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Studies on Feasibility of Weber Basin Reclamation Project Completed

By GEORGE T. BLANCH

UTAH'S congressional representatives have recently requested that this session of Congress appropriate funds for the beginning of construction of the Weber Basin reclamation project. This is the culmination of several years of intensive work by the Bureau of Reclamation and nearly two years of work by representatives of the Utah Agricultural Experiment Station and the United States Department of Agriculture.

If the project is successfully carried through to fruition it will mark what may well be the beginning of a new era in water resource development in the Western States. It may set a precedent in cooperative planning of such projects in that the United States Department of Agriculture and the Utah Agricultural Experiment Station have cooperated closely with the Bureau of Reclamation in collecting and analyzing basic data pertaining to the project.

What the Project Contemplates

The Weber Basin project contemplates the storage of water from the Weber River that now is wasted in Great Salt Lake. Most of it will be stored during the heavy spring runoff. Contemplated storage facilities will include a major reservoir on the Weber River at Wanship in Summit County, the enlargement of the Pineview Dam on the Ogden River, and the diking of Willard Bay—a part of Great Salt Lake—to provide a fresh water reservoir off the main river channel. The stored water will be used for irrigation, municipal and domestic purposes, hydro-electric generation, wild life propagation, and recreational purposes. The storage also is expected to reduce or eliminate completely flood hazards along the river. The main purposes of the project are for irrigation and municipal water supplies.

In addition to the storage facilities, irrigation canals, aqueduct, power plants, and pumping stations, a network of drainage canals in Weber and Davis Counties for removal of high water tables will need to be constructed.

Location of Project

The project is located in Davis, Weber, Morgan, and Summit Counties. Most of the irrigation and municipal water will be used in Davis and Weber Counties. For investigation of the agricultural potentials of the project, the area was divided into three sections largely on the basis of topography and climate. The sections also represent three somewhat different types of farming because of differences in topography and temperatures.

Lake Plain Area

The largest and most important is the lake plain area which extends from the Weber-Box Elder County line on the south, and from the base of the foothills on the east to the lake on the west. This area was once a part of the ancient lake bottom. The topography is relatively level, and there is quite a wide range in soil conditions. Most of the presently cultivated and irrigated lands of Weber and Davis Counties are in this area. The lands that are proposed for new irrigation are interspersed with, and on the perifery of, the lands now irrigated. A considerable part of the new lands will require drainage, and some clearing and leveling also will be needed to adapt them to irrigation agriculture. The present plans provide for approximately 37,500 acres of new land to be irrigated, and about 8,000 acres of land now inadequately irrigated to receive additional water.

Foothill Area

The foothill area is the next most important area. This area extends along the base of the Wasatch Mountains from Ogden on the north to Bountiful on the south. Much of the land in this area has considerable slope. The steeper parts, however, are not proposed for irrigation. A small acreage of first class soil that has slopes up to 30 percent will need to be irrigated by sprinkler system. Most of the land will be served by flood irrigation. Because of the slopes, the soil, and protection from frosts, fruit is an important crop in this area. Truck

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DR. GEORGE T. BLANCH is professor of agricultural economics and in charge of the economic phases of the study of the Weber Basin Project for the Utah Station. An earlier report on how the project will help in the development of the Weber area written by Francis M. Warnick, Bureau of Reclamation area engineer for the project, appeared in the June 1950 issue of Farm and Home Science.

WINTER OF 1951-52 ONE OF DEEP SNOWS

By GREGORY L. PEARSON

Snow surveys made about the first of February disclosed that in no part of Utah would the runoff be below normal runoff during next summer's irrigation season. While this comes as welcome news to southern Utah water users who need extra water to replenish low reservoir supplies depleted by last year's drought, there is also a somber note for the northern part of the state, where a definite flood potential has built up. Water is a great friend when used beneficially, but it also can be expensively destructive when uncontrolled.

Highest February Record

With the exception of the high snows at Timpanogos divide in American Fork Canyon and the Widtsoe-Escalante course on the east fork of the Sevier River, the water in the snow pack on our mountain watersheds is higher than has ever been recorded on February 1 since snow surveying first started in Utah in 1924. Snow cover on Timpanogos divide was 10 percent higher in 1950, and the Widtsoe-Escalante course had considerably more snow in 1949.

The water content of the snow on all courses measured in the state varies from 160 to 292 percent of average, and is at approximately the April 1 average or considerably above.

A series of snow courses running from the headwaters of the Strawberry River, Daniels Creek above Heber City, Hobble Creek, and the Spanish Fork River area south to the headwaters of the Price, San Rafael, and San Pitch Rivers have more snow water than has ever been measured on April 1 with the exception of one or two years. They have from 130 to 185 percent of their April 1 average. April 1 measurements should set new records on most of these courses even if precipitation is below normal for the remainder of the snow accumulation season.

Flood Potential

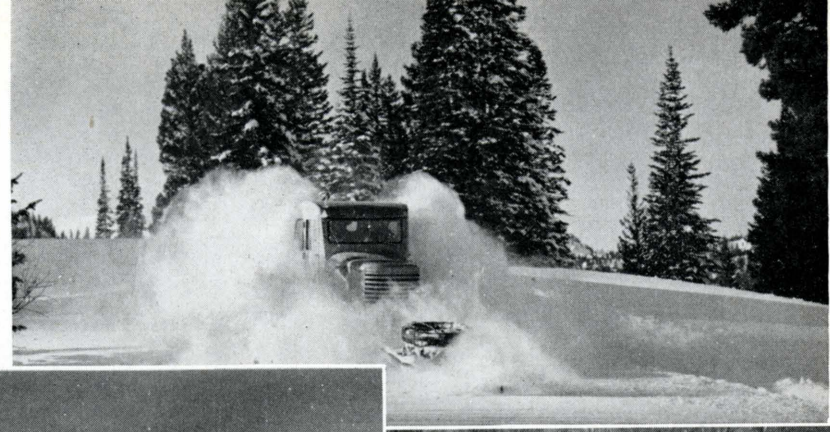
At some of these courses surveyors found it necessary to cut aspen trees and stick them up in the snow by the snow course markers so that the courses can be located when the next surveys are made. Markers were barely showing above the snow. The illustrations will accentuate the flood potential lying on these watersheds.

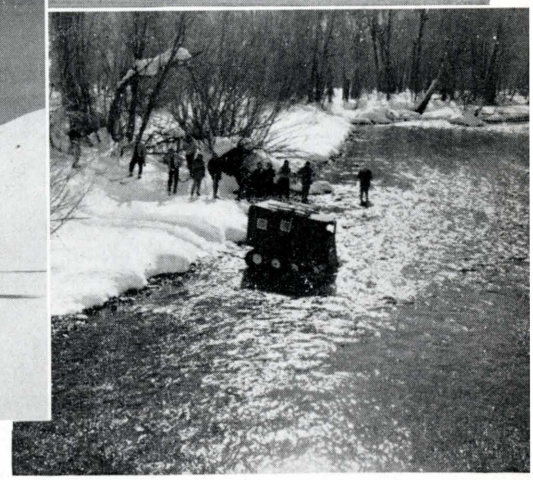
GREGORY L. PEARSON, in charge of the snow survey in Utah, is a hydraulic engineer with the Division of Irrigation of the Soil Conservation Service and works in collaboration with the Utah Station.

(Above) Snow surveyors determine depth and water content of the snow so that sugar companies can determine acreage allotments in line with available water. Bankers make or reject commodity loans on these bases. Farmers, ranchers, shippers, municipalities, and agencies concerned with power production, water supplies, and flood control are interested in the results of such surveys

(Lower) Record snow depths cover Utah's watersheds this year. Surveyors pause at Franklin Basin Ranger Station near the head of Logan River to note snow depth on building

Snow Cover Deeper Than in 1948-49— Flood Hazards in Northern Utah





(Upper) The Frandee Snoshu races along in powdery snow. Machines such as this one built by the Utah Scientific Research Foundation at Logan enable surveyors to measure snow on remote watersheds with relative ease
(Lower right) Snow machine demonstrates its ability to ford streams as well as travel over snow
(Left) While the sight of snow surveyors traveling afoot is decreasing owing to the increased use of oversnow vehicles, it will not disappear entirely since some of Utah's most important courses are inaccessible to machine travel

At the East Portal snow course by Strawberry Reservoir, the snow water was 21.6 inches. The previous February 1 high was measured at 12.9 inches in 1950, the average being 7.2 inches. The April 1 average is 11.8 inches of water. Highest April 1 measurement ever recorded was 19.2 inches in 1936. The previous April 1 high is already exceeded.

