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THE U.S. SEED INDUSTRY: TODAY AND TOMORROWDr. Harold D. Loden ^{1/}

It is a privilege to participate in the program of this 23rd Annual Short Course for Seedsmen. I am particularly appreciative of the privilege of participating in the Short Course during which the Noble Pace Seed Technology Laboratory has been dedicated.

When Dr. Delouche assigned the title for this talk, I was glad he used the term "Seed Industry." This is a much better term than "Seed Trade" or "Seed Business," to characterize what the seedsmen of today do. We are truly an industry just as much as the automotive industry, the steel industry, or the petrochemical industry. In discussing the topic "The U.S. Seed Industry: Today and Tomorrow," I would like to take a brief look at our industry - past, present, and future - with respect to the economic environment in which the seed industry has developed and in which it must continue to function.

To do this, we must look at American agriculture. I recently read an interesting report which pointed out that the American farmer as we know him today has evolved through three definable dimensions.

First, the agrarian dimension began with colonization of this country and continued past the turn of the present century. In this period, farming was not considered a business; it was a way of life. Likewise, there was very little organized seed industry. Seed were a product of the farm whenever possible. Trade was most often between neighbors. There was a very strong work ethic during this era. Much of the labor was generated by the family. Capital requirements were rather small. Land was generally inexpensive and readily available. Those requirements which could not be furnished by the family were purchased. This meant that quite often the initial purchase of seed was not replenished and when purchased were most often obtained from neighbors. There was little interference from state and federal governments. In summary, there was nothing which approached the seed industry as we know it today.

The next major dimension, the industrial, began in the early part of this century with the industrial and technological revolution. Draft animals, required for more than three thousand years for plowing, harvesting, and transportation were made obsolete by the invention of the internal combustion engine and the assembly line. Animals were replaced by machines which did not require oats and corn, thus freeing thousands of acres of land for crop production. Crops could be produced for sale rather than for internal uses such as animal feed. The self sufficient farmer became a marketer. It was during this time that the farmer began losing much of his independence, mainly because his

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capital requirements increased substantially. The banker became more and more important and demanded to know how the money loaned would be spent and how and when it would be repaid. The government interfered with free market for agricultural products and eventually dictated to the farmer how much of each crop he should plant and harvest. I believe it appropriate to say that it was the early part of the twentieth century when the seed industry, as we know it today, was really born.

We have now reached what can well be termed the "Executive Dimension." The farmer of today, and tomorrow, who plans on continuing in business has developed the same kind of profit and loss mentality as an executive in any major business in this country. He has become a specialist in a particular group of crops or livestock. Many are even specialists in production of certain kinds of seeds. His energy is directed toward obtaining the highest return on invested capital. He must be a better manager than his predecessors. Automation is the name of the game. Farming is becoming more and more capital intensive. Marketing is complicated - and often worldwide.

In summary, the farmer has evolved from a frontiersman to a manager of a complicated business - one which is changing and will continue to change at a faster rate than ever before.

I believe it is self-evident that the transition in the seed business has been of the same type and magnitude as that which has occurred in agriculture. These changes have been dictated, and will continue to be dictated, by the characteristics of agriculture - not only domestic but on a worldwide basis.

Let's now look briefly at a number of other facts which serve to shape the environment within which the seed industry must exist.

There is a food shortage in many parts of the world and the cost of food is going up in this country and abroad. This concern about food has stimulated much activity. It was responsible for the recent World Food Conference in Rome, and almost daily we see or hear articles in the press and special TV programs about food. For a long time, almost historically, the American public has taken for granted an abundance of high quality food at low cost.

We should remind ourselves of a few basic facts. First, agriculture is a system for converting basic resources into the goods that people need. Basic resources are land, water, air, light, sunshine, and seed. We could emphasize, "First, the Seed." Living seed contain within themselves the genetic basis that determines the potential for growth and development. Seed are the bridge from one generation to another. The needs of people are food, clothing, and shelter, plus beauty and recreation for quality of life worth living. Therefore, everyone who eats food, wears clothes, and has some type of home has a vital stake in agriculture. They likewise have a vital stake in seed. The potential for growth in seed plus the phenomenon of photosynthesis are the vehicles by which basic resources are converted into goods which people use.

