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## ECONOMIC ISSUES ARISING FROM CHANGE

Warren C. Couvillion<sup>1</sup>

There is an old Chinese curse that states "May you live in a time of change". We may look at this as absurd since all of us accept change very readily or at least we think we do. None of us really like to change. However, I feel that we are probably less bothered by change than our parents, and our children will accept change easier than we do.

In the past few years, the seed industry has seen several major changes. There will probably be more change in the industry in the next decade than there has been over the last few decades.

Factors producing change or evidencing change which have impact on the seed industry include:

FARMERS ARE MORE SOPHISTICATED

LESS POWER IN THE FARM SECTOR

INCREASED PUBLIC PRESSURE

CHANGING STRUCTURE IN THE SEED INDUSTRY

OPERATING IN A WORLD MARKET

BIOTECHNOLOGY

### Current Situation in Mississippi

Before discussing the above listed changes, some information on current practices followed by Mississippi farmers will be discussed. During the 1983 crop year, a survey of Mississippi farmers was taken to ascertain their seed practices. Information was gathered on the cotton, soybeans, rice, and wheat crops. Farmers were asked about varieties planted, seed class, varietal selection, sources of seed, double cropping, and custom cleaning. Some of these results follow.

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The estimated crop acreages of public, private, and unknown varieties are shown on Table 1. It can be seen that most of the soybeans and rice are planted to public varieties. In fact, there were no private varieties of rice reported. An interesting statistic of this table is that almost a half million acres of soybeans were planted to private varieties. This number would have been much lower a few years ago, if any existed at all. Private varieties have sold at a premium to the public varieties. Thus, firms are beginning to be repaid for some of their investment although it will take a much larger share of the market to be profitable. Profit will be delayed because these returns are just beginning to materialize and costs have been accumulating over several years. Wheat, a relatively new crop to Mississippi farmers, is almost all planted to private varieties.

Self pollinated crops indicate changes in farmers' habits for these crops over several years ago. Cotton seed has been handled in the private sector for several years. The 18 percent planted to public varieties is probably up from a decade ago.

It is interesting to note that Mississippi farmers plant extremely high classes of seed (Table 2). It is conjectured that these percentages probably run higher in Mississippi than in many other states, especially for soybeans and wheat.

Mississippi farmers used the Coop/Farm Supply stored at their major source of seed for all of the crops, as is shown in Table 3. Sources of soybean seed showed the most variation, as well as the highest percentage of seed saved. These results are what I would have expected. Our farmers in Mississippi use very little neighbor seed. Those of us associated with the seed industry hope that this does not change. If it indicates change, we view this change as positive.

The major influences for variety selections shown in Table 4 indicate that farmers rely heavily on past experiences in selecting varieties. They also indicate that variety trial information is important. This is viewed as an indication of the level of sophistication of farmers. The surprising number of this table was the extremely low influence that advertising had on farmers. Dealers' recommendations seem to have a much greater influence on varieties planted than advertising.

#### Farmers are More Sophisticated

Today's farmer has by necessity become much more sophisticated in his business dealings. Widely fluctuating prices, high interest rates, farm program alternatives, and the stagnating or the declining rate of increase in land values have forced farmers to become much more aware of the total business environment. The question now is more than "Will it grow?". "Will it pay?" is the question that needs to be asked

Table 3. Two main sources of seed planted, Mississippi, 1984

Source	Cotton	Soybeans	Wheat	Rice
-----percent-----				
Saved	3.9	22.1	15.8	15.2
Coop/Farm Supply	78.7	57.1	77.5	84.8
Farmer/Seedsmen	7.8	11.8	6.7	0
Farmer/Not Seedsmen	2.2	5.5	0	0
Other	7.4	3.6	0	0

Source: Unpublished data from a 1983 survey of Mississippi farmers.

Table 4. Two main influences in variety selection, Mississippi, 1984

	Cotton	Soybeans	Wheat	Rice
-----percent-----				
Planted Previously	45.2	56.0	50.8	58.3
Variety Trail Information	24.3	13.1	10.4	11.6
Dealer Recommendation	17.2	14.4	15.1	11.6
Advertising	2.6	3.0	2.1	0
Neighbor	5.5	6.6	3.8	0
Other	5.3	6.9	17.8	18.5

Source: Unpublished data from a 1983 survey of Mississippi farmers.

