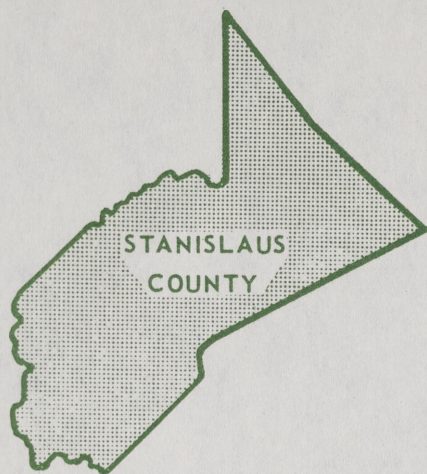


AGRICULTURAL EXTENSION SERVICE

UNIVERSITY OF CALIFORNIA



Scenic Drive and Old Oakdale Road
P. O. Box 1411
Modesto, California 95353
Area Code 209 — 524-1251

December 4, 1970

Carl W. Muller, Chairman
Bushberry Advisory Board
11512 E. Keyes Road
Denair, California 95316

Dear Mr. Muller:

Attached is a resumé of the research accomplished during 1970 by the Stanislaus County Agricultural Extension Service. The statistical data will be on file at the Extension Service Office at Scenic Drive and Old Oakdale Road in Modesto.

There is more than ample justification for the monies utilized in this research in the data supporting the labels for Botran® and Captan®. Without this supporting data from the Agricultural Extension Service, it would have been difficult to obtain permission to use these materials. Extreme losses were noted in those fields not treated for mold.

I have also attached an article written by Armen Sarquis, County Director of Extension -- "Do We Need Agricultural Research?" -- that I think will be of interest to boysenberry growers.

We wish to thank the Bushberry Advisory Board for the confidence they have expressed in us by making the grant which has helped to underwrite the cost of this research.

Sincerely,

A handwritten signature in cursive script that reads "Paul D. La Vine".

Paul D. La Vine
Farm Advisor

PDL:ss
Enclosures

1970 BOYSENBERRY RESEARCH

The research was conducted by Paul La Vine with Rick Carlos, an MJC student, assisting. The research was done in five parts:

1. The testing of registered materials for mold control.
2. The testing of unregistered materials for mold control.
3. A test on a comparison of virus-free versus common-stock plants.
4. A test on the number of canes best for mechanical harvesting (3-5-7-all).
5. Testing materials which may facilitate mechanical harvesting.

REGISTERED-MATERIALS PLOT

In the registered-materials plot, Botran[®], Captan[®], and a Botran[®]-Captan[®] combination were tested. These two materials and the combination were vastly superior to the no-treatment plots. The materials were applied three times (see plot layout attached -- Cole Mold Plot) -- early-bloom, mid-season (earliest berries pink), and pre-harvest. Three applications gave the best results. From an economic standpoint, it would appear that two applications in early-bloom and mid-season would be adequate.

Most growers had applied one of these materials, either singly or in combination, based on the assumption that these materials were cleared for use. An alert insecticide salesman, Russ Thompson, noted that these materials did not have registration in California. As a result of the research accomplished in 1969 by the Extension Service, paid for by the Bushberry Advisory Board, sufficient data was supplied to the California State Department of Agriculture that full clearance was given to use the materials. They are now labeled properly so that in the future, the industry can use these materials as recommended by the Agricultural Extension Service.

It would appear from the research of 1969 and 1970 that, if there are rainy conditions during the bloom, it would be almost imperative that the grower treat for mold control. This research also indicates that in those seasons when harvesting is slow, or, if mechanical harvesting is to be used, that treatment with these mold-control materials should be applied.

UNREGISTERED-MATERIALS

There are a number of unregistered materials which show a great deal of promise in controlling mold. By law, the treated fruit cannot be used and must be disposed of. For this reason, only a few materials can be tested at a time unless the companies manufacturing the materials agree to purchase the berries to be disposed of. The Bushberry Advisory Board is fortunate in having growers willing to aid in the research, oftentimes at a great deal of expense to themselves. The unregistered materials were tested at the Everett Cole ranch with Mr. Cole paying for the cost of the berries which had to be destroyed. (See plot layout attached - Cole New Material Plot 1970_A)

The materials tested in this trial were Mertec® and Benlate®. Both materials were superior to the no-treatment plot. The combination of Mertec® plus Captan® gave the best results under the conditions of this test. A limited number of unregistered materials will be tested during the 1971 season. The combination of Botran® and Captan® will be used as a standard.

