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What Industry and the General Public Expects of Graduates from College Agriculture Departments

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Panel Discussion

Industry and the general public expects any graduate trained in any phase of agriculture to have sufficient agricultural knowledge to be able to make a contribution to the community in which he lives and works. If the graduate expects to earn his living from the agricultural economy, then because of his training he is expected to make some contribution toward the furtherance of that economy. In many of the other countries of the world where it is more difficult to obtain an advanced education, the college students are trained for the express purpose of becoming leaders in their respective fields. Here in the United States, although expressed in a somewhat different manner, the same thing is expected.

Intelligent agriculture is one of the most complex of all businesses. Soils, plants, animals, climates, and men – probably five of the most complex and variable factors in any civilization – all enter into a sound agriculture program. Consequently, it is impossible to adopt any fixed rules by which we can apply our agricultural knowledge.

It should be the purpose of everyone connected with agriculture in any way to give the land operator – be he farmer, rancher, forester, or other – the viewpoint from which he can regard his land and water, his work and his life, as inseparable parts of nature's cycle. In this way, the farmer begins to realize that modern science can and does affect his daily life. The personal application of scientific advances will have a profitable meaning for him.

The forces of knowledge and research are eternally at work on the problem of agriculture. But that knowledge must move to the farm. The farmer himself must adapt it to his own farm.

College is the place where our knowledge or ideas or facts are formally presented at the highest level. It should also be the place where the basic or fundamental facts obtained in the many different fields such as mathematics, chemistry, physics, biology and other scientific fields together with our liberal arts training can be integrated into an overall application of knowledge.

Knowledge, without action, is worth very little. And in agriculture, applied knowledge is the difference between progress and no progress. Some of the best advice I ever received came from an old college

professor who once said to me, "A college education won't hurt you any if you are willing to learn after you get your degree." When I graduated I thought I had all of the answers, but the longer I work in the field of agriculture the more convinced I become that it is much more difficult to apply knowledge than it is to obtain knowledge. To me, college increased my knowledge of facts. And knowledge of facts are essential, but it also takes something I prefer to call common-sense or horse-sense, if you will, to integrate and put that knowledge to beneficial and practical use.

In agriculture we are working with people, basically. Therefore, it is essential that we be able to communicate with people, either orally or written or both. Some people with whom we must communicate understand technical language – others must have the technical information rephrased and retold in everyday language. As long as we continue to communicate in the English language, it is important we know how to express our ideas and thoughts properly and accurately. That alone is sufficient reason for good training in speech and grammar and composition. We do not communicate wisdom; we communicate ideas. Most people spend more time communicating than doing anything else – that is, reading, writing, and talking. However, communication between individuals and between groups is probably one of the most outstanding defects that civilization is facing today. I have used the term communication because it expresses an interchange of thought or an exchange of information. To communicate effectively is to listen and understand, and to understand is to recognize basic needs and desires and then try to meet those needs and desires.

What are some of the more specific things expected from graduates from college agriculture departments? Before we start thinking in terms of the future, let us briefly look at some of the very important developments of recent years that have significantly affected the agricultural economy. Some of these, not necessarily in the order of importance, might be listed as:

1. Discovery that land does not wear out with proper care and management.
2. Male sterile technique in plant breeding.
3. Systemic insecticides.

¹Agronomist

²2007 Editor's note: Olin Industries and Mathieson Chemical Company merged in 1954 to form the Olin Mathieson Chemical Corporation, which adopted the name Olin Corporation in 1969. In 1999 it spun off its specialty chemicals business as Arch Chemicals, Inc.

4. Chemical weed and brush control.
5. New additives for livestock feeds such as hormones, antibiotics, etc.
6. Atomic radiation for plant mutations and changes and tagged ions for chemical studies.
7. Performance testing of beef cattle.
8. New kinds and forms of fertilizers.

When it is realized that many of the above items have taken place during the past 15 or so years and how this has changed many farm operations, I think the college agriculture departments can take a pat on the back for a job well-done, but the surface is only being scratched. Let us think about a few of the more important developments we can expect within the near future that could have an even more significant impact on the agricultural economy of the world. They might be any of the following:

1. New crops adapted especially for cold or drought areas.
2. Practical use of solar energy.
3. Soil conditioners for structure changes, surfactants, wetting agents, etc.
4. Weather modification such as predictions, foil mulches, reflection, absorption, etc.
5. Hormones for synchronizing heat periods in livestock and chemicals for changing growth characteristics and development of plants.
6. Increased efficiency in utilization of soil moisture and normal rainfall and irrigation.
7. Utilization and marketing research.