Table 1. Estimated crop acreage for soybeans, cotton, wheat, and rice for public, private, and unknown varieties, Mississippi, 1984

	Soybeans		Cotton		Wheat		Rice	
	000 Ac.	%	000 Ac.	%	000 Ac.	%	000 Ac.	%
Public	2,228.7	75.2	181.9	18.5	40.5	6.4	58.3	85.0
Private	450.2	15.2	763.2	75.2	477.8	75.8	0	0
Unknown	285.9	9.6	42.6	4.3	111.9	17.8	10.1	15.0
Total	2,964.8	100.0	987.7	100.0	630.3	100.0	68.4	100.0

Source: Unpublished data from 1983 survey of Mississippi Farmers.

Table 2. Class of seed planted, Mississippi, 1984

	Cotton	Soybeans	Wheat	Rice
	-----percent-----			
Registered	18.3	8.3	12.9	36.7
Certified	66.9	68.0	69.0	63.3
Originator <sup>1</sup>	11.8	1.5	0	0
Non Certified	3.0	20.7	13.8	0
Unknown	0	1.5	4.3	0

Source: Unpublished data from a 1983 survey of Mississippi farmers.

<sup>1</sup>Private industry label--usually synonymous with registered seed.

and is being asked. This means that seedsmen have become and will continue to become more sophisticated. Such things as futures markets, call contracts, options, and computers have become a part of the everyday lives of farmers. Farmers who have not changed to meet the new challenges have often had to change occupations. Small farmers with everything paid for may be able to operate without a minimum of change, but those types of farmers are a vanishing breed.

In the past, the major risks farmers faced were production risks under rather stable market conditions. Now there are tremendous financial risks associated with these production risks. Some of the practices Mississippi farmers, and I am sure many others, have used to help avoid these risks are: increased irrigation, double cropping, and increased mechanization to insure timeliness of operation. What do these things mean to seedsmen? It means that new varieties will need to be developed to meet some of the newer management techniques used by farmers. Double cropping, no till planting, and irrigation may all require special varieties for maximum efficiency. If unexpected rains follow irrigation, a given farmer may have requirements for a drought resistant variety on one field and on the field next to it, need a variety that will be able to resist the effects of too much water.

The capital intensiveness of a farms' machinery complex may increase the pressure for varieties that will allow him to alter his production schedule to use his men and machines in the most economical manner. A systems approach to the farm will have to be tied back to the seed used, therefore increasing the pressure to become more aware of the total farm package rather than one variety of one crop.

#### Less Political Power in Agriculture

That there is and will be less political power in agriculture is not something new to you. This paper will not dwell on this matter except to state that these changes will force farmers and individuals operating in the inputs sector dealing with farmers to operate much more like other businesses. The traditional "Agriculture is a Way of Life" means that what many of us remember from our FFA days may be an obsolete approach to farmers.

The trend toward larger farms will probably continue. Along with this trend, we may see decreased roles in the agriculture support sector such as ASCS, extension service, farm oriented lending agencies, etc., as the numbers continue to decline. These changes will not be drastic, however, they will cause major changes over time.

### Increased Public Pressure

This term is rather vague and can be taken several ways. What kinds of public pressure are now facing and will be facing seedsmen in the future?

Probably the most pressure will be the demand for quality. As pointed out elsewhere in this paper, timeliness of operations of highly mechanized farmers place a much greater burden to provide a quality product that will produce uniform stands. This is not new in the business, but what has surfaced in more recent years is the fact that settlements over seed problems are handled in courts of law rather than between the two individuals concerned.

This type of pressure will require firms to keep many more records than they have in the past. If a seedsman, because of poor seed quality has to incur the cost of replanting and a payment for decreased production due to timeliness, as well as the cost of seed; the bill for poor quality can be staggering. In some cases poor quality may not be the seedsman's fault. However, if he does not have documented proof of the quality of seed when it left his establishment or be able to show that seed from the same lot performed well elsewhere, he may have no recourse but to pay. Thus, the days of "running your own business on the back of a matchbook" as I was told by one of our seedsmen a few years ago are, or soon will be, gone.

Use of variety trial data gathered by an unbiased institution also puts pressure on your product to perform. These types of demands may be good or bad for your firm. Regardless of the outcome, increased pressure is placed on firms and there is little hope for anything but increased pressure.

### Plant Variety Protection Act of 1970

This piece of legislation has had and will have the most significant impact on changing the structure of the seed industry since the widespread use of hybrids came into the industry. Even though the act has been in place for 14 years, its impact is only just now having an effect due to the nature of the time involved to develop new varieties and have them accepted by farmers. Farmers gave as their major reason for variety selection as "Planted Previously". This reason was given as one of the two main influences for planting 45 percent of the time for cotton and over 50 percent of the time for soybeans, wheat, and rice, thus the long time required for heavy private involvement.

