is critical to our industry to produce beet roots with high processing quality, and it can be profitable to both the beet growers and the processors to do so. Modifications to participating contracts may be needed to establish greater incentives to grow high quality beets, and the tools used to determine the fertilizer needs of every beet field need to be refined. Improved quality of beet roots at harvest can be accomplished!

In the past, the devastating effects of certain sugarbeet diseases have been controlled through the development of varietal resistance, chemical treatments, and agronomic practices. Now another one, Rhizomania, has been identified in the United States. From what is presently known of this disease, it is believed to have the potential of spreading throughout the North American beet growing areas. The disease is caused by the beet necrotic yellow vein virus which is transmitted among host plants by a soil borne, fungal vector, *Polymyxa betae*. The vector has been identified in many soils where beets are grown outside of the known disease infested areas, so the disease could spread rapidly with any transfer of soil particles carrying the vector infected with the virus. The disease has been studied in Europe, but there is much more to be learned about the organisms involved, particularly under our soil and climatic conditions. Research has been initiated at the USDA Station as Salinas, California, to gain knowledge about the vector, the virus, host plants, soils, and their interactions. With additional information, we will be better able to cope with the problem. Presently it appears that varietal resistance will be the most practical means of control, so the plant breeders have a challenge ahead of them. The development of germplasm carrying resistance has started in California. Holly Sugar Corporation has found a source of resistance in their breeding lines. Among the North American resear-

chers, there are people capable of conquering Rhizomania as they have diseases in the past, and I have confidence that they will. Regardless, we must take precautions to limit the spread of Rhizomania!

In recent years a new field of science has evolved which has received considerable news coverage under the coined term, "genetic engineering." The molecular structure of chromosomes was discovered, and techniques have been developed to utilize the information in order to alter living organisms by various manipulations of genes, the basic units of inheritance in the chromosomes. A necessary part of "genetic engineering" is the ability to culture individual cells or tissues on sterile, artificial media and to regenerate whole plants from them. The full potential of using these techniques to incorporate new, desirable characters into crop plants is not yet known, but expectations for the future are great. However, the basic work for the techniques has been done with microorganisms, and researchers in this new field of science are just beginning to work with higher plants with some success inn petunias, tomatoes, potatoes, and tobacco. In its present state of development, gene substitutions or alterations for germplasm enhancement are feasible only for character of simple inheritance, and this will restrict the usefulness of the techniques because any character of agronomic value are multigenic in inheritance. Even so, in order to utilize these new developments for sugarbeets, there is extensive ground work to be done. Progress has been made already with cell and tissue culture techniques, but this is only a beginning. To get the basic and practical research done which is needed will require a multidisciplinary approach.

Briefly, our industry must support research projects in this rapidly changing field of science as related to sugarbeets in order to build a foundation for moving forward and to avoid being left in the dust. I must admit that I do not expect any major changes in the germplasm of the sugarbeet in the near future as a result of gene

alterations because of the basic work which is yet to be done. In addition, there is the stumbling block of controls over testing genetically altered organisms with the required environmental risk assessments. On the other-hand, the use of new cell and tissue culture techniques may very well provide short cuts in selecting improved genotypes from existing germplasms.

To this point, nothing has been mentioned about changes in the factories, and it is best that I keep the comments brief because my knowledge is limited. To mention a few events, there was the switch from coal to natural gas as an energy source in many factories, and then the return to coal. Advances in electronics made central control centers in the factories possible, and controls over various parts of the manufacturing process have been improved. Continuous centrifugals for separating the crystals from the molasses have replaced manual units. Techniques such as pre-liming are available to give better utilization of lime and improved juice quality. There was a period when large capital expenditures were made for pollution control, and we still have the cost of operating and maintaining the equipment. I can remember when the Robert battery was used for diffusion and thinking what a terrible task it would be to work all day filling the cells of the battery with cossettes. Today we have continuous diffusers which require little labor, and with advanced designs, capacities have increased, drafts have been reduced, and temperature requirements have been lowered, all of which have contributed to improved efficiency.

The improvements in the factories have been made with three major factors in mind: to reduce manpower requirements, to conserve energy and reduce energy costs, and to increase the level of sugar extraction. These factors are still uppermost in our minds, and technologies are available to make additional gains in the efficiency of the factories such as ion exchange, ion exclusion, reverse osmosis, falling film evaporation, and continuous crystalli-

zation. We need to know how to make these technologies practical and efficient to the point that they will justify the capital expenditures needed to incorporate them into our existing factories. Some of the innovations would be simpler to install if a new factory were to be built, but with the present status of our industry, this is not likely to happen. Even so, these technologies could be the highlights of the future and are worthy of much more developmental research. In addition, perhaps there are unconventional approaches to sugar extraction which have yet to be developed. This is the basis for he cooperative project between industry and the USDA Western Regional Research Center at Albany, California.

In summary, the general goals of increasing sugar production per acre while reducing grower costs, and improving the level of extraction of sugar while reducing factory operating costs still remain. Breakthroughs are needed so we can compete better in the tough market for sweeteners. I urge all of you to take advantage of the opportunities to learn which are being offered in the technical sessions. Any one of you may get that germ of an idea which could lead to a significant advancement, and through cooperation I have confidence that the beet sugar industry will progress.

On the 50th anniversary of our Society, I would be remiss if I did not make a few statements concerning James H. Fischer, Secretary-Treasurer of the Society, who has contributed more to the success of this organization than any other individual. Apart from the Society, Jim has done an admirable job of serving our industry in all phases. At this General Meeting he will receive the Forty Year Veteran Award, having started to work for the Beet Sugar Development Foundation in January, 1947 on a part-time basis. This will make a clean sweep of all the awards given by the Society, and, in addition, he has received the Dyer Memorial Award. He was instrumental in organizing the Beet Sugar Institute, a short course for training industry personnel, and establishing the Journal

of the American Society of Sugar Beet Technologists. Jim has appeared before congressional committees in behalf of the industry to obtain federal funds for sugarbeet research and was successful more often than not. His primary job has been as Manager and Secretary-Treasurer of the Beet Sugar Development Foundation, and I am sure that all people who have served as directors of the Foundation will agree that his skills for organizing and diplomacy have been invaluable for the smooth operation of the organization. These are only a part of his many activities and accomplishments. If each of you would take the time to study his service to us, you would realize what a gem we have had supporting our industry for his entire career.