RICHARD B. RUSSELL AGRICULTURAL RESEARCH CENTER

By

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Mr. Chairman, Ladies, Gentlemen, etc.,

I am here to tell you about the sunflower research we are responsible for at the Richard B. Russell Research Center in Athens, Georgia. Our investigations of sunflower oil were started last year soon after we moved into our beautiful new building.

Russell Research Center is new - only about a year old. Therefore, before discussing our sunflower research I am going to tell you about the Center and outline some of the research capabilities.

First, about the name of the Center, last March, Secretary of Agriculture, Clifford M. Hardin, announced that the Southeastern Agricultural Research Laboatory in Athens, Georgia, as being named the RICHARD B. RUSSELL AGRICULTURAL RESEARCH CENTER in honor of the Senior Senator from Georgia.

In making the announcement, Secretary Hardin said, "Senator Russell supported the development of the Research Center in Athens from its inception and the facility is truly a monument to his diligence and persistence in improving and expanding research effort. Although the Center is designed to concentrate on the crops, poultry, and livestock products of the southeast, its findings will have an impact across the Nation".

Concept and Construction of Russell Research Center

In 1962 the Senate asked the Department of Agriculture to submit to the Congress a program for strengthening research to expand utilization of agricultural commodities.

This report was placed before the Congress in 1963 by Senator Russell. Arguments for a research center in the southeast were based on:

1. The shift from cotton to diversified agriculture;

2. The rise of meat and poultry production and the simultaneous need for more versatile feedstuffs;

3. The changing labor supply with a consequential need for mechanical harvesting and new crop varieties suitable for such practices;

4. The increasing production of oilseeds;

5. The growing need for more processing of agricultural products to give farmers additional returns; and

6. The need to supply processed products tailored to meet the specific needs of domestic and foreign markets.

Funds for Russell Research Center were included in the 1964 agricultural appropriations bill. Architectural plans were developed and construction was begun late in 1966. The building is now essentially complete. We moved into it with a skeleton staff of 19 people in May, 1969; we now have about 100 people on board. The Center cost $11 million to build.

Mission and Organization of Russell Research Center

Russell Research Center has a very broad mission. We start with a problem in the field or orchard and follow it through the succeeding steps of harvesting, processing, distribution, and merchandising. The Center will have the widest range of scientific disciplines of any research facility in the Department of Agriculture. We will not have any production capability on the site. Production of crops, poultry or animals, will be done cooperatively at federal and state agricultural experiment stations.

As Secretary Hardin stated, our research will emphasize studies on crops important to the southeastern states. These include fruits, vegetables, and tree nuts; animal products, with particular emphasis on poultry products and pork; feeds, forages and oilseeds, particularly the southeastern grasses, Coastal bermuda, bahia and pangola; and sunflower, peanuts, and other southeastern oilseeds. We will seed new and more efficient processes for making new and traditional products.

Organizationally, our work is divided into seven groups. There are three commodity groups and four groups that may be called support groups. The three commodity groups are Fruits and Vegetables, Animal Products, and Feeds, Forages and Oilseeds. The support groups are Engineering, Pharmacology, Biochemistry and Product Evaluation.

We will have a strong cooperative federal-state program under which southern state experiment stations, other research divisions of ARS, and RRC will jointly work toward the solution of important regional problems. In this program, scientists from other federal and state organizations will work at the Center where this is feasible and advantageous to the research. This close cooperation will provide a much wider range of scientific disciplines that can be directed toward the solution of problems.

In developing new and improved processes, we will be mindful of the increasing problems of pollution resulting from agricultural industry and concerted research effort will be devoted to minimizing wastes from processes.

Sanitation and microbiological problems of the food and feed industries will be the subject of substantial research effort in each of the product classes.

When completely staffed, the Center will employ about 500 people, of which about 150 will be senior scientists, that is people at the Ph. D. level.

Sunflower Research

Our sunflower studies, under the leadership of Dr. James A. Robertson, are aimed at the development of:

1. Flavor and color-stable cooking and salad oils for domestic and export markets;

2. High polyunsaturated oil with bland falvor for use in such foods as emulsion-type margarines, filled milk, mellorine, and toppings;

3. A bland defatted flour containing less than 3.5 percent crude fiber and more than 50 percent protein for use in food products, such as breakfast cereals, bakery products, protein-type beverages, meat products, and meat analogues;

4. Low-fiber (not more than 3.5 percent crude fiber) high-protein (over 50 percent) feed meal for use in poultry feed, and sufficient information on nutrient content to avoid discounting the product for use in computor formulation of feeds; and

5. A ruminant feed from hull fractions and receptacles in which at least 80 percent of the carbohydrate is available as metabolizable energy, a three-fold increase in digestibility.