At the Gooseberry Reservoir course on the headwaters of Huntington Creek and the Price and San Pitch Rivers, the water content was 27.8 inches. Regular February 1 measurements have not been made here, but the snow cover compares with an April 1 average of 18.8 inches of water. Highest April 1 measurement recorded here was 29.0 inches in 1936. A new record is sure to be set here this year.

Snow in the Valleys Particularly Heavy

In all parts of the state, the low snows are particularly heavy, being more above average than are the high snows. Moisture in the soils underlying the snowpack is good.

In southern Utah on the headwaters of the Sevier, Virgin, Coal Creek, and Beaver Rivers, although residual winter streamflow has been low as a result of last year's drought, the watershed mantle is wet from the melting of early fall snows. In contrast, a year ago the soil fell from the end of the sampler in a powder dry condition. With a snowpack varying from 90 percent of the April 1 average on the Beaver River to 130 percent on the Sevier and Virgin Rivers, water users in these areas can expect to replenish low reservoir supplies as well as have sufficient for their needs this coming season.

Since high flows can be expected next spring throughout the state, those concerned with preventing damage from flood waters should start now to see that river channels are clean and free of debris, and take other necessary local precautions.

WEBER BASIN

(*Continued from page* 1)

crops are important on a small part of the area. Approximately 13,000 acres of new land is proposed for irrigation and 8,000 acres of land now with only a partial water supply will receive supplemental water. It is the cities and communities located along the base of the mountains in or adjacent to this area that need most of the municipal water.

The Mountain Valleys

The mountain valleys constitute the third area. These lands are in Morgan and Summit Counties. They lie at higher elevations than the other areas and have a shorter growing season. No new lands are proposed for irrigation here but about 8,400 acres of land now insufficiently irrigated would be provided an adequate supply.

Land to Benefit

In all, 50,500 acres of new land, and 24,400 acres of land to receive supplemental water, or a total of approximately 75,000 acres will benefit from the project. Slightly more than 175,000 acre feet of water would be required to serve this land. Most of the new land is now used for grazing livestock.

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Peach Varieties for Utah

Preliminary Recommendations

By R. K. GERBER, ODEAL KIRK, and S. W. EDGECOMBE

THE success of the Utah fruit industry is dependent on growing the best adapted, highest yielding varieties with quality acceptable to the consumer. Agricultural experiment stations and commercial companies are constantly introducing new varieties in an attempt to get better quality, hardiness, or earlier ripening varieties. It has been estimated that during the period 1948-1952, 504 new varieties of fruits will be introduced in the United States. No farmer can test all the new varieties of any fruit and he is constantly at the mercy of salesmen who press the sale of their special products. Consequently in 1948 the Utah Agricultural Experiment Station planted a three and a half acre peach variety orchard at the Howell Field Station at North Ogden and added an acre and a half of new varieties to its two acre block at Logan in order to be able to make variety recommendations for growing in Utah. As new peach varieties are introduced they will be planted in this orchard and varieties of poor quality eliminated.

This report is of a preliminary nature, giving the results of one year's fruiting in most cases and two years' in a few. One hundred and eight varieties are here reported. Twenty-four have not fruited and will be evaluated later.

Peach varieties in their order of ripening at the Howell Field Station are presented in table 1. Also included in the table is the date of ripening at Logan or Ogden, color of flesh, freeness of flesh from stone, texture of flesh, the attractiveness of the fruit, the quality, and the average size. Varieties starred (*) in the table show promise for this area. The remaining varieties need further study and comparison before an evaluation may be made.

R. K. GERBER, ODEAL KIRK, and DR. S. W. EDGECOMBE are all members of the Department of Horticulture. Mr. Kirk, who has been superintendent of the Howell Field Station, has recently left for Iran on a Point 4 assignment. Dr. S. W. Edgecombe is head of the department and Mr. Gerber is an assistant professor.

Early Peaches

The earliest peach to ripen was the Mayflower with which most of the growers are acquainted. It is a small, moderately attractive, poor to fair quality, white fleshed, clingstone peach ripening nine weeks ahead of Elberta.

Three varieties ripened fairly close together about seven weeks ahead of Elberta. These are Cherry Red, Erly Red Fre, and Early East. Each is quite attractive. Cherry Red is a yellow, juicy, firm fleshed clingstone with red streaks in the flesh. It has moderate size and fair to good quality. Erly Red Fre is a white, stringy, juicy freestone of good size and fair to good quality. Early East is a yellow, juicy, stringy, clingstone that becomes nearly freestone as it ripens. It had good size and quality.

Five varieties ripened in a group about five weeks ahead of Elberta. These were Starking Delicious, Prairie Daybreak, Prairie Sunrise, Red Haven, and Herb Hale. They were moderately to quite attractive in appearance. Starking Delicious is a yellow, stringy, juicy semi-freestone that becomes free as it ripens. It had good size and quality. Prairie Daybreak is a yellow, juicy, stringy to buttery fleshed freestone with good size and fair to good quality. Prairie Sunrise is a yellow, juicy, melting fleshed semi-freestone that becomes free as it ripens. It has good size and quality. Red Haven is a yellow, juicy, stringy to buttery fleshed freestone with good size and fair to good quality. Herb Hale is a yellow, juicy, stringy to melting fleshed freestone with good size and quality. It was considered slightly inferior to Prairie Sunrise.

Fair Beauty ripened about four weeks ahead of Elberta. It is moderately attractive and is a yellow, juicy, firm fleshed freestone of moderate size and good quality.

A group of eight varieties ripened about three weeks ahead of Elberta. These are Triogem, Prairie Rose, Loring, Fire Glow, Early Halehaven, Southland, Fairhaven, and July Elberta. They are moderately to quite attractive in appearance. Triogem, Loring, Fire Glow, and Early Halehaven are yellow, juicy, stringy fleshed freestones of good size and quality. Prairie Rose, Southland, Fairhaven, and July Elberta are yellow, juicy, stringy fleshed freestones of good size and fair to good quality. Until these varieties fruit for another year it is difficult to state which is the most outstanding.

Halehaven ripened about two weeks ahead of Elberta. It is moderately attractive and is a yellow, juicy, stringy freestone with good size and fair to good quality.

Two varieties ripened about the same time as the Elberta. These are Early Elberta and J. H. Hale. These were moderately to quite attractive in appearance. Early Elberta is a yellow, juicy, stringy-fleshed freestone of moderate size and fair to good quality. Elberta is a yellow, juicy, stringy-fleshed freestone of good size and fair to good quality. J. H. Hale is a yellow, juicy, stringy-fleshed freestone of large size and fair to good quality.

Alexander, Greensboro, June Elberta, Red Bird, Triumph, Howard

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Address correspondence regarding material appearing in these columns either to the editor or to the author.

More detailed information on the subjects discussed here can often be found in Station bulletins and circulars or may be had through correspondence.

Fig. 1. From left to right the corn samples came from: high moisture, low nitrogen; low moisture, low nitrogen; low moisture, high nitrogen; high moisture, high nitrogen

With sweet corn selling at $25 a ton to the canning factories and nitrogen fertilizer at 14 cents a pound, the farmer who increases his yield of ears by five tons an acre by the addition of 200 pounds of fertilizer will find sweet corn a profitable enterprise. However to be effective, use of fertilizer must be accompanied by adequate irrigation water.

Balance *Nitrogen and Water* for Sweet Corn

By H. B. PETERSON

A PROPER balance between nitrogen and soil moisture is often the key to profitable production of sweet corn in Utah. The moisture condition that is best at one fertility level may be the poorest at another level, but maximum yields are obtained when the nitrogen supply is high and the moisture plentiful. The effect of the different moisture-nitrogen relationships on the growth of sweet corn is illustrated by the results from irrigation and fertilizer trials conducted by the Agricultural Experiment Station.

An excellent response to a side dressing of nitrogen was obtained in an experiment at Logan in 1951. The fertilizer was applied as ammonium nitrate about the time the corn was 6 to 8 inches in height. Similar results have been obtained in previous years. The 1951 trial consisted of three carefully controlled soil moisture conditions and sixteen fertilizer combinations. Only nitrogen and moisture treatments significantly influenced the crop.

DR. HOWARD B. PETERSON is professor of soils. He is joint author with Dr. D. W. Thorne of the book "Fertility and management of irrigated soils."

Table 1. Effect of moisture and nitrogen fertilizer on the maturity of sweet corn (average days after September 1)

Soil moisture condition	Pounds of nitrogen per acre			
	0	50	100	200
	days	*days*	*days*	*days*
Wet	13.1	8.7	7.4	5.2
Medium	16.5	12.7	11.6	11.2
Dry	15.1	14.0	13.1	11.0

Table 2. The influence of moisture and nitrogen on the yield of sweet corn

Soil moisture condition	Pounds of nitrogen per acre			
	0	50	100	200
	tons	*tons*	*tons*	*tons*
Wet	3.32	4.51	5.75	8.20
Medium	3.05	4.53	6.55	5.70
Dry	3.07	5.10	5.86	5.66

The maturity of the crop was hastened by the addition of nitrogen. This was most pronounced on the wet plots as can be seen by the data in table 1. On these plots the ears also matured more evenly. Earlier maturity often means less worm damage and less chance of frost damage.