And there is still much work to be done on problems that have been with us for all these many years. For example, losses to American farmers from insects amount to about \$4 billion each year, about \$3 billion from plant diseases, and about \$1.8 billion from weeds and grasses. The American farmers spend about \$300 million a year for pest control and industry is spending about \$8 million each year for pesticide research alone.

The importance of research in the field of agricultural chemicals is shown in that industry last year spent about \$160 million. This is about the same amount that was spent by the United States Department of Agriculture (\$83 million) plus all 48 of the Land Grant Colleges (\$77 million). Industry estimates that it costs about \$1.2 million to develop, test, screen, and successfully get a new pesticide accepted on the market. This certainly points out the fact that a lot is expected from graduates from college agricultural departments and that the opportunities are present.

Fifteen agricultural chemical companies, large and small, report that they now employ about 375 agricultural college graduates and plan to add 175 more during the next five years. This indicates almost a 50 percent increase.

The fertilizer industry estimates a continuing need of 200 to 300 college graduates, mainly with an agronomic or general agriculture background, each year for the next 10 years. The National Science

Foundation found that industry hired about 20 percent of agricultural science graduates who received their B.S. degrees. The chemicals and allied products industry constitutes only about 10 percent of those hired by industry, which means that many are being hired by industry that is only indirectly concerned with agriculture.

An important reason why the fertilizer industry is interested in employing agronomic majors is summed up in the statement found in the study, "Informational Sources Important in the Acceptance and Use of Fertilizer in Iowa," made by Marvin Anderson: "Fertilizer dealers and salesmen were selected by 12 percent of the users as their main source of information on new fertilizers. The Production and Marketing Administration, Soil Conservation Service, and Vocational Agriculture instructors in total accounted for slightly less than the fertilizer dealers and salesmen. While over 50 percent of these same farmers credited their landlord, neighbors, and friends as a causative factor in starting to use fertilizer, only 4 percent said they would go to the same group for information on a new fertilizer just about to be placed on the market."

Another study made in Louisiana showed that for every question asked of the county agent concerning the use of fertilizer, nine questions were asked of the fertilizer dealer.

The results of these studies indicate the strategic and increasing importance of fertilizer dealers and salesmen as sources of technical information during this era of rapid technological changes in the fertilizer industry. An important result of this trend is that a greater burden is placed on handlers of fertilizer to have available for farmer distribution the most recent technical literature on fertilizers and to be able to understand and answer questions raised by farmers.

More widespread use of sufficient fertilizer can make a particularly significant contribution to the lowering of per-unit costs of farming and the improving of farming efficiency. This is very important because the basic long-range needs of American agriculture are to reduce per-unit costs, to improve quality, and to expand markets. There is still a lot to learn about utilizing fertilizer more effectively. Also, as our knowledge increases, it must be put to work on the farm.

The use of commercial fertilizer has nearly quadrupled in the past two decades. Research in soil science and plant nutrition has provided the know-how. Recognition of the economic advantages has provided the incentive, but the American farmer has done the rest.

The fertilizer industry of today is the largest of the industries producing heavy chemicals. It appears that in the future the manufacture of mixed commercial fertilizers will be even more strictly in the hands of the chemist than it has been in the past. This may tend to center production in fewer hands than is the

case today. Unlike most American industries, the fertilizer industry of the United States enjoys no tariff protection, so that during normal years if American fertilizer prices get out of line with world prices, imports will follow. It is certainly to the credit of the fertilizer industry that at no time, either during the emergency periods or since, were fertilizer prices increased markedly, unreasonably, or out of proportion to general price increases. Continuously and today, fertilizer is still the farmer's 'best buy' and value among all of the farm supplies in which he makes an appreciable investment.