THE TEST ON VIRUS-FREE VERSUS COMMON-STOCK PLANTS

This is the same trial reported on last year, located at the Paul Couture ranch on Bangs Avenue.

The weight of 200 berries taken at random from the virus-free rows was 7%

greater than the weight of 200 berries also taken at random from the common-stock plants. This agrees with the previous report--that the virus-free berries appeared to be somewhat heavier. They also appeared to be plumper than the common-stock berries.

The drupelet count also averaged slightly higher in the virus-free vines. There appeared to be more off-type vines on the virus-free rows than we counted in 1969. By off-type vines, we considered those that had a great number of small berries or those vines with abnormalities of the leaves as being off-types. See attached letter from Dick Converse (Richard H. Converse, Plant Pathologist USDA and Professor, Oregon State University, November 4, 1970).

A difficulty in this plot continues to be that the virus-free plants were planted from rooted cuttings rather than the normal tip-in plants. Although those plants which survived have since become, for the most part, vigorous plants, there have been enough of them that, because of soil conditions, haven't grown as well as they should. There are also more skips in these rows than in the common-stock rows.

In spite of the fact that we adjusted the total yields by giving the missing plants a value, this does not seem to be a fair practice and it leads us to the conclusion that we should establish another trial using tipped-in plants for both trials. Having a feeling that the virus-free vines are superior, is not enough, when considered from a scientific standpoint. The industry should follow up on Dr. Converse's suggestions and acquire some plants of the new stocks he has available.

MULLER TEST PLOT ON THE NUMBER OF CANES BEST FOR MECHANICAL HARVESTING

The purpose of this trial was to find the best number of canes for use with a mechanical harvester. The thought behind leaving less canes than usual was that with fewer canes, the fruit, as it was shaken from the top of the vines would fall into the catching frames better.

Three measurements were made: drupelet count; the weight of 300 berries; and the total number of crates for each of the four rows in the trial.

<u>MEASUREMENTS</u>	<u>THREE CANES</u>	<u>FIVE CANES</u>	<u>SEVEN CANES</u>	<u>NINE CANES</u>
<u>Drupelet Count</u>	55.7	50.2	54.5	51.7
<u>Average Weight of 150 berries*</u>	1.80	1.74	1.89	1.78
<u>Total Number of Crates</u>	107	118	131	128

It is difficult to draw conclusions from this trial. If a statistician were examining the figures, I am sure that his first comment would be that the plot was too small and did not allow for soil differences. It appears that the rows are so situated that some of them have an advantage by being on a better soil, so that soil differences are masking any possible significant differences due to number of canes.

TESTING MATERIALS WHICH MAY FACILITATE MECHANICAL HARVESTING

In 1969, a number of plant growth regulators were tried. Of these, some were quite evidently of no value. Others, such as 4CPA (para-chlorophenoxyacetic acid) are noted for increasing berry size; however, the chances of having 4CPA registered for use are unlikely due to the tremendous expense which would be

*The average total weight of 300 berries divided by 2 (150 berries from each end of the test rows)

PROBING THE LIMITS OF THE RANGE OF CATALYTIC ACTIVITY OF HYDROLYTIC ENZYMES

The range of the activity of an enzyme from nature is very broad and includes a considerable variation. The greater the activity of an enzyme, the wider the range of the reaction rates, the faster, and the more varied the range of the reaction rates, the more the activity of the enzyme is broadened.

Thus, the range of the activity of an enzyme from nature is very broad, and the range of the activity of an enzyme from nature is very broad, and the range of the activity of an enzyme from nature is very broad.