Without additional nitrogen the yields of ear corn were not influenced by varying the moisture. As can be seen in table 2, the addition of 50 pounds of nitrogen per acre induced the greatest yield increase on the dry plots. One hundred pounds of nitrogen was most effective on the soil of medium moisture. The heavy application of 200 pounds of nitrogen was beneficial only on the wet soil. Favorable soil moisture conditions and high

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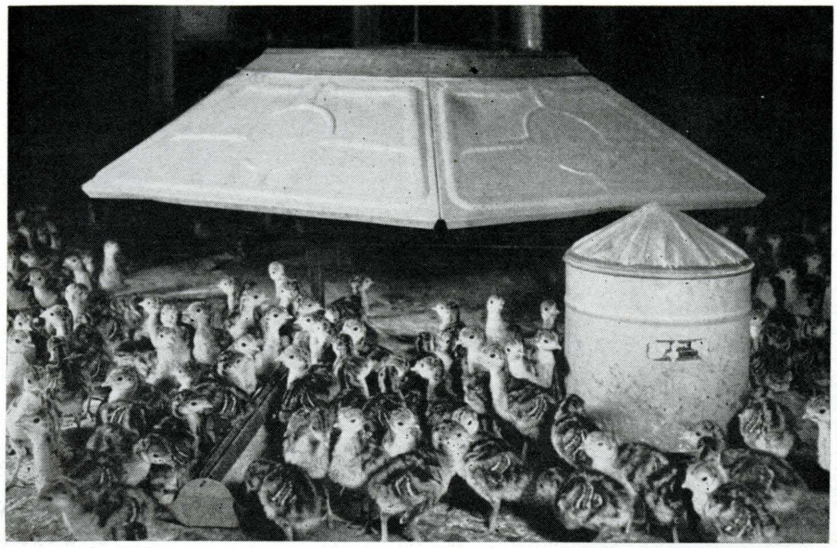


Picture courtesy Evans Advertising Agency

Is Alfalfa Meal Economical Feed for Turkey Poults?

By C. I. DRAPER

PROFITS in turkey raising depend to a great extent on cheap feed since such a large part of the cost of raising turkeys is the feed. Alfalfa meal has been included in poultry mashes for many years, mainly for its vitamin content. In many sections of the United States the quantity included in mashes has been kept at a minimum probably because the price is high compared to other feeds, good quality alfalfa meal is not available, and little research has been conducted to determine the maximum amount that poults can tolerate.

In Utah, alfalfa is grown extensively and is generally of good quality. Since it is usually one of the cheaper ingredients of a turkey ration, replacing the more expensive cereal grains by this less expensive product would lower the cost of producing turkey meat. Early experiments conducted by the late Professor Byron Alder showed that alfalfa meal could be used economically in the rations of growing turkeys up to 25 percent of the mash. Later studies have been made to determine the maximum amount of alfalfa meal that poults can tolerate in their diet.

The general plan of these studies was to feed Broad Breasted Bronze poults an all mash diet during the brooding period. The mash was made of the following ingredients:

Cereal basal	*percent*
Millrun	35
Wheat	26
Barley	21
Corn	18
Alfalfa meal (Replacing an equal amount of cereal basal)	10 to 31
Meat meal	8
Sardine meal	5
Soybean meal	15
Dried whey	5
Limestone flour	2
Salt	.5
Cod liver oil (300 A 400 D)	.5
Manganese sulfate ¼ ounce	

In making up the diets, 10, 13, 16, 19, 22, 25, 28, and 31 percent of sun-cured alfalfa meal replaced equivalent amounts of cereal basal. No attempt was made to adjust the protein content of the ration when the cereal grains were replaced with alfalfa meal. This procedure was justified since the object of the experiment was to determine the possibilities of replacing cereal grains with cheaper alfalfa meal on a pound for pound basis.

Table 1. Weights and feed consumption at the end of an 8 week period of Broad Breasted Bronze turkey poults fed various levels of alfalfa meal in their starting rations.

Alfalfa in ration	Weight	Feed consumption
percent	*pounds*	
10	2.38	6.29
13	2.38	6.53
16	2.37	6.67
19	2.41	6.91
22	2.31	6.44
25	2.18	6.42
28	2.05	6.40
31	2.01	6.42

These studies have shown that young poults tolerate a lower percentage of alfalfa meal than growing turkeys. Rations containing from 10 to 22 percent gave comparable weights and about the same efficiency of gain in the use of feed (table 1). Amounts of alfalfa greater than 25 percent were definitely depressing on weight and also on efficiency of gain.

Mortality did not seem to be affected by the alfalfa in the ration.

The amount of feed required to produce a pound of gain was directly related to the amount of alfalfa meal in the ration. There was a consistent and gradual decrease in efficiency of feed utilization as the percentage of alfalfa in the mash increased. However, these investigations suggest that fairly high levels of alfalfa meal can be used in the starting diet of turkey poults if cereal grains are scarce and the price is high in comparison to alfalfa meal. But when alfalfa hay is selling at prices equal to or higher than grain, as at present, there is no advantage in adding it to the ration of young poults.

DR. C. I. DRAPER became head of the Poultry Department on retirement of the late Professor Byron Alder in July 1949.

Right Amounts of *Nitrogen Fertilizer* Important in Sugar Beet Production

By JAY L. HADDOCK

TEN years ago the basic fertilizer recommendation for sugar beets in the Great Basin area was barnyard manure and superphosphate. However, field experiments conducted in this area by sugar companies and experiment stations during the past decade have emphasized the need of commercial nitrogen as a supplement to other fertilizer practices. But from many sources have come warnings of the harmful effects of an excess of available nitrogen on the sucrose percentage of sugar beets. Yield of beets and sucrose percentage are so markedly influenced by available soil nitrogen that neither a deficiency nor an excess should be tolerated.

Nitrogen Needed to Produce a Crop of Beets

Since available soil nitrogen should be known and additional amounts supplied with precision, a beet grower needs to know two important facts: (1) the total nitrogen requirement of an expected sugar beet crop and (2) the available nitrogen-producing power of his soil. The first of these can be readily estimated from data accumulated at the Utah Agricultural Experiment Station. Although the average yield of beets is from 14 to 16 ton per acre, a 20-ton crop is frequent and readily attainable.

How much nitrogen does a 20-ton crop of sugar beets need? Chemical analyses of both tops and roots indicate that such a crop requires approximately 200 pounds per acre. Since some available nitrogen is lost from the soil by deep percolation under irrigation, somewhat more than this amount must be made available in the soil.

DR. JAY L. HADDOCK, soil scientist of the Division of Soil Management and Irrigation of the U. S. Bureau of Plant Industry, Soils, and Agricultural Engineering, works cooperatively with the Utah Station on problems of fertility and irrigation of Utah soils.

Supplemental Nitrogen Fertilization

The intelligent sugar beet grower is not only anxious to know how much nitrogen his crop requires but also how much of this 200 pounds his soil will supply. By subtracting the nitrogen supplied by his soil from the total requirement, the grower can estimate how much nitrogen fertilizer he should purchase to supplement the nitrogen available in his soil.

Unfortunately at the present time no reliable direct soil test has been developed and standardized that will provide an estimate of the nitrogen-supplying power of a soil. As a result present day recommendations on nitrogen requirements for sugar beets are rough and frequently in serious error. Beet growers and sugar company field men realize that green manure crops, previous crops, barnyard manure, and in fact every farm practice influence the nitrogen-supplying power of a soil. They also realize that general production could be raised considerably if they had a fair basis of estimating the available nitrogen-potential. But they realize also the disastrous economic effects of a large excess of nitrogen. A little increase in yield above cost of production adds considerably to the relative net profit of sugar beets. But when so little is known about the available nitrogen-potential, field men prefer to err on the side of too little rather than too much fertilizer.

Field and Plant Tissue Tests of Nitrogen Requirements

Many field experiments have been conducted during the past decade testing the effects of nitrogen fertilizer on typical soils in sugar beet areas. While the results of these experiments can be applied in a general way, one is always faced with the fact that any given grower's field has not been cropped or fertilized like the field under experiment. Neither were fertility conditions similar to begin with. Moreover it is not possible to conduct extensive field tests on a portion of every field prior to growing a crop of beets.