In a broader sense, the agricultural system produces, harvests, stores, transports, processes, and delivers to the consumer. The needs are increasing. World population has been growing at an alarming rate in recent years. Per capita consumption of food has gone up as people around the world have more money to spend. The population problem becomes greater since the immediate result after the basic food needs are met is, in most instances, an increase in birth rate with further increased demand for food. But while the needs are increasing, the resources are declining. Agricultural land is converted to non-agricultural uses. Water for agriculture, industrial, and municipal supplies is not adequate in some areas. Fertilizer has become scarce and expensive. Energy to power the system is also expensive. Agriculture is continually faced with new and difficult problems. The seed industry, as an integral part of agriculture, faces the same problems.

What this means to us, as seedsmen, is that we are part of a constantly changing environment. The direction and magnitude of the changes dictate the changes we must make, or should make, in our products and our business if it is to survive.

As another basic fact, agriculture is a cost intensive business. The conversion of raw goods that people need requires investments in resources, labor, energy, buildings, equipment, and managerial skills. All these items cost money, and the system will not operate for long unless the economic incentive is there. Basically, the consumer of the goods must pay for the cost of production and a little more, or someone else pays for him. If we have food shortages in this country, it will probably be because people choose not to produce for economic reasons rather than because we lack the basic resources and technology to produce.

The history of the seed industry has indeed paralleled the history of agriculture. Agriculture began when man ceased to survive by collecting plants and hunting animals, and began to plant and save seed for successive crops and domesticated animals. Then came the selection of improved lots, trading, and commerce of seed. Here we have finally reached the present state in which we have a sophisticated and complex industry of genetic improvement, production, and distribution of seed and crop varieties. Since a people's well being and prosperity are based on good agriculture, an adequate supply of good seed is basic to agriculture. As seedsmen we are all quick to point out the importance of our industry, but we must also recognize that we also need the land, the weather, and the protection of the growing crop to obtain development of genetic potential. All this is accomplished in the real world of nature and the economic world of dollars and cents.

Unquestionably, we all agree that the developers and producers of quality seed play a vital role in the efficient functioning of the American agricultural economy. Seed which the farmer plants represents a minor cost factor compared with the size of his investment for land, equipment, the cost of labor, and other inputs necessary to produce a crop. The purchase of seed can have a very important effect upon a farmer's financial success, and the price of seed is of considerably

less importance than its potential performance.

Historically, the economic function of the seed company is to contract with growers for the production of seed, the purchase of that seed at the time of harvest, the cleaning and conditioning of seed to prepare it for shipment to customers for planting, and financing the seed crop from the time it is purchased from the grower until it is sold to the customers. One of the unique facets of the seed business is that it is highly seasonal. The structure of the seed business is like any other large organization. It may range in size from a company having annual sales in excess of one hundred million dollars to small one-man operations. Management principles for the seed industry are the same as for any other business of similar size. The seed industry is also characterized by its complexity; a seed company no doubt requires personnel with a wider range of technical capabilities and a higher degree of specialized technology than most business enterprises of comparable size.

It is difficult to determine the total number of seed companies in the U.S. Considering only those companies whose business is primarily the production, processing, and sale of seed as opposed to local seed merchants, we estimate they number about 600.

Another figure, again an estimate, is that the total value of seed planted in the U.S. is probably between 1.8 and 2.0 billion dollars, including that saved by the farmers for their own use. On the other hand, we estimate that the approximately 600 companies producing and selling seed in the U.S. have an annual sales volume of 1.1 to 1.3 billion dollars.

The export of seed from the U.S. is of importance from two standpoints. First, and of greater importance, is that seed from the U.S. provides the basic requirement for the production of untold quantities of food, feed, and fiber around the world. Without this, the standard of living in those areas, as deplorable as it may be in some, would not be what it is today. Secondly, seed exports from the U.S. to other countries is an important facet of our total industry. It is not only important, but has been growing. In 1963, about 20 million dollars worth of seed were exported. In 1974, this had reached a value considerably in excess of 100 million dollars. Those figures not only reflect a growing market but are indicative of the appreciation of high quality seeds produced in the U.S. throughout the world. The U.S. seed industry not only serves as the basis for our national agricultural economy but is doing so on a world-wide basis. The status of technology of the seed industry in the U.S., coupled with some of the best seed producing areas in the world for production of high yields of high-quality, disease-free seed, means that the international trade of seed is expected to continue its upward growth trend.