Texas Agricultural Experiment Station scientists are engaged in basic studies on the properties of sunflower important to food use under a grant from the Research Center. This evening, Linda Dugger and Dr. J. V. Pomenta will present two papers on this work, which has been carried out under the direction of Dr. Edward E. Burns.

At the Russell Research Center we are investigating the use of sunflower oil in various food products and as a cooking oil. We are interested in defining how the composition of the oil affects its stability and keeping qualities as well as that of the products in which it is contained or cooked. The information reported here is part of this study.

The fatty acid composition of the oil of sunflower seed has been reported by a number of investigators to vary with planting location and with the climatic conditions during the growing season (1-5). Sunflower seed produced in the northern part of the United States yields an oil which typically contains 65 - 70% linoleic acid (2); whereas, oil from seed produced in the South varies from 30 - 60% linoleic acid (1,4). Sunflower oil with a lower linoleic acid content, such as is produced in the South, probably will be less susceptible to oxidative rancidity and thus have better keeping qualities than oil with higher linoleic acid content. Information is therefore needed on the fatty acid composition of the oil of new varieties or hybrids of sunflowers. Plant breeders and agronomists will find such information useful in the development of

Figure 1

FATTY ACID COMPOSITION OF SUNFLOWER VARIETIES

GROWN IN THE SOUTH

Growing Area	No. of Var. a/	Composition of Oil %(area ave.)		
		Saturates	Oleic	Linoleic
Clemson, S.C.	10	11.0	43.6	45.6
Crossville, Ala.	11	11.3	44.8	43.5
Experiment, Ga.	22	11.6	44.8	43.3
Tifton, Ga.	19	11.2	53.0	35.3
Baton Rouge, La.	8	10.1	54.2	34.4
College Sta., Tex.	22	9.7	57.6	32.2
Ave.		10.8	49.7	39.1

a/ Oilseed varieties.

improved varieties of sunflowers suitable for the South.

The Russell Research Center has received over 200 sunflower seed samples of from 7 to 27 varieties grown in 13 experiment stations in 6 states in the Cotton Belt and in California. These samples were obtained from cooperators of the U.S. Regional Sunflower Yield Tests conducted by Dr. Murray Kinman, Oilseed & Industrial Crops Research Branch, USDA, ARS, College Station, Texas. The total oil content and fatty acid composition of the oil of seed from six experimental plantings in five southern states in 1969 are summarized in this report. (Figure 1).

The average total oil content ranged from 36.5 at Experiment, Georgia to 44.0% at College Station, Texas, with an average oil content at the six locations of 39.4%. In most instances, seed of the open pollinated varieties had a higher oil content (ave. 40.7%) than those of the hybrid varieties (ave. 37.0%).

All the varieties were relatively low in the saturated fatty acids, palmitic and stearic. Small amounts of palmitoleic, linolenic, arachidic, behenic, and lignoceric acids also were present in all samples. Linoleic acid and oleic acid together ranged from 86.8% to 91.3% of the fatty acid content of the oils. The oleic acid of individual varieties ranged from 33.4% to 62.7%, and linoleic acid ranged from 27.3% to 54.2%. As can be seen in this slide, the average oleic and linoleic acid content of all the varieties at the 6 locations was 49.7% and 39.1%, respectively. As reported by others, the linoleic acid content of sunflower oil appeared to vary inversely with temperature during development of the seed. The oil of the sunflowers grown at the warmer locations and at the lower latitudes (South Georgia, Louisiana, and Southeast Texas) had a lower linoleic acid content (32.2 - 35.3%) than those grown at somewhat cooler locations and higher latitudes (South Carolina, North Alabama, and Central Georgia) (40.3 - 45.6%). Also, the data show that in most cases, the linoleic acid content is lower than the oleic acid.

As I mentioned earlier, we are in the early stages of developing the over-all research program for the Russell Research Center. We solicit the suggestions, advice, and counsel of the industry to assure that our program will be meaningful to the needs of sunflowers growers, processors, and marketers.

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