On the basis of field tests the recommendation from Colorado is to "ap-

(*Continued on page* 20)

Too much nitrogen does not increase yields of sugar beets, but unduly depresses sucrose percentage. Plot at left received 80 pounds of nitrogen and yielded 25.5 tons of beets per acre, the one on the right received 160 pounds of nitrogen and yielded 25.1 tons of beets an acre

Two More Years' Data Support Earlier *Pruning Recommendation*

RECOMMENDATIONS on the best method of pruning peach trees in Utah now have the backing of four years' data. During three of these years commercial crops were harvested. In 1950 the fruit crop was largely destroyed by late spring frosts at blossom time.

Trees Pruned by Four Methods

The Elberta orchard used in this experiment was planted in 1945 at the Howell Field Station for Horticultural Research at North Ogden. Each spring since 1948 the trees have been pruned by one of the four methods illustrated in fig. 1 to 8. These are (1) corrective, (2) long or thinning out, (3) conventional, (4) severe. With corrective pruning only interfering branches growing across the center of the tree and vigorous shoots which might form new scaffold branches, plus dead wood, were removed. In the long or thinning out type of pruning the weaker shoots plus enough others to make 35 to 75 percent of the total are thinned out and the scaffold limbs are cut back to outward growing laterals at the height of 8 to 9 feet. The conventional method is the one commonly followed by many Utah peach growers. The weaker shoots plus enough others to make 35 to 75 percent of the total are thinned out and the remaining shoots are headed back one third to one half. This method results in a heavy bearing surface largely in the top of older trees. In the severe method the weaker shoots plus enough others to make 50 to 75 percent of the total are thinned out and the remaining shoots are headed back to 4 to 6 inches.

This is the second progress report of the peach pruning experiment. The first appeared in the September 1949 *issue of Farm and Home Science. Three crops have been harvested since that time, although the* 1950 *crop was largely destroyed by late spring frosts at blossom time.*

With corrective pruning (fig. 1) there was ample terminal growth for fruit production. The 1951 yield data confirm this (table 1). However, the fruiting wood is dying out and is not being replaced in the center of the tree with the result that the fruiting area is moving outward and upward from the lower center. With the long or thinning out method (fig. 3) the reverse is true. This method enables new fruiting wood to develop in the interior of

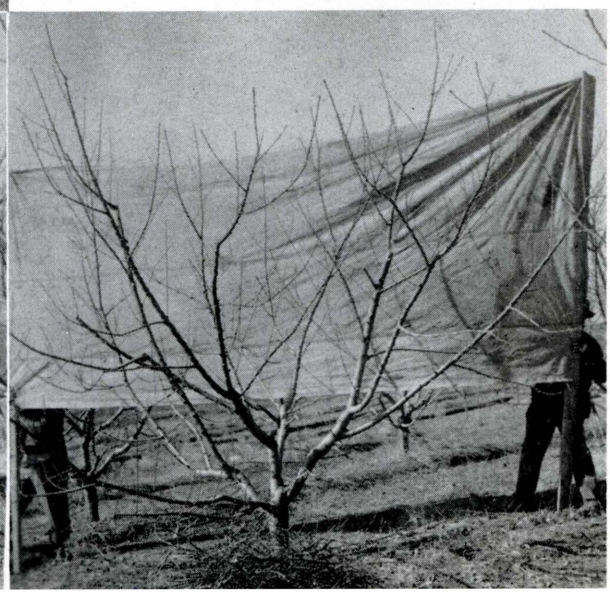


Fig. 1. (Upper left) This tree was pruned in the spring of 1950 as shown in fig. 2. Note the length of terminal growth and its distribution following the corrective pruning method. Also note the lack of fruiting wood in the lower center of the tree

Fig. 2. (Center) The same tree shown in fig. 1. Corrective pruning done March, 1951. A minimum degree of pruning. Only interfering branches growing across the center of the tree and vigorous shoots which might form new scaffold branches plus dead wood were removed. Prunings removed are shown at the base of the tree

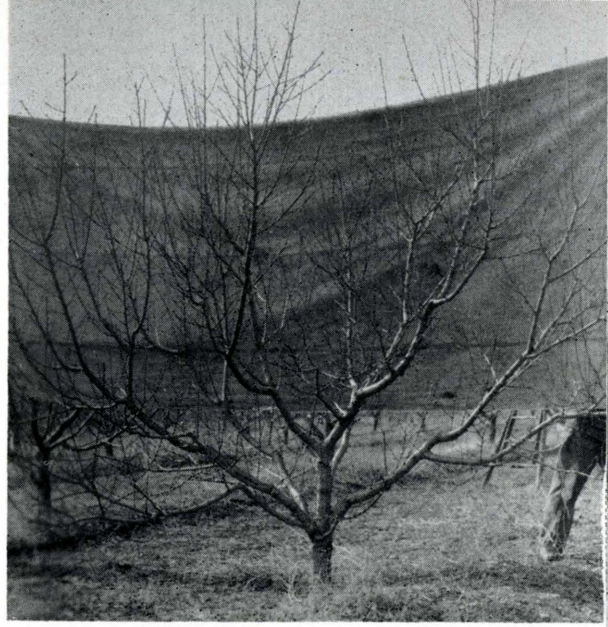
Fig. 3. (Lower left) A long or thinning out pruned tree showing the response of the tree to this method of pruning. Tree pruned in the spring of 1950

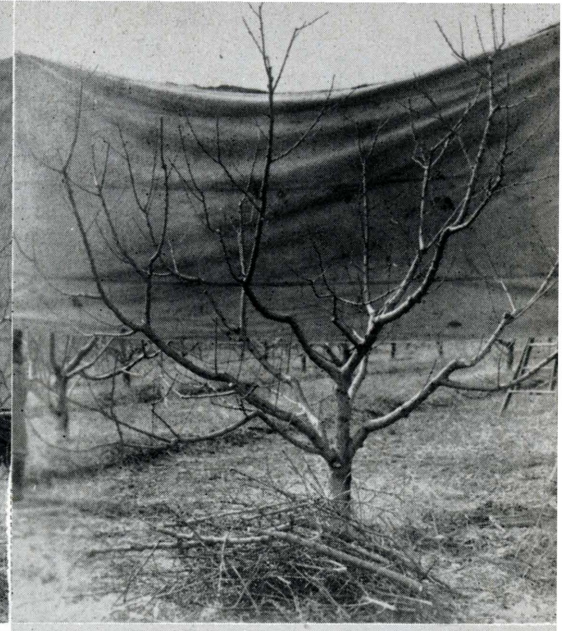
Fig. 4. (Lower right) The same tree shown in fig. 3. A considerable number of Utah peach growers have changed to this method of pruning in recent years. The weaker shoots plus fruited out branches are removed or thinned out so that only enough fruiting wood is left along the main scaffold limbs to permit proper fruiting and new shoot replacement the following season. The scaffold limbs are cut back to outward growing laterals at the height of 8 to 10 feet depending on the growth of the tree. It is evident from the data obtained to date that this method does result in larger crops of high quality marketable fruit than the conventional or severe methods of pruning. Fruiting wood can be maintained from the trunk to the end of the scaffolds. Prunings shown at the base of the tree

By S. W. EDGECOMBE

R. K. GERBER

ODEAL KIRK





the tree from all the scaffold branches and the fruit at harvest time is borne from the main trunk out to the tips of the branches. With the other two methods (fig. 5 and 7) trees produced excessive wood growth. Much of the new growth is too long and does not bear fruit buds near the base on the main terminal growth. These latter two methods produce wood growth in place of fruit.

