INAUGURATION LECTURE
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Mr. Chairman thank you for your kind words. Ladies and Gentlemen, it is a real pleasure to be here at this congress. It is an opportunity to meet many old friends and to make new ones. It is an opportunity to hear about the latest developments from prepared presentations and an opportunity to discuss these developments with many scientists. I was pleased that your selection committee chose me for this prestigious international award for there are many capable scientists and industrialists who have contributed to the development of our crop. I feel particularly indebted to many of them. These include:

The **nutritionists** who provided the information which gave direction to our breeding projects. Their work enabled rapeseed breeders to initiate projects to reduce the levels of erucic acid and glucosinolates in the seed.

The **chemists** who provided the background knowledge of the composition of oilseeds and who developed quick and accurate methods of analyses without which it would not have been possible to isolate the exotic genotypes which were required.

The **plant breeders** especially those in Europe who made available the germ plasm from which the exotic characteristics were isolated.

Finally, the **financial contributors** who had faith in the projects before the potential of rapeseed was generally recognized.

It is with an appreciation of how dependent our plant breeding work is upon the contributions of many capable scientists that I accept this award.

While rapeseed (or canola rapeseed) is grown at lower latitudes or nearer to the equator, I think that the crop is most important to more northerly areas such as Northern Europe and Canada. In these areas, rapeseed or canola rapeseed now supplies an important part of the local requirements for edible oil.

When I began to work on rapeseed, some three decades ago those of us who worked with rapeseed, especially in Canada, seemed to be a voice in the wilderness. I recall trying to get some of our scientists, especially those in soils and weeds, to initiate some work with rapeseed. The usual answer was, "The crop is not important enough we cannot afford to spend our time on it." Fortunately after they initiated preliminary experiments, these scientists realized that the crop was responsive to various treatments and had considerable potential for development. Similarly our farmers were hesitant about

beginning to grow the crop but after acquiring some experience with it became enthusiastic supporters. I have seen this pattern repeated many times. Now that I have retired, I am very pleased to see that that there are many younger scientists who are interested in the crop and who will continue developmental work. This will help to ensure the continued success of our industry.

Although conventional plant breeding has changed rapeseed rather dramatically, the crop appears to have become one of the favorites for the application of biotechnology. It is a major crop and the methods for tissue and microspore culture have been worked out. Microspore culture permits the production of large numbers of inbred lines in a short time. Tissue culture facilitates selection of variants in vitro. Somatic hybridization facilitates recombinations of cell constituents, such as chloroplasts and mitachondria previously very difficult to achieve. DNA transfer opens exiting possibilities for introducing new characteristics into the crop. While all these possibilities are exciting, and likely to be productive, I hope that the need for resources to develop biotechnology will not decrease the resources made available for conventional rapeseed breeding.

During the last few years interest in developing hybrid rapeseed cultivars has been increasing. The development of hybrids in Australia and Canada appear to be largely based on the pol male sterility inducing cytoplasm derived from a strain sometimes called "Polima". Reports from France indicate that innovative methods are being used to improve the performance of the ogu male sterility inducing cytoplasm derived from a male sterile radish. Hybrid cultivars are used to produce rapeseed in China. One group of cultivars is based on the pol cytoplasmic male sterility while the other is based on a genetic male sterility system (GMS). The genetic male sterility system developed at Shanghi (Mr. Li) is based on a di-genic system with interallelic interaction. With this system the seed yields from hybrids seem to be equal to those from crosses made by hand while seed yields from hybrids based on the pol cytoplasm are somewhat lower. By selecting the appropriate genotypes from the genetic male sterility system it is possible to produce a generation of all male sterile plants and when pollinated by the appropriate genotype the next generation will have only male fertile plants. Seed production with the GMS system resembles seed production with a CMS system in that alternating rows of male sterile and "restorer" lines are grown to produce hybrid seed.