Many of the large and some smaller corporations have developed protected varieties. These varieties are performing extremely well when compared to the public varieties. In fact, in Mississippi soybean trials the private varieties in most instances have outperformed public

varieties. A survey of 1982 farmer plantings showed that approximately 15 percent of soybeans planted were planted to private varieties. One of the major suppliers of soybeans said to me personally that his firm had sold over 40 percent of their bean seed under private label. Eleven different private labels were listed by farmers. If we think back only a couple of years, we can see that this is a significant increase. Looking ahead, the move to private varieties at a rapid pace seems eminent. I am not familiar with many of the other states, but here there are more than 10 companies developing soybean varieties adaptable to our state (also adaptable to Louisiana and Arkansas). The number of people doing similar work on public varieties is much, much lower. Given that breeders, as a group, are equal in abilities, the sheer numbers of people working in the private area would lead one to this conclusion. In many cases individuals working in private firms have access to a higher level of technology than is available to public programs. This has been magnified by tight budgets in both state and federal programs.

The potential returns to "building a better mousetrap" has been the prime mover to this increased interest. Many new entrants into the seed business are firms who are diversifying into other than their traditional areas. We have seen large drug companies, food companies, and other types of firms enter the industry. Some of the smaller companies who have historically built their business on expanding public varieties for planting by farmers have also entered the business varying degrees of success. They have entered either by purchasing rights to varieties or by developing their own through the hiring of breeders. One of the problems with free enterprise and private industry is that if left alone "it works". Thus, the finances to work for several years in a breeding program that may or may not be successful in producing the "better mousetrap" is beyond the financial scope of many of these firms. If you are small "you better be good" is a statement that bears truth in the seed industry.

Joint ventures between large and small firms already operating have made the transition from public to private varieties smoother than could have been the case for other types of industries. The large firm with a newly developed variety in many instances has acted in a very similar manner to that of the foundation seed program to provide basic seed for expansion. The difference being that the parent firm received royalties and the small firm has the rights to sell the variety in a local area. This arrangement has been beneficial to both parties in many cases. However, it should be noted that profits are usually the bottom line. When and if it becomes more economical to "do it yourself," the role of the small firm will diminish.

Seed conditioners may play an increased role in custom cleaning but custom cleaning is not the major source of income for plants except in isolated cases. The money to be made in the seed business is from purchasing seed at a small premium above grain prices and selling it at



seed prices. The margin in these types of operations are much greater than those received for custom cleaning (usually 200 percent or more above).

The above discussion leads to further thoughts of other segments of the seed industry that have traditionally played important roles. The segments I am speaking of lie very close to home. What will be the future roles of universities, foundation seed programs and seed certification programs. Some of their major traditional functions will be abandoned. It is probable that the magnitude of current roles will be altered. The sizes of seed certification agencies and foundation seed programs will probably be smaller. On the university side, changes will probably allow researchers to do more basic research since there will be some reduced pressure to release new varieties. In any event, it is felt that our farmers will be the primary beneficiaries from these changes.

#### Gravity Tables

In addition to a changing structure of the firms within the industry, there are some changes taking place within existing firms. In the conditioning side of the soybean industry, for example, there is an increased interest in the use of gravity tables in the conditioning line. If the reason for installing the gravity table is improved quality, firms are to be applauded. If the sole reason for installation of the gravity table is increased sales, your firm needs to take a hard look at the expense of adding these to your line. There has been some work in the physical value of the use of gravity, however, I do not have the answer from an economic standpoint. As stated earlier "Will it pay?" will be the determining factor for inclusion of gravity tables in soybean lines.

#### World Markets

One change that has to be made whether talking about inputs (seed) or inputs is that we face a world market for our products. This is more so true on the product side of the market. Often seed varieties are not well adapted to many areas and our markets may be limited in that respect. From 1970 to 1982, U.S. seed exports grew from \$62 to \$290 million dollars, an increase of over 450 percent (3).

Where are these markets for our seed? Our bordering neighbors accounted for approximately 32 percent while Japan and the EEC accounted for an additional 36 percent of our seed exports (3). Rossen pointed to the Mideast, South Korea, and Africa as major prospects for new seed business in the short run and Turkey, Yugoslavia, South Africa, and China as potential customers in the future. Vegetable and crop seed are

our major seed export crops. The two major crop seeds exported are corn and soybeans, respectively.