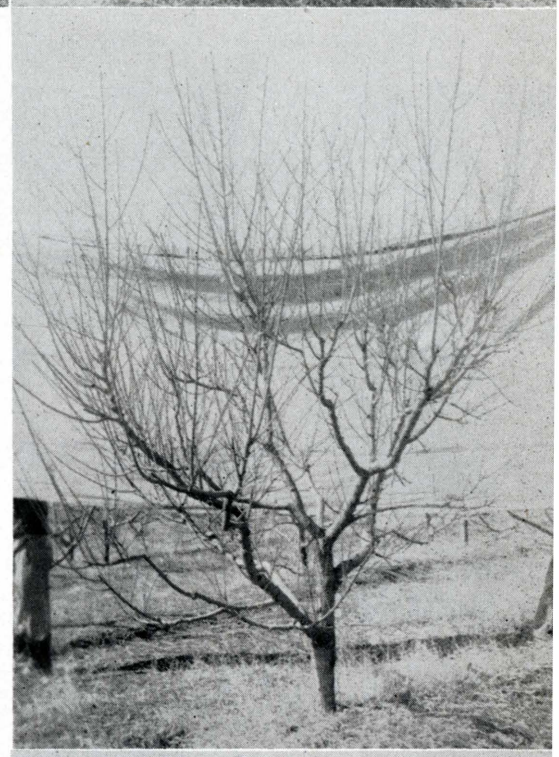
Fig. 5. (Upper left) Conventionally pruned tree showing the response of the tree to this method of pruning. Tree pruned in the spring of 1950

Fig. 6. (Upper right) The same tree shown in fig. 5. The conventional method of pruning is still followed by many Utah peach growers. The weaker shoots plus enough others to make 35 to 75 percent of the total are thinned out and the remaining shoots are headed back a third to a half. This method eventually results in a heavy bearing surface largely in the top of the older trees. Prunings are shown at the base of the tree

Fig. 7. (Center) A tree showing the response to the severe method of pruning. The tree was pruned in the spring of 1950. Note the excessive growth of new wood which is undesirable

Fig. 8. (Lower right) The same tree shown in fig. 7. The severe method of pruning is not as commonly followed now as a few years ago by Utah growers. The weaker shoots plus enough others to make 50 to 75 percent of the total are thinned out and the remaining shoots are headed back to 4 to 6 inches. Growers have thought that this method would eliminate hand thinning of the fruit. In the experimental plots of this treatment, no fruit thinning was done. Yields have been so disappointing that the method is definitely one which should not be followed. Prunings shown at the base of the tree

—All photographs taken 1951



Fruit Thinned

All the trees in the experiment with the exception of those in the "severe" type of pruning were thinned soon after the June drop. The standard used in thinning was to leave enough peaches on the tree to size properly following a standard of 1200 peaches to a mature tree.

(*Continued on page* 22)

LIGHT PRUNING IS BEST

THIS report is based on yields from three commercial crops and field observations on growth for seven growing seasons. Some of the trees in the experiment are much larger than normal and already they have attained mature size. With such trees yield data should indicate what might be expected with mature trees. Some of the conclusions from this study are: (1) severe pruning is undesirable and should not be practiced in Utah orchards, because production is reduced greatly. Under this system of pruning, excessive wood growth occurs in place of fruit production. (2) Both the corrective and long or thinning out methods of pruning are much more productive than the conventional pruning, particularly so in years such as 1950 when there may be severe injury to the flower buds at blossom time. (3) The highest color and quality are produced with the less severe methods of pruning. (4) Thinning properly is necessary to insure the desired size of fruit, since pruning alone cannot result in satisfactory yields of large sized fruit.

Final conclusions cannot be drawn at this time. It will be necessary to continue the experiment for another ten years to obtain the complete picture of the effect of different pruning methods. However, during the past four years, reports have been published by a number of experiment stations which agree with the Utah data in that the lighter methods of pruning are more productive. Previous experimental work carried out in British Columbia and Missouri is also in agreement with the Utah data.

Plan Your Kitchen to be an Efficient Work Center

By MARJORIE P. BENNION

All homemakers are interested in ways of improving their kitchens. They know that food preparation and other kitchen tasks are among their most time-consuming activities.

As part of the Western Regional study on farm homes, kitchen research is being conducted by the Utah Agricultural Experiment Station to show that some of the time and effort spent in the kitchen may be eliminated if kitchens are organized and arranged to reduce travel and traffic. Research studies indicate that in the preparation of meals, most of the work is done at the sink, range, or mix areas of the kitchen. To eliminate unnecessary travel, these areas should be within a few steps of each other. Farm kitchens should often be large, but the main food preparation areas should be close together. This may be accomplished by placing the equipment around one corner of the room, or in a U-shape formed by a peninsula arrangement. The peninsula may be used for the sink, range, or an eating or working counter. If the main work area is planned in a space without a doorway, much cross traffic will be eliminated.

(Above) The mix "center" provides easy access to all the utensils and ingredients needed for baking, and is conveniently located between the refrigerator and the range

(Right) The experimental kitchen at Utah State Agricultural College shows from left to right, the serve, sink, range, and mix "centers" in a typical L-shape arrangement

Kitchen Arrangements

To become acquainted with the various kitchen arrangements is often helpful before planning the kitchen. Common kitchen arrangements are the U-shape, L-shape, corridor, straight line types, and the peninsula variations. The L-shape is more often found in larger square rooms, and the others in more rectangular-shaped rooms. One should try out the proposed arrangement by going through the motions of preparing a meal and cleaning up before making any major changes. However, in planning it is necessary to think of the future needs of the family as well as the immediate. What will the kitchen be used for in addition to food preparation—eating, hobbies, washing, ironing, playing, sewing—all must be considered in planning.

Work Centers

Whatever arrangement is chosen, it is advisable to organize the supplies and equipment into centers—such as

MARJORIE P. BENNION, assistant professor of home economics, has charge of the housing research. Mrs. Bennion is a graduate of Iowa State Teachers College and has a master's degree from USAC. She joined the Utah staff in July 1950.

sink, range, mix, and serve. The china and eating areas might also be considered centers. Many agree that most of the work is done at the sink, so it is usually considered the most important center. The sink center needs to include work space on either side for stacking dishes before and after washing them. Space should be provided at the sink for storing the equipment and supplies used there first—such as pans, knives, supplies needing water first, and clean-up equipment.

The range center should include enough space for storing skillets, pan covers, griddles, serving bowls, and platters in addition to testing forks, spoons, tongs, potato masher, and turners. Canned vegetables, seasonings, and supplies used first with boiling water should be stored within easy reach.

The mix center often includes the refrigerator. All of the equipment used for measuring, baking, mixing, and blending foods should be found in the mix center. This counter should be at least 36 inches wide to provide adequate space for baking activities. The refrigerator door should open directly toward this counter to save steps.

The serve center, which is frequently near the range, needs to include storage space for ready-to-eat foods such as cereals, bread, crackers, and cookies. The toaster, waffle iron, and tray may be stored in the serve center. Table linen and silverware could be in the serve center if it is quite close to the table.

In the china center, only the same kind of dishes should be stacked or stored behind each other. Narrow, half shelves provide adequate space for small dishes, cups, and glasses.

Suggestions for Storage of Supplies

In general, the storage of kitchen supplies and equipment will prove more convenient if these suggestions are followed in storing.

1. Store equipment and supplies within easy reach of where they are used first. This may mean placing several articles – knives, measuring spoons, salt, flour, or sugar—in more than one place.

2. Have shelves within easy reach of worker. Do not place heavy equipment either too high or too low. For instance, keep the mix master at counter level where it does not need lifting before using.

3. Place supplies so that they may be seen and grasped easily. Do not stack unlike articles. Pull-out shelves or revolving shelves make the equipment stored in deep base cabinets more accessible.

4. Have work counters next to the range and refrigerator, and on both sides of the sink.

5. Have some shallow, divided drawers for small equipment.

6. Table linen is more accessible if stored on shallow pull-out trays.

7. Vertical files for pan lids, cooler racks, baking pans, and trays make the equipment more accessible and avoids stacking.

Arranging Centers

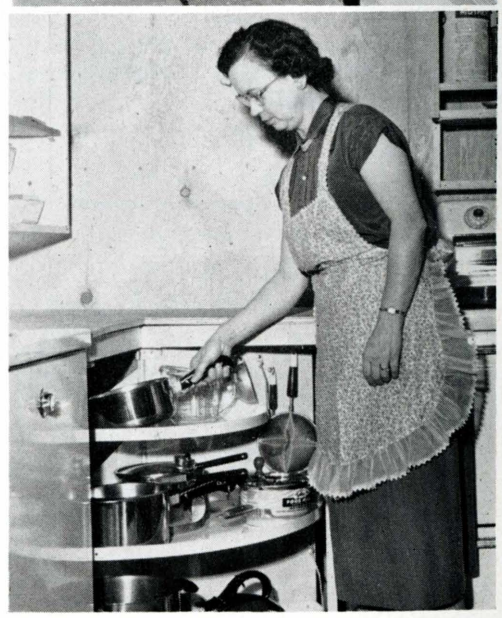
A few suggestions may be helpful in arranging centers in the kitchen.

1. Keep the most used major equipment close together, e.g., the sink and range may be placed on either sides of a corner or in a straight line with counter space between.

2. Place the mix center near the range if a lot of baking is done.

3. If the eating area is in the kitchen, it is convenient to place the china center both near the table and the sink. However, it may be more convenient for some to have the refrigerator or range near the eating area.

