

## SCOPE OF SUNFLOWER RESEARCH - CARGILL, INCORPORATED

By

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It is a pleasure for me to be a participant of this conference and to have been a part in working toward its development.

A number of you realize that Cargill is involved in sunflower research. A few of you have been to our Research Farm and know first-hand some of the work we are doing. Others are asking, "What kinds of research is Cargill doing with sunflowers?" Might I first state that our program is a modest one. Our research operations are centered primarily at Glyndon, Minnesota, which is located in the Red River Valley just east of Fargo, North Dakota. On this Research Farm we do most of the breeding and a majority of our agronomic testing. In addition to this location, we also have testing sites at Fort Collins, Colorado; St. Peter, Minnesota; Grinnell, Iowa; Seward, Nebraska; and a test site this year at Wadena, Minnesota. At our Livestock Research Center near Elk River, Minnesota, we do feeding trials; at our Minneapolis General Office and Research Center, we carry on our product testing and utilization as well as marketing research and development. Additionally, we have a winter nursery at Pergamino, Argentina.

What areas of research are we primarily involved in and why? I would consider our major area of research, and perhaps the most productive, to be cooperative research. In other words, we want to work closely with the state institutions of North Dakota and Minnesota, with the U.S. Department of Agriculture, with our friends across the line in the Canadian Department of Agriculture, and with other commercial companies. One of these cooperative research projects, a weed research program, will be reported by Dr. John Nalewaja from North Dakota State University. We worked with Melroe Manufacturing Company demonstrating the effectiveness of harrowing sunflowers for weed control. In fact, I have a film with me which is available to those of you wishing to see one of these harrows in action. Currently, we have under way a cooperative study covering bee pollination. We are only one of several firms joining with North Dakota State University, the Growers Association, and Concordia College in this investigation. We feel this is an excellent opportunity for all of us to work together in finding an answer to a common problem. Here we asked the question, "How much can we influence yields in this area by the addition of honey bees?" This sounds like a simple question; and, since we don't know the answer, there's only one way to find the answer -- applied research. Another example is a rotation and fertility study be-

ing carried out by the Area Vocational School located at Thief River Falls, Minnesota. Their vocational agriculture department asked us what type of useful sunflower research they could do, so we sat down together to plan the test. We are now working with them in carrying out this study.

We cooperate with the U.S. Department of Agriculture and the Canadian Department of Agriculture in conducting yield trials. We work especially close with Murray Kinman. Sometimes I wonder if my telephone bill runs a little high for my boss, but we feel that the cooperation we've had between ourselves and the Department of Agriculture has been well worth it. Together we have been able to get things moving in a breeding testing program which could not have been done as rapidly otherwise. We feel that it is in the best interest of everyone where we work together to solve common problems. At Cargill, we have an area of research dealing with products and marketing where we investigate the sales of oils and the oil products such as resins and vehicles. Here are some of the types of questions we raise: "What kind of products can be made for industrial application out of sunflower oil?" - "How do they compare to alternatives made from safflower oil or soybean oil?" We work directly with people who buy these products to evaluate how they compare in various uses.

We also do research with the sunflower meal. We have an extensive Research Farm in our Livestock Feed Division (Nutrena). Here they are running a number of trials using sunflower meal. We want to know how it will best fit various types of rations. I think Dalton Gandy stated earlier that there wasn't too much information on sunflower meal in the feeding of large animals. This is one of the primary areas which we are testing. We are also cooperating with North Dakota State University in evaluating sunflower meal in poultry rations.

Then, of course, there are the hulls. What kind of applications could these be put into? Many suggestions have been made - some uniquely interesting. Could they be used like wood shavings? Can they be used to make a fiberboard? Could they be molded into charcoal briquettes? Would they have a place in terms of animal feed as a roughage to add to or feed with a high-concentrate ration? These research areas are not my responsibility, but the company is currently doing work along these lines.

Research under my direction falls into two categories- one of cultural practices, the other a direct breeding program. These are primarily in areas which are not being tested or worked on by state institutions and is where information simply is not available for growing sunflowers in this region. When the farmers ask me for answers to specific problems, I feel that if I don't know the answer, I should try to find it. If the answer is not in the literature or available from someone else, then there is only one thing to do--that's to set up an

experiment and find the answer. I find myself quite involved in a few such trials. For example, a farmer might ask: "I live out north of Crookston, and if I get a late spring and have to delay planting, what variety should I plant at what population?" "At what date do I change varieties?" "Should I change populations to fit this?" Thus I have a variety by date by population study.

What about seed size? We've worked some in terms of grading and processing sunflower seed for precision planting. As we became involved with sunflowers, we found that there were problems in getting seed to plant properly. Many of you who worked with us along these lines recognize that precision grading of seed does result in more accurate planting, so that desired populations and spacings can be achieved. Then the farmer comes back and says, "I don't want that small-size seed; it's not going to grow as well." Is he right or wrong? The usual situation is that smaller seed often does give slightly lower yields. Out of curiosity a year ago I planted the three grades we used last year. To my surprise, the smallest seed gave the best yield at all locations. I don't have a good explanation for this, so I'm simply testing it again more extensively. There is also the question facing the seed producer of "How much isolation do we really need for seed increase and certification?" "What is the effect on oilseed and bird seed types of sunflowers if isolation is inadequate?" There are many more realistic and important questions such as: "What populations should I grow?" "How should they be varied to fit the available moisture?" "Should different populations be used for different varieties?" Other questions arise as we start moving into hybrid production. With the recent release of the genetic male sterile inbred line from the Department of Agriculture it is now possible to make hybrids by simply removing fertile plants prior to their shedding of pollen. We know that it is possible, but is it feasible? Since no one knows, we are trying it on a small scale. In addition to these cultural practice studies, we are involved in varietal evaluations. What are the best varieties available for planting in this area?

In addition to these other areas of research we have a modest breeding program. This program is geared toward improving both yield and oil content. We're using, primarily, varieties from the Soviet Union as a base. From these high-oil varieties we are deriving inbreds and testing their combining ability. We are hopeful that we will be able to use these inbreds in the production of a high-yielding very high-oil hybrid in the near future. At present we don't know how effective the genetic male sterile system is going to be. Can we incorporate the red-stemmed marker? If these inbreds are not used in hybrids in the very near future, we think that they will be used in synthetic varieties.

One of the most useful tools we use in our breeding program is the NMR (Nuclear Magnetic Resonance Analysis) equipment of the University

of Illinois at Urbana. Just to give you an idea of the size of program which we are running, this past year we analyzed over 15,000 samples for oil content. We have a disease nursery in which we plant sunflowers on a continual basis to build up disease level in the soil in order to screen inbred lines as we develop them. We have the over-winter nursery in Argentina. This winter nursery permits us to move the program twice as fast. We are using both a direct inbreeding (from open-pollinated Russian varieties) and a modified recurrent selection program. Sometimes I feel that we have a tremendously big program; but, on the other hand, if I look at it with only myself, one technician and a minimal amount of part-time labor, I realize that it is relatively small. Labor is one way of measuring the size of the program. Another way is by the plot area which we use. We have over fifty acres of nursery plots, 40 acres of which are the rod-row type of material. Those of you who work on experiment stations realize that this is a fair amount of material. This is over 16,000 of various types of entries in the breeding and testing program.

I hopefully have covered most of the areas in which Cargill is conducting research dealing with sunflowers. The total program is geared toward improvement of variety and towards answering practical questions for both farmers and consumers.

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