During the last decade most rapeseed breeders throughout the world have been concerned with incorporating the genes for low erucic acid and low glucosinolate levels into their genetic stocks. While this is necessary it has reduced the amount of work that could be devoted to other characteristics. Experimental results now available clearly show that many improvements in rapeseed (or canola rapeseed) are possible. These include increases in yield, improvements in agronomic

characteristics, resistance to pests (diseases and insects) and further improvements in quality. Thus there are many characteristics that can be improved and plant breeding methods can be used to ensure continued progress.

Indeed with the current worldwide surpluses of edible oilseeds and oilseed products I sometimes wonder whether we as plant breeders should have been spending a greater proportion of our resources on improving the quality and diversifying the characteristics of our products than on increasing the yield of our varieties. Manufacturers who make automobiles, television sets and computers are continually changing and improving their products. I believe that we must do everything possible to give our consumers the best possible product.

One or two decades ago the reasons for for developing rapeseed with low linolenic acid content in the oil seemed to be obvious. Now there is some controversy regarding the most desirable fatty acid composition for edible oil. Most of the nutritional studies showing the nutritional benefits of omega-3 fatty acids seem to be based on diets involving fish oils. Fish oils usually contain a complex mixture of rather unusual fatty acids and often high levels of vitamins such as A and D. Since it is possible that other factors may be involved, I would feel more confident about the benefits of omega-3 fatty acids if the nutritional experiments were based on a vegetable oil such as linseed oil. At the same time the benefits of reduced levels of linolenic acid in rapeseed oil have been clearly demonstrated; the product is much more stable . Thus, until the benefits of omega-3 fatty acids have been clearly established, the current price of peanut and olive oil suggests that we might begin by developing two rapeseed oils, one with a fatty acid composition as close as possible to peanut oil and the other resembling olive oil.

I believe that we have been altogether too apologetic about our products. It has taken a large American firm to publicize the merits of the oil. They state that "It is very low in saturated fatty acids, high in monounsaturated fatty acids, has adequate amounts of linoleic acid and contains omega-3 fatty acids." These advantages have been known and canola oil is an excellent product but it is only now that the favorable aspects are being brought to the attention of the consumer. This approach is essential since food consumption or food preference is often based to a large degree on tradition. In Canada we believe that Canola oil is a high quality product. We obtain more than 50% of our requirement for edible oil from Canola and more than 70% of the liquid oil comes from this source. This is a world record for consumption of this product When the people in other countries recognize the merits of Canola oil our whole industry will prosper.

During the years that we have worked with rapeseed we have faced many problems. Some of these problems, such as the erucic

acid question, threatened our whole industry. In Canada, in the mid nineteen-fiftees, Ken Carrol and Joyce Beare-Rogers provided some of the early warning signals about the potential hazards of erucic and other long chain fatty acids which motivated Keith Downey and me to see what could be done about it. We received encouragement and help from many scientists especially Birt Craige (NRC Saskatoon) who helped us to establish laboratories to do the required analyses. As you know the genes conditioning the absence of erucic acid were isolated fairly quickly and the new oil has become a world standard for high quality edible rapeseed oil. As production of rapeseed increased concern about the low quality of the meal increased. Several animal nutritionists such as Milt Bell and Don Clandinin clearly demonstrated that minor antinutritional constituents of the seed, known as glucosinolates, were the major factor which prevented effective use of rapeseed meal by farm animals. This led to a search for genes conditioning reduced levels of glucosinolates. Clair Youngs and Les Wetter (NRC Saskatoon) provided a fairly rapid method for determining the glucosinolate content of small samples of seed. Using this method and seed samples from Poland at Kieth Downey's laboratory in Saskatoon, the chairman of the organizing committee of this Congress, Jan Krzymanski, isolated the first and for a long time the only source of low glucosinolates genes in rape. These genes have been and are being incorporated into varieties in many countries. My purpose in reviewing these events is to demonstrate that progress in our industry was the result of a high degree of cooperation between many agencies and individuals in many countries for the purpose of serving the whole industry. I hope that we will continue to subordinate narrow interests to the interests of our whole industry.

Some problems have been solved but much work remains to be done. This conference is an example of international cooperation and I hope it will help us to use modern science and technology for the benefit of our industry.

With these remarks I would like to thank you for the honor that you have bestowed upon me and to extend my wishes for a very successful industry.