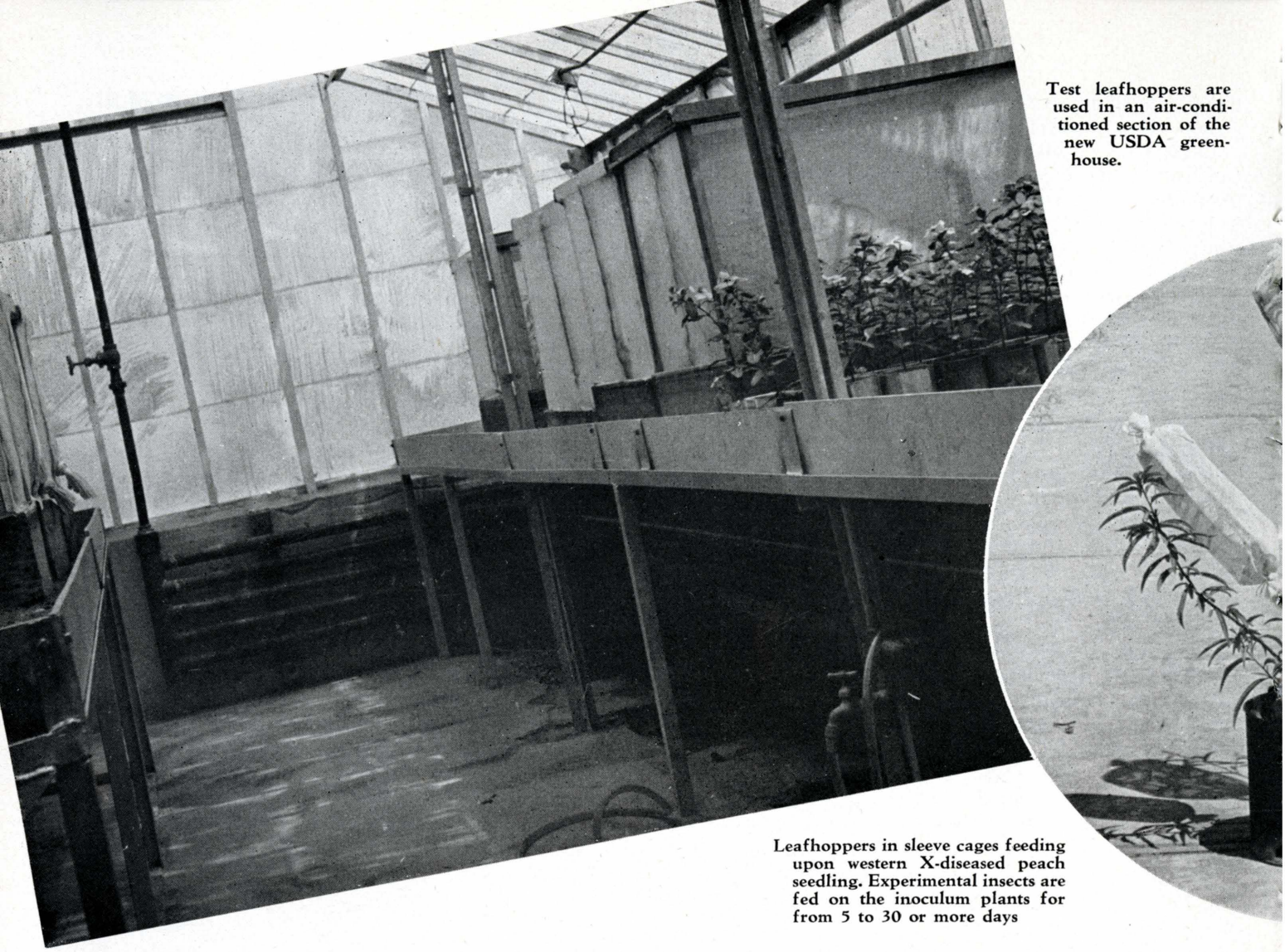
In planning a suitable kitchen arrangement, it often is necessary for the homemaker to plan a preferred arrangement and then to compromise with what is possible.



(Upper) A lap board near the sink for sitting down jobs. Here Mrs. Marie Webster finds the board at the right position for peeling potatoes

(Center) A pull out panel next to the range is a handy place for skillets and small equipment used in cooking. Here Mrs. Bennion demonstrates the one in the experimental kitchen

(Lower) The revolving corner makes equipment accessible and easy to see. The range cabinet provides storage for equipment and supplies within easy reach of where they are used first



Test leafhoppers are used in an air-conditioned section of the new USDA greenhouse.

Leafhoppers in sleeve cages feeding upon western X-diseased peach seedling. Experimental insects are fed on the inoculum plants for from 5 to 30 or more days

THE spread of the western x-disease of peach and wilt and decline of sweet and sour cherry have become major problems in the production of stone fruits in Utah. Transmission by means of bud inoculations between various stone-fruit trees have demonstrated that the western x-disease complex is responsible for both these disorders as well as for red leaf in chokecherry.

Virus Diseases Spread by Insects

In nature these virus diseases appear to be spread within orchards only by insects. As is true with many virus diseases of plants, certain sucking insects pick up the virus while feeding upon diseased trees. If the virus-vector relationship is suitable biologically, the insect becomes a potential vector (an insect which carries and transmits disease-causing microorganisms) after the virus reaches its salivary glands through the blood stream. During the process of feeding the mouth parts of the insect work like a pump, and the saliva is used to prime the pump. Some of the infective saliva is injected into the healthy plant, and if the plant is susceptible to the virus it shows symptoms of the disease within a few days, months, or years, depending upon the virus.

Some viruses are transmitted by insects within a few minutes after feeding upon a diseased plant; others require many days of incubation within the insect before infection can be produced. In the case of the western x-disease, experiments indicate that from one to two months is required before the leafhopper is able to transmit the virus after feeding upon a diseased tree. In 1948 the Federal Bureau of Entomology and Plant Quarantine established a virus-vector laboratory at Logan in cooperation with the Utah Agricultural Experiment Station and the Federal Bureau of Plant Industry, Soils, and Agricultural Engineering. The search for the vector of the western x-disease virus has also been carried on in Washington, Oregon, and California. During the first year of these studies one of the important insect vectors was discovered. In 1949 a single case of transmission in field plots at The Dalles, Oregon, incriminated the geminate leafhopper, *Colladonus geminatus* (Van D.), and shortly thereafter entomologists of the Washington Agricultural Experiment Sta-

GEORGE H. KALOOSTIAN is the USDA entomologist in charge of vector investigations in stone-fruit trees in Utah. He was assigned to this project in 1948 *by the Division of Fruit Insect Investigations, Bureau of Entomology and Plant Quarantine. MERVIN W. NIELSON received his M.S. degree in entomology under Mr. Kaloostian's supervision. He is now working towards his doctor's degree at Oregon State College. This study was made under the Research and Marketing Act of* 1946.

Leafhoppers Found to Transmit Western X-Disease Virus

By GEORGE H. KALOOSTIAN and MERVIN W. NIELSON

The geminate leafhopper, Colladonus geminatus (Van D.), a vector of the western X-disease virus in Utah. Greatly enlarged. Photograph of insect by senior author and G. W. Cochran

tion found it to transmit the virus in Washington. However, it was not established from what source the leafhoppers picked up the virus, since in both cases the insects had fed upon both diseased cherry and peach trees. Specific transmission of the western x-virus from diseased peach to healthy peach was established in Utah during the spring of 1950 in the greenhouse at the State Agricultural College.

Early in 1951 it was also demonstrated in Washington and Utah that the geminate leafhopper is capable of transmitting the western x-little cherry disease virus from sweet and sour cherry to peach, and the importance of the naturally infected wild chokecherry as a reservoir of the virus was established when the western x-disease virus was transmitted from chokecherry to peach.

Discovery of Vector of Western X-Disease

The discovery of a vector of the western x-disease virus was a significant event for workers who had initiated the search with an exhaustive insect survey of stone-fruit orchards in the Western States. From the long list of insects catalogued about 200 species were selected as vector suspects for testing. Thousands of tests were made with this group of insects. The number of suspects had been reduced to less than ten species by 1948, although some tests were continued with a number of additional sucking insects found in fruit orchards.

The most important factor in the discovery of the geminate leafhopper as a vector of the western x-disease virus is the long incubation period required within the insect. This period is between 30 and 70 days. The reason for this long incubation period is not completely understood. It may be a simple matter of build-up in the number of virus particles by multiplication, or it may be the time required for the virus to travel from the mouth parts of the insect to the salivary glands, the stomach, and the blood stream. It is possible that both processes are involved.

At Logan peach-to-peach transmission of the virus by the geminate leafhopper was accomplished by the following procedure: The leafhoppers were fed upon a diseased tree for 9 days, then transferred to a healthy Lovell peach seedling and allowed to feed upon it for 33 days. This plant did not become infected. The surviving leafhoppers were transferred from the first test tree to a second healthy Lovell seedling and allowed to feed upon it for 25 days. This plant showed symptoms of the disease about two months later. All transmission obtained at Logan followed the same pattern whether the source of the virus inoculum was peach, cherry, or chokecherry. Single leafhoppers are able to transmit the virus as well as large numbers. In serial feedings on test trees at approximately 10-day intervals after the feeding period on the diseased plant, the test trees that were exposed to the viruliferous insects before the end of the long incubation period did not become infected.