Enzyme	100,000	100,000	100,000	100,000
Enzyme	100	100	100	100
Enzyme	1.0	1.0	1.0	1.0
Enzyme	10	10	10	10

It is known that the range of the activity of an enzyme from nature is very broad, and the range of the activity of an enzyme from nature is very broad, and the range of the activity of an enzyme from nature is very broad. It is known that the range of the activity of an enzyme from nature is very broad, and the range of the activity of an enzyme from nature is very broad, and the range of the activity of an enzyme from nature is very broad.

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required to show it as a safe material.

One of the materials, Etheral[®], showed promise in 1969 for shortening the ripening time. It also gave indications that the treated berries came off much more readily. It also had the advantage of being composed of naturally occurring substances (ethylene gas and propionic acid) so that it could quite likely be registered much more easily than some of the other materials. In spite of the promise shown in 1969, the 1970 trials in which Etheral[®] was tried at several timings, replicated to compensate for soil differences and at varying concentrations from low to high, did not show any response at all.

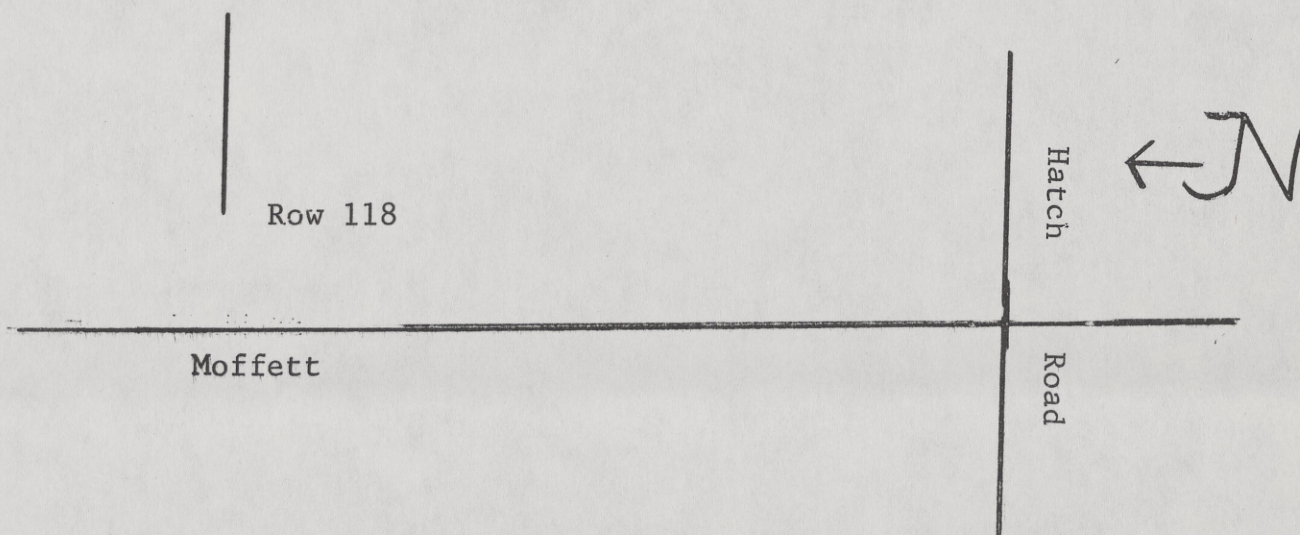
Additional work should be carried on during 1971 for it appears that Etheral[®] must have certain climatic conditions before a response becomes measurable. We feel that it would be interesting to see what type of weather is required to trigger the functions of Etheral[®].

#

In order that the information contained in this circular may be more clearly understood, trade names are sometimes used. No endorsement of named products is intended, nor is criticism implied of similar products not mentioned.

COLE NEW MATERIAL PLOT 1970

<u>Material No.</u>	<u>Color Code</u>	<u>Material Name</u>	<u>Amount Per 100</u>	<u>Amount 3 gals. H₂O</u>
1.	Yellow	Benlate®	1/2#	6.71 gr. 3 gal. H ₂ O
2.	Red	Mertec®	1-1/2#	20.43 gr. 3 gal. H ₂ O
3.	Blue	Mertec®	3#	40.86 gr. 3 gal. H ₂ O
4.	Orange	Mertec® (1-1/2#) & Botran® (1#)		20.43 & 13.5 gr., 3 gal. H ₂ O



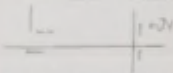
Each plot is 20 ft. long (stake to stake) marked at each end with designated color code. Sprayed to runoff approximately 150 - 200 gallons per acre.