I have purposely talked about the fertilizer industry because I am more familiar with what it expects from college agricultural department graduates. In order to understand where these graduates might fit into the fertilizer industry it is necessary to look at some of the phases of the industry. In addition to maintaining and operating manufacturing plants and related functions, the fertilizer industry maintains chemists, agronomists, and laboratories to test materials and finished products, selects and trains dealers and agents who provide local distribution. The industry also checks on results obtained by fertilizer users, assists in the dissemination of official and scientific information about fertilizers to all interested in the use of fertilizers, cooperates with all groups interested in maintaining and improving soil productivity, and conducts research to improve present materials, develop new and better materials, conserve natural supplies and improve methods of manufacture, distribution and use.

The change and competition occurring in the fertilizer industry have furnished further incentive for employing well-trained men who can use knowledge gained in college and can apply it to the changes that are taking place in agriculture. Many of the production practices used by farmers today were not even known 20 years ago. Future production will be more and more dependent on sound chemical management together with better water management. It has been said, and rightly so, that in the future, fertilizers properly used may have to account for at least 50 percent of our total production of most crops.

The fertilizer industry, which is only one of the many industries needing men well-trained in the field of agriculture, is able to obtain only 15 to 20 percent of the number needed. And the fertilizer industry today wants well-trained men who don't "guess" their way around in agriculture. Looking into the future, this situation is likely to become critical – it is serious already. Each year, not only are a smaller percentage of the students enrolling in colleges, but fewer students are enrolling in those courses that would qualify them for degrees in the field of agriculture. This means that there are fewer well-trained graduates for, not only new jobs, but to fill vacated jobs in industry, in Federal Government,

in Colleges and Universities, and in State and local government, and in vocational agriculture.

From an income standpoint, a study made by the National Science Foundation in 1951 the median income for men in industry was \$5,900, in Colleges and Universities, \$5,700, \$5,600 in Federal Government, and \$4,200 in State and local government. The median in private industry was higher for all degrees and for all age groups although the greatest difference was in the age group from 35 to 50. The reason was probably due to the fact that industry was willing to pay higher salaries for men who had both experience and training.

This last point has some far-reaching influence. For example, since industry tends to pay higher salaries than the other groups, it is only natural that many of the men who have proven their ability to apply their knowledge of agriculture are offered and accept positions at the higher salaries. Consequently, a very high percentage of the agricultural trained men in industry worked at one time for one of the other groups mentioned above. And with fewer students enrolling in agriculture competition has become very keen between the Land Grant Colleges and the small school agriculture departments. Having had experience with both types of schools I know a lot of the disadvantages of each. Certainly, from a purely research standpoint, the student has a better opportunity to receive better training from the larger Land Grant Colleges, but in the applied fields of agriculture, it is frequently better for the student to have a well-rounded background in agriculture than it is to have specialized too much.

In our organization, we have a number of graduates from both Land Grant Colleges and from small school agriculture departments and it would be very difficult to separate them in so far as their work and performance is concerned. It seems we must look at some of the things we are attempting to do a bit more realistically. For example, if we are attempting to train our students to qualify for specialized work after graduation then we should certainly give them specialized training in college. However, if we are attempting to train our students to qualify for generalized agricultural work, then we are going to have to give them training in general agriculture knowledge. Take the case of a student who wanted to be a clay mineralogist after graduation. This is a highly specialized field and he will of necessity have to have specialized training. But let us take the case of a student who wants to become a field representative for an agricultural chemicals concern or a county agent. This student will be working with all segments of agriculture and he needs general training. Actually, there is no conflict between the two types of training – there is a place for both, and there are students for both.

Industry and the general public have the right to expect any graduate trained in any phase of agriculture to have a better understanding of that phase

than people not trained along those lines. All of you are probably well acquainted with many cases where some of our students were trained in one phase of agriculture and then devoted their energy, efforts, and lives to another phase of agriculture. Some were very successful at making the change, others were not. To me a part of the reason was one could make the change in the application of his basic knowledge and the other could not. This is true with any field of education.

From the progress that has been made in the field of agriculture it appears that students have not only

received the fundamental training on which to build and learn after graduation but they have also been able to make efficient and economical application of that knowledge because agriculture is better today than it was only a few years ago. And as long as we have to depend on agriculture for food and fiber and shelter for the peoples of the world, there will be a need for graduates from college agricultural departments with better training for greater progress. Our leaders in agriculture of the future are the students in our agriculture departments today.

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