The geminate leafhopper is being studied in Utah, as well as elsewhere, and evidence continues to indicate that it is the primary economic vector of the western x-disease in this region. It is commonly found in alfalfa and clover fields, where it reproduces during the summer months. Sticky-trap board surveys in orchards from May to September have indicated two population peaks—one in June, probably consisting of the overwintering generation, and the second in September, the progeny of the adults of the June peak. Adult leafhoppers collected in August and September lived six to seven months. A movement of leafhoppers occurs in September and October from clover and alfalfa to stone-fruit trees.

Control experiments are under way at the present time, but as yet no recommendations can be made. Preliminary indications are that a residual spray such as DDT, with proper precautions to prevent mite build-up, will reduce leafhopper populations in orchards. Dormant and summer sprays may be tied in with the regular sprays now recommended for stone-fruit trees, but a special post-harvest or autumn spray may be necessary to prevent infection of the trees by the fall movement of the insect vectors.

Phosphate Fertilizer Increases Alfalfa Hay Yields

By REX NIELSON

HAY production in Utah can be increased materially with the use of phosphate fertilizer. This is shown by the results of numerous tests in many areas of the state. In addition to increased yields the quality of the alfalfa is nearly always improved, that is, the phosphorus content of the hay from fertilized plots is considerably higher than that from non-fertilized plots. Typical yield data from these experiments are given in table 1.

At some locations the yield of alfalfa was not increased by the addition of fertilizer. It has been found from these studies that in some areas soil phosphorus is available in sufficient quantities to supply all that is required by alfalfa. In checking the history of such areas it is usually found that they have either been phosphated previously, have been manured heavily, or the soil tests high in available phosphorus.

Table 1. The yield of first cutting alfalfa in tons per acre in various areas of the state

Place	Treatment - pounds None	90*	180*
		tons	
Kingston	.75	1.19	1.49
Panguitch	1.16	1.62	1.46
Nibley	.96	1.19	1.14
Ephraim	1.74	1.53	1.67
Vernal	1.17	1.91	2.11
Bicknell	1.77	2.02	2.66
Neola	.34	.89	1.05
Salt Lake	2.28	2.32	2.37
Alpine	2.26	2.41	2.49

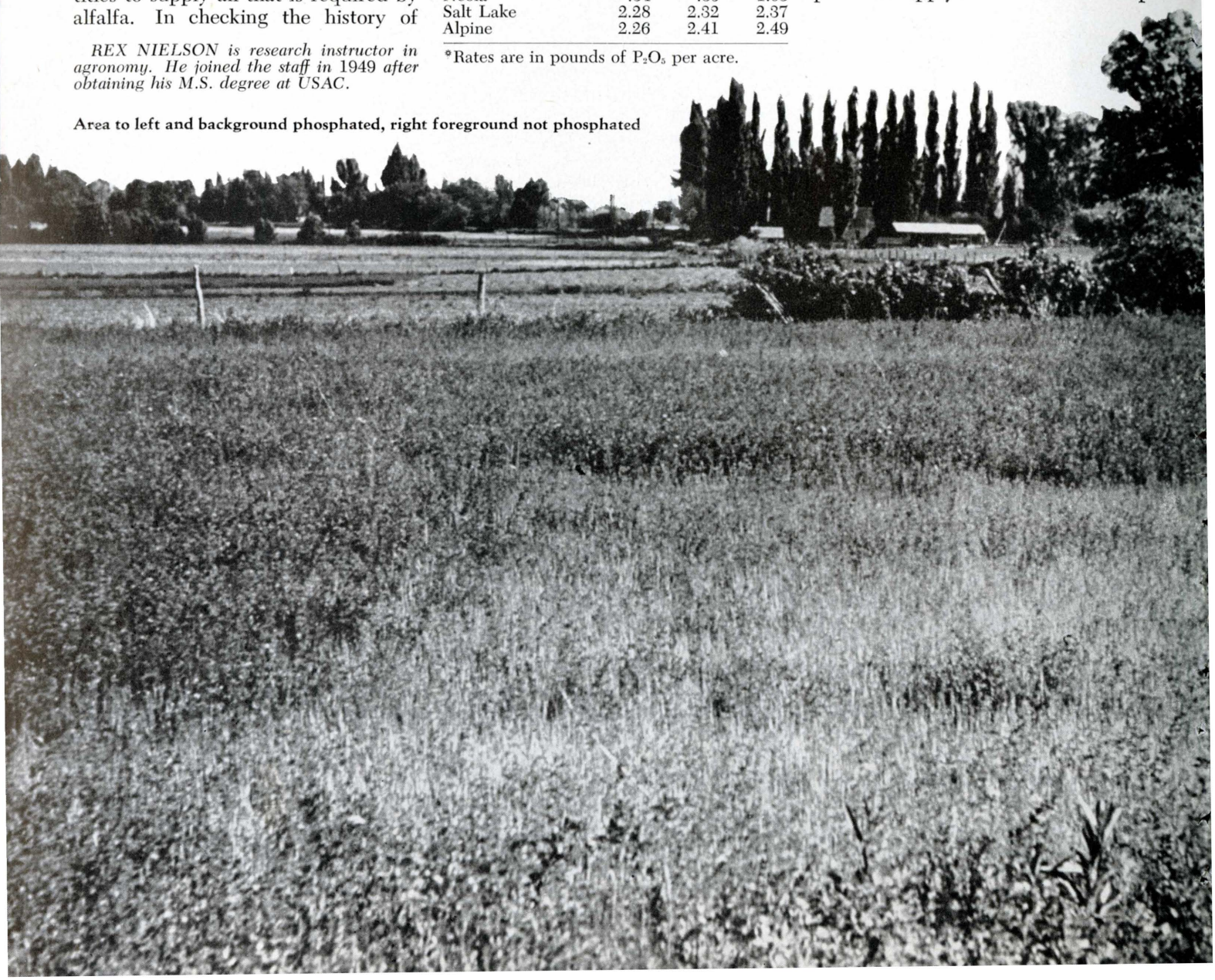
*Rates are in pounds of P_2O_5 per acre.

REX NIELSON is research instructor in agronomy. He joined the staff in 1949 after obtaining his M.S. degree at USAC.

No Adequate Method of Predicting Fertilizer Needs

There is at present no adequate method by which one can predict accurately whether or not the yield of alfalfa at any given location will be increased by the addition of phosphate, as many complex factors are involved. A soil test, previous cropping history, and previous fertilizer practices all serve as guides in predicting fertilizer need, but even with this information accurate estimates are not always made.

It seems generally advisable, however, that soils be kept sufficiently well supplied with readily available phosphate to supply all needs of the crops



Area to left and background phosphated, right foreground not phosphated

Poor hay crop caused by lack of phosphorus

in the rotation. Soil tests can be used to indicate whether a soil is high or low in available phosphate. More accurate information about the value of phosphate fertilizer in increasing hay yields on individual farms can be obtained by strip tests. That is, apply phosphate in strips using several rates. By observing the results obtained from these strip tests, one can predict rather accurately whether or not a deficiency of phosphorus exists. It should be kept in mind that correcting a phosphorus deficiency alone may not result in increased yields. Good farming practices are also needed.

Benefits of Phosphate Extend Over More Than One Year

It is interesting to note that data from these experiments show the benefits from phosphate fertilizer last over a period of several years. Significant yield and phosphorus content increases in the hay have been measured three years after the original application of fertilizer (table 2).

The 180-pound application of P_2O_5 per acre increased yields more than did the 90-pound treatment (table 2). Sufficient data are not available, however, to determine whether 180 pounds applied as one treatment is better than the same amount applied in two treatments. At present 90 pounds of P_2O_5 per acre is the recommended practice.

Table 2. The yield of first cutting alfalfa in tons per acre three years after being fertilized

Treatment	North Logan	Panguitch	West Cache
	tons	*tons*	*tons*
None	1.05	.58	.31
90 lbs. P_2O_5 per acre	1.57	1.27	.86
180 lbs. P_2O_5 per acre	—	1.85	1.16

How to Apply Fertilezer

The results of limited studies seem to indicate that broadcasting phosphate on the alfalfa and harrowing it into the soil is a satisfactory method for applying the fertilizer. In tests carried on for the last two years at Logan, broadcasting has been equally as effective as drilling the material in bands.

Time of Application

Time of application is apparently not critical, as fall applications appear to be equally as effective as spring treatments. The alfalfa should not have any appreciable vegetative growth when fertilized, as considerable burning may result.