Row 118

Plot	1 2 3 4	5 6 7 8	9 10 11 12
Material	<u>1 2 3 4</u>	<u>1 2 3 4</u>	<u>1 2 3 4</u>
Applied:	4/28/1970	4/28/1970	6/4/1970
		5/26/1970	
		6/4/1970	

THEORY OF THE EARTH

NAME	DATE	SECTION	TIME	SCORE
1.	10/10/20	10/10/20	10/10/20	10/10/20
2.	10/10/20	10/10/20	10/10/20	10/10/20
3.	10/10/20	10/10/20	10/10/20	10/10/20
4.	10/10/20	10/10/20	10/10/20	10/10/20



THEORY OF THE EARTH

THEORY

1.	10/10/20	10/10/20	10/10/20
2.	10/10/20	10/10/20	10/10/20
3.	10/10/20	10/10/20	10/10/20
4.	10/10/20	10/10/20	10/10/20

COLE MOLD PLOT

Row
No. 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147

1 2 3 1 2 3 1 2 3 1 2 3

 1 2 3 4

- 1 Captan[®], 2#/100 gallons (Red)
- 2 Captan[®], 1-1/4# plus Botran[®] 1-1/4#/100 gallons (Yellow)
- 3 Botran[®], 2#/100 gallons (Blue)

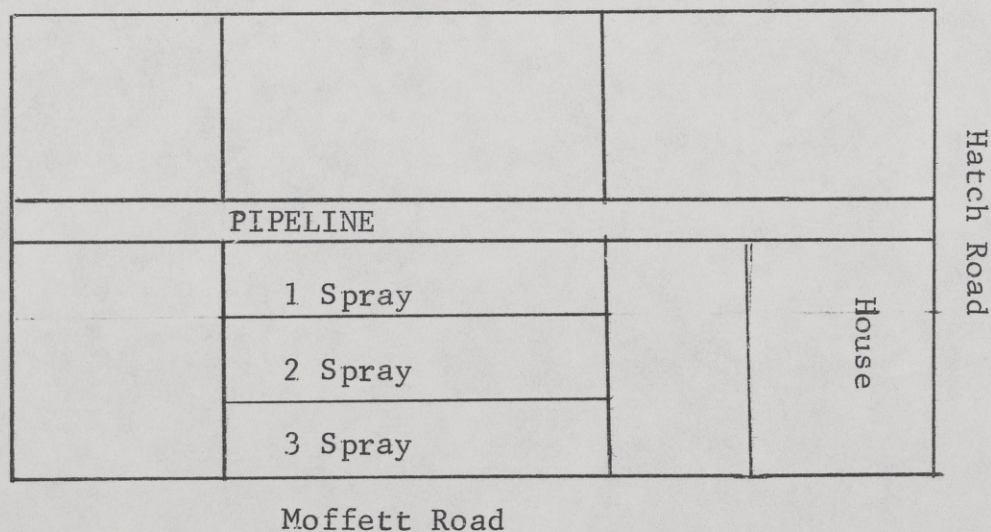
Application Dates:

April 28, 1970

May 16, 1970

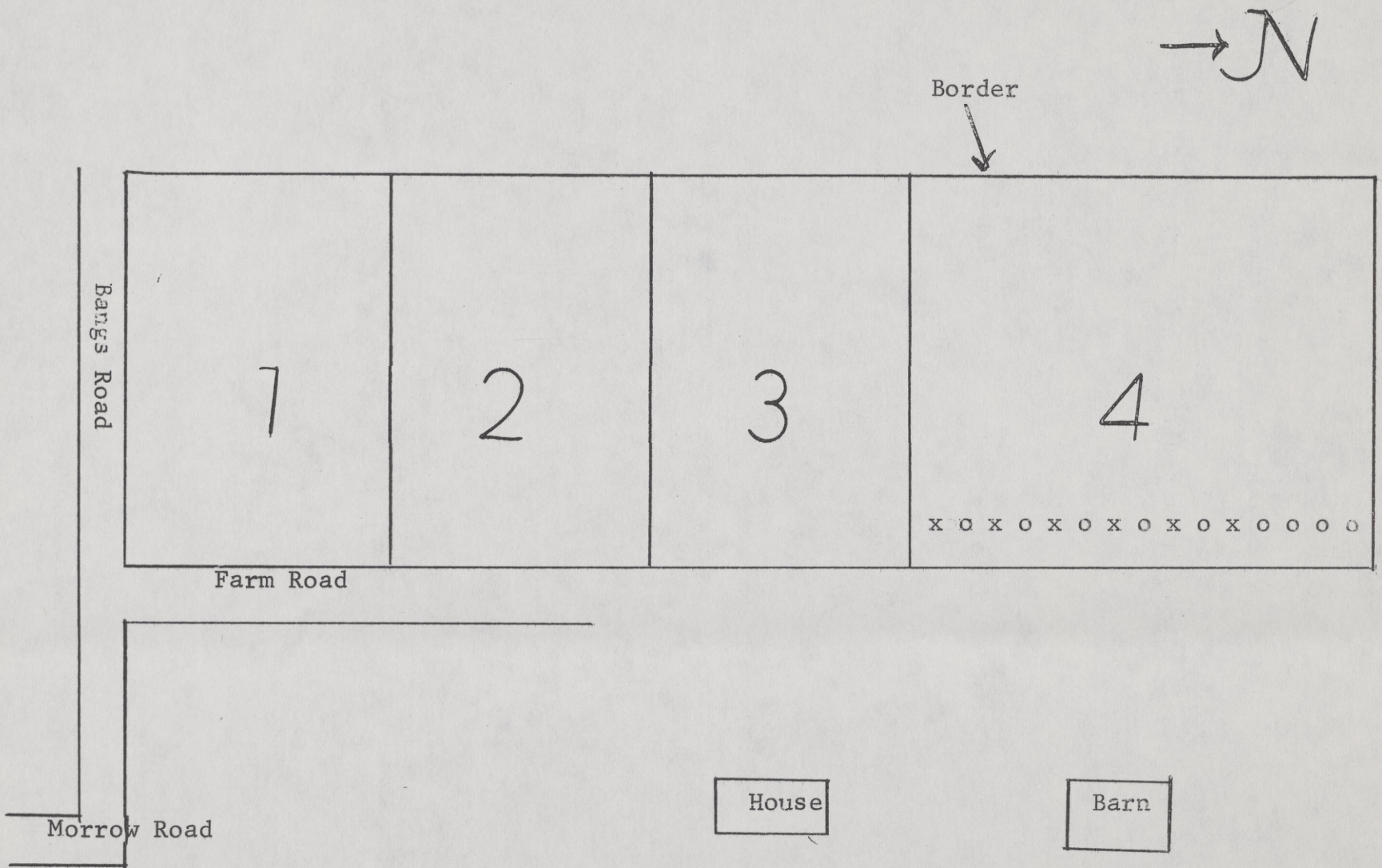
June 2, 1970

← North



BOYSENBERRY PLOT

Paul Couture
November 1967



x = Virus-tested (Beltsville)

o = Common

(Boysen 65 referred to in
Dr. Richard Converse's
letter attached.)

To test Beltsville vs. common Boysenberry plants

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE

Department of Botany and Plant Pathology
Oregon State University
Corvallis, Oregon 97331

November 4, 1970

Mr. Paul D. LaVine
Farm Advisor
Agricultural Extension Service
P. O. Box 1411
Modesto, California 95353

Dear Paul:

I have indexed some of the Boysenberry plants sampled when I visited in Modesto and Fresno last September. The preliminary results are attached. Nothing has definitely been related to the witches'-broom disorder in Boysenberry so far. As you can see, 70-5 and 70-7 were both witches'-broom sources, and one showed symptoms on C. quinoa and on strawberry while the other did not. We will hold our grafted Boysenberry through next season to watch for brooming to develop.