No analysis of the U.S. seed industry would be complete without recognition of one very important aspect - the very close and unusually harmonious relationship which has developed and exists at its highest level today in the working relationships between the private sector and

the public and quasi-public segments of our industry. Nowhere else in the world are such relationships to be found. Without these relationships, our industry could not have reached its present status in making its contributions to our national and world-wide economy.

Now let's look to the future. It will not be my purpose to impose upon you unprovable predictions based upon crystal ball guessing. Instead, I would like to talk more about the immediate future and discuss some of the problems facing our industry, subject to forces which have already been set in motion.

First, like other businesses, seedsmen have to adjust to escalating costs, and this has in recent years been coupled with shortages in a number of kinds of seed. Production contracts of many specialty crops have to be completely restructured to adjust to new values of options open to the seed producer. The entire economic environment occasioned by "inflation, recession, or stagflation" will have profound effects upon the seed industry in the immediate and long-range future.

Another new dimension for variety development of the future has been introduced by the Plant Variety Protection Act. Both public and private breeders can now enjoy certain safeguards on the production and sale of new varieties they have developed. This program has already indicated its overall value to serve agriculture by stimulating greater research for the development of more improved varieties for farm and garden. We are going to see more sophisticated research programs by the private seed industry.

We are going to see the multidisciplinary approach more widespread. The team of experts has now become essential. Plant breeding must have the broad support from specialists in other related fields. Naturally, this intensified research by private industry will magnify the demands upon universities and experiment stations to train personnel and increase basic research.

Not all of the future is bright, particularly in the realm of regulation. We must accept as a fact that we will be faced with increased government regulation, both state and federal. OSHA is a reality. GRAS is here. DDT is gone. Aldrin and dieldrin are gone. Field burning is being curtailed. New zoning rules and new land use rules appear to be imminent. EPA regulations affecting every segment of agriculture, including the seed industry, are being promulgated in an ever increasing number. Regulations to improve our environment mean that some parts of agriculture will have to adopt very expensive procedures or else shut down. Unfortunately, none of these regulations take into consideration the costs which these constraints, individually or collectively, have upon the seed industry, agriculture, or the consumer. It is likewise unfortunate that many of these new regulations are being set up and administered by individuals who have no training in agriculture or knowledge of farming.

Another factor none of us considering the future of our industry can afford to overlook is the trend to a different kind of corporate struc-

ture with different business objectives for a large segment of the industry. Mergers and acquisitions are bringing together combinations of different disciplines for greater variety of resources. These mergers often bring together the matching of physical science research with botanical research. This should strengthen the total scientific impact. Some seed companies are also diversifying into other related agricultural fields. Many companies are becoming truly multi-national. All of this should bring to the seed industry greater financial strength, more sophisticated management, and a complimentary effect between genetic improvement and other agricultural inputs.

As this evolution takes place, it should be self-evident that the inputs from organizations such as Mississippi State University, its training in seed technology and sponsorship of these seed short courses, must be greatly magnified. It should be further evidence of the fact that the leadership of this institution has already recognized the growing importance of the seed industry and is preparing to meet the demands of the future. Mississippi State University's Seed Technology Laboratory has developed for itself a position unique among institutions around the world. This laboratory is a monument to the foresight of seedsmen like Noble Pace and Lane Wilson, who worked untiringly and unselfishly to help bring the seed industry to its present state of development and technology.

Truly, this modern and well equipped facility and its many graduates stands as evidence of the vision, faith, and foresight of Mississippi State University and its leaders - particularly Louis Wise and "Bill" Giles - in recognizing the challenges which face the seed industry of today and tomorrow.

In conclusion, let's reflect briefly on the remarkable and exciting opportunities in agriculture which are also opportunities for the seed industry. The world population is increasing by about 75 million people per year. We face the challenge of upgrading diets around the world. This means that agriculture has a constant, increasing, long-term demand for its products. Undoubtedly, with proper management, yield levels of crop production can be maintained or increased. The challenge for the seedsman is to generate, with the greatest possible ingenuity, the technology to meet those ever increasing demands. As providers of seed - the basic input for food, feed, and fiber production - the future for those of us in the seed industry seems exceedingly bright.