Some commercial concerns are advocating the use of nitrogen and potash fertilizer on established stands of alfalfa. Although numerous experiments have been made in Utah using both nitrogen and potash, at the present time not one of these experiments shows that yields have been increased as a result of using these fertiliers.

NEW PUBLICATIONS

Cir. 877. Cultural studies on carrot stecklings in relation to seed production, by Leslie R. Howthorn. U. S. Department of Agriculture in cooperation with the Utah Agricultural Experiment Station. 21 p.

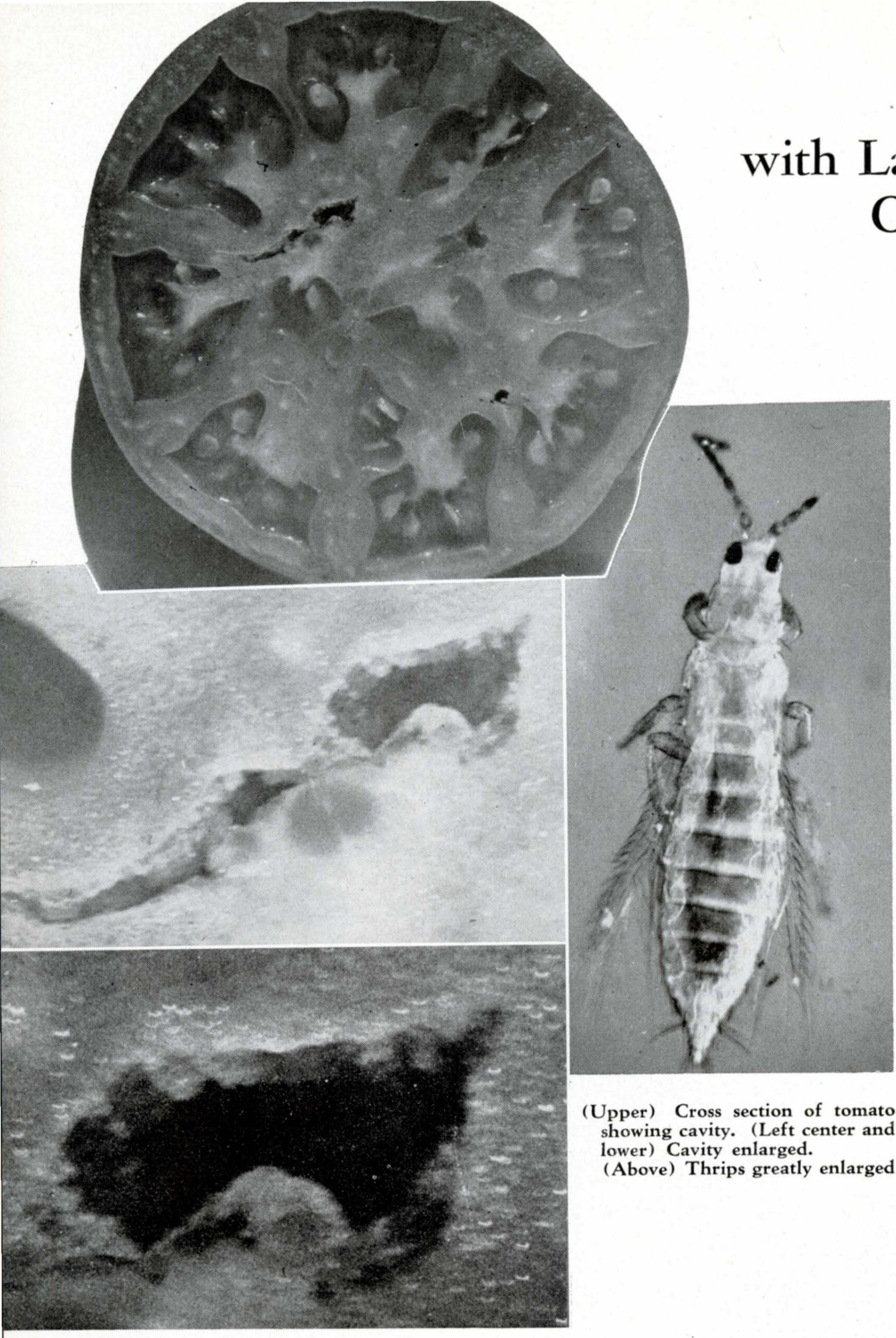
This circular reports studies to determine the effect of rate of seeding, time of planting, and width of planting shoe on the numbers and distribution by size of the stecklings produced and to determine the effect of steckling size on stand, rate of plant development, height, branching habit, seed yield, and viability. Studies on the best time of harvesting are also reported.

Cir. 892. Studies of soil moisture and spacing for seed crops of carrots and onions, by Leslie R. Hawthorn. U.S. Department of Agriculture in cooperation with the Utah Agricultural Experiment Station. 26 p.

In this circular studies to determine the effect of soil moisture and spacing on the growth, time of maturity, seed yield, and viability of carrot and onion crops grown for seed are reported.

These circulars are published by the U. S. Department of Agriculture, but single copies may be obtained free by writing the Utah Agricultural Experiment Station.

Tomatoes with Large Blossom Ends Often Harbor *Thrips*



(Upper) Cross section of tomato showing cavity. (Left center and lower) Cavity enlarged. (Above) Thrips greatly enlarged

Tomatoes with large blossom ends often harbor thrips in cavities within the fruits. Encased insects are not the only objectionable features of such fruits, in addition the cavities often become excessively calloused from thrips feeding. This lowers the consumer appeal of the fruit, even when purchasers fail to see the small insects.

Thrips were first found inside tomato fruits in a canning factory at Spanish Fork in 1941. In a study made in 1942 by Walter E. Peay, of the Bureau of Entomology and Plant Quarantine working cooperatively with the Utah Station, and Dr. George F. Knowlton, professor of entomology, 13.5 percent of tomatoes selected at random from conveyor belts in canning factories were found to contain cavities, while 27 percent of the tomatoes with cat-faced blossom ends contained cavities. At one plant where Moscow-type tomatoes were being canned, the researchers found only 7 percent of the fruit contained cavities compared with 14 percent at another plant nearby where mostly Stone-type tomatoes were canned.

They found that thrips gained entrance to cavities inside tomato fruits through openings at the blossom end. The size of the cavities ranged from a pinhead to an inch or more in diameter. A few were close to the blossom end but the majority were deep in the fruit. Some were merely unfilled seed pockets, but most of them were in the solid tissue. From 13 to 32 percent of the cavities contained thrips.

To determine whether thrips attack some varieties of tomatoes more than others, Peay and the late Dr. H. L. Blood of the U. S. Bureau of Plant Industry, Soils, and Agricultural Engineering, made a series of tests from 1942 to 1947 with 54 different varieties of tomatoes. They found a great difference between varieties in the number of cavities and therefore in the number of thrips inside. Small-fruited varities with small blossom ends, such as Red Cherry, contained no cavities capable of harboring thrips. Medium-sized fruit with small blossom ends, such as Michigan State Forcing, Comet, Satisfaction, Bonny Best, Prichard, and John Baer contained only a few cavities. Varieties producing large fruit, but with small blossom ends, such as Globe and Oxhart, contained few cavities. Varieties such as Stone, Giant of Rome, and Peak of Perfection, producing large fruit with large blossom ends usually showed the most fruit with cavities.

Attempts in recent years to control thrips in tomato fields by spraying have proved economically unfeasible because of the large number of times a field must be sprayed to control the thrips.

Fluid Milk Market in Utah Unstable

By WELLS M. ALLRED

THE market demand for fluid milk in Utah and adjoining states has greatly expanded in recent years. This is a result of (1) An increase in population (Between 1940 and 1950 population in Utah increased 139,000 or 25 percent and the population of 8 Intermountain States increased 22 percent), (2) High per capita consumption of fluid milk, (3) Production of high quality milk which enables Utah producers to enter outside markets and also to expand marketing of fluid milk in the state.

Even though the market for fluid milk has increased greatly in recent years, there are still some problems in connection with the market. One of these is how to obtain a more stable market.

A and C Grade Milk

Milk entering commercial channels of trade in Utah is of two types or classes, grade A and grade C. Grade A milk is produced under more rigid sanitary requirements than grade C. In addition, grade C milk is limited to use in manufactured products. These include frozen dairy foods, butter, cheese, cottage cheese, evaporated milk, condensed milk, condensed skimmed milk, ice cream mix, and edible dry milk solids. (Dairy Laws as printed and published by the Utah State Board of Agriculture, 1947.) Grade A milk can be used for these manufactured products, plus fluid products such as fluid cream and various milk beverages.

Price Differential Between Two Grades