Firms should look at exports in the future for increased business. It is my feeling that we will see increased business. It is also my feeling that we will see increased exports in the future particularly if the trend of firms becoming larger continues. Many of the new owners and old owners in the seed business are already in the international market.

### Biotechnology

One of the new "Buzz Words" is Biotechnology. If one thinks for a minute, all agriculture research that has been going on for years could have fit under this label. Dr. Delouche, in a series of articles in Seedsmen' Digest in 1983, discussed several technological issues that may drastically alter the seed business as we know it. The Plant Variety Protection Act of 1970 has altered the structure of the industry. We are seeing a shift in the size of firms and the location of some of the basic functions of the industry, however, the same basic functions are being performed, i.e., soybean breeding by private firms rather than universities. When discussing Biotechnology, we are talking about a change in the basic functions being performed that may be far more drastic than anything that we have witnessed thus far. Hybridization drastically changed the seed industry, however, seeds are still produced in the field.

In the April 1983 article, Delouche states:

The new Biotechnology being developed and positioned for exploitation is based one way or another on progressively deeper insights into genes, gene action and control, and the associated physiology of differentiation. The technology arising out of these insights provides the means to do things only dreamers dreamed about a few decades ago. [p. 10, April 2].

Some are particularly intriguing and many have far reaching economic effects on the industry. Some of these are cloning, gene transfers, somatic hybridization, somatic embryogenesis, and coatings.

### Cloning

Cloning involves taking a bit of tissue from a plant and culturing it in a broth of nutrients and hormones (tissue culture). In some cases seedlings have been regenerated successfully in wheat and tobacco. Using this method of propagation, the sexual process which reshuffles traits is by-passed. The promising feature of cloning (making copies) is that the superior plant could be duplicated in enormous numbers (2).

### Somatic Embryogenesis

Somatic embryogenesis is a process where tissue is taken from young embryos, floral stalks, or very young leaves. They can be cultured to form somatic embryos identical to the embryos in true seed, dispersed and induced to germinate and develop into a plant. Looking ahead, we can visualize the production of "cultured" seed in the laboratory (2).

### Gene Transfers

Gene transfer is the transfer of genes or gene sets from one species to another (recombinant DNA technology). Monsanto announced last year that their scientists had successfully transferred a genetic trait from a bacterium to a plant cell. If one lets his mind wonder a bit, we can think of changes of awesome magnitude. One pointed out by Delouche was the conceivable potential to transfer the nitrogen fixation symbiotic mechanism from legumes to cereals, thus diminishing or eliminating the need for nitrogen fertilizer. Something like this could have tremendous effects on grain production world wide (2).

### Somatic Hybridization

Somatic hybridization is a method of breaking down the barriers of sexual crossing from species to species. Protoplasts from different species can be caused to fuse thus producing a hybrid cell from which a hybrid plant might (and has been) generated. Combined with tissue culture, cloning techniques could produce totally new plants combining the desirable traits of two sexually incompatible species. This process can also lead to mind boggling thoughts of what may lie in the future.

### Coatings

Coatings have been used on the seed in the past but the surface has only been scratched. From the above discussion of the new biotechnology it follows that newly developed materials will require mediums to make them useful. Increased use of coatings may become a reality much sooner than some of the other techniques we discussed.

Delouche states:

Increasingly, the seed is also being perceived and used as a convenient carrier of "applied" materials for the purpose of protecting the seed and developing plant against pests, influencing the growth and development of the plant, and/or modifying the environment in the vicinity of the seed in desirable ways. [p. 26, July 2].

Systemic fungicides, insecticides, micronutrients, and season long protection against certain diseases are now being applied to seed. Using crop seed as carriers of weed control chemicals is relatively new. There are many other innovations that are possible using modern coating technology.

#### Summary

The above mentioned "new technologies" will definitely play some role in the future. The question for many of these is, When?. The costs of putting these technologies has not received much attention, and rightly so, since many of these would fall in the category of basic research. Should some of the techniques become economically feasible we will see tremendous changes in the seed industry.

Many of the things presented in this paper point to an industry that will use much higher levels of technology in the future. Much of this technology will require large amounts of capital which point to larger and larger firms. The acquisition of smaller firms by larger firms has already begun. Those of us who remain complacent in our own little world will truly understand that the Chinese curse presented has true meaning.

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