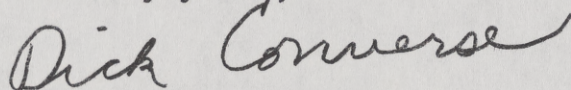
The comparison of USDA Boysenberry-65 and Muller Boysenberry stock in your yield test at Mr. Paul Coutoure's ranch (spelling?) in Modesto (70-1 versus 70-4) was of great interest to me since it demonstrated that a virus has moved into Boysenberry-65. The Boysenberry-65 stock I have reacts on Alpine strawberry but not on C. quinoa. I would expect 70-4 to show symptoms on Alpine also. Remember the grafts are only 4 weeks old now, and we may get delayed symptoms. Previously we found evidence of a virus that caused systemic necrosis on C. quinoa moving into Boysenberry-65 at the Pevehouse isolation farm east of Modesto. This new occurrence is independent confirmation that this Boysenberry latent virus spreads in the field in California. We are working on the identity of this virus right now in the lab.

Otherwise, this indexing work showed that Baumbeck and Teraoka's stock, as far as tested, are free from the quinoa-infecting latent virus, although carrying a latent virus detectable in Alpine. I suspect from 70-9 that variegation is transmissible since we got rather unique symptoms with it. Confirmation of this must await symptom development in grafted Boysenberry.

In summary, Paul, I think we can say that this tiny survey has shown the probable existence of at least 3 viruses in Boysenberry over and above the witches'-broom disorder. We have no evidence yet for or against the transmissibility of the latter.

I appreciate your continuing cooperation in studies of Boysenberry diseases and will keep you informed of new work here as it develops. Remember that we hope to release Boysenberry-71 free from all known viruses next spring. Do you think that your Boysenberry growers as a group could set up a small isolation plot to increase this stock in some location remote from the present Fresno and Modesto Boysenberry acreages? Perhaps the University would be interested in cooperating at the Reedley Station to get such a project started.

Sincerely yours,

A handwritten signature in cursive script that reads "Dick Converse". The signature is written in dark ink and is positioned below the "Sincerely yours," line.

Richard H. Converse
Plant Pathologist USDA
and Professor OSU

Attachment

cc: S. Wilhelm
W. B. Hewitt
R. C. Crouch

I, the undersigned, do hereby certify that the above is a true and correct copy of the original as the same appears in the records of the Board of Health of the City of New York.

In testimony whereof, I have hereunto set my hand and the seal of the Board of Health, at New York, this 10th day of June, 1901.

Mayor

Secretary

City of New York

100

DO WE NEED AGRICULTURAL RESEARCH?

There are critics of agriculture that say we do not, but they apparently have not given the matter any depth of thought. Right now they are in a particularly vulnerable position.

They have maintained that the scientists' efforts to produce higher yields are wasted since we already have surpluses. We can refute that by noting that the nation's corn crop from the Corn Belt to the Deep South was seriously reduced due to southern corn leaf blight this past season.

And were it not for the extensive crop research network that exists between government, universities and private industry, we might not already have assurances that damage from this new strain of blight can be all but eliminated from, at the latest, the 1972 corn crop.

This current example makes it rather obvious that a cut in ag research could mean a cut in our food supply somewhere, sometime in the future.

Another aspect of this need for ag research is the fact that evolutionary changes are continuously taking place that can result in a more virulent strain of a plant disease or lack of resistance on the part of a crop variety. Continuing research is the only answer to these problems and many others that can affect all of us directly or indirectly. There are many pluses for ag research--lower cost; higher quality and more healthful food; better fibers; increased efficiency of capital, labor and land resources; and raised living standards.

Research has helped make U. S. agriculture more competitive in world markets, thereby contributing to a better foreign balance of payments situation. Ag research has also contributed to the pool of basic knowledge about ourselves and our environment.

If it were not for the stored surplus stocks of the CCC, a very serious feed grain deficit would have developed this winter. The so-called surpluses are not large in terms of an emergency and even squirrels have enough sense to store a few acorns and nuts beyond current needs.

The term "surplus" is in many cases a misnomer as it has a negative connotation. These supplies of food or feed are really "reserves" that a prudent individual would provide for and they should not necessarily influence current crop prices received by farmers.

Armen V. Sarquis
County Director of Extension
and Farm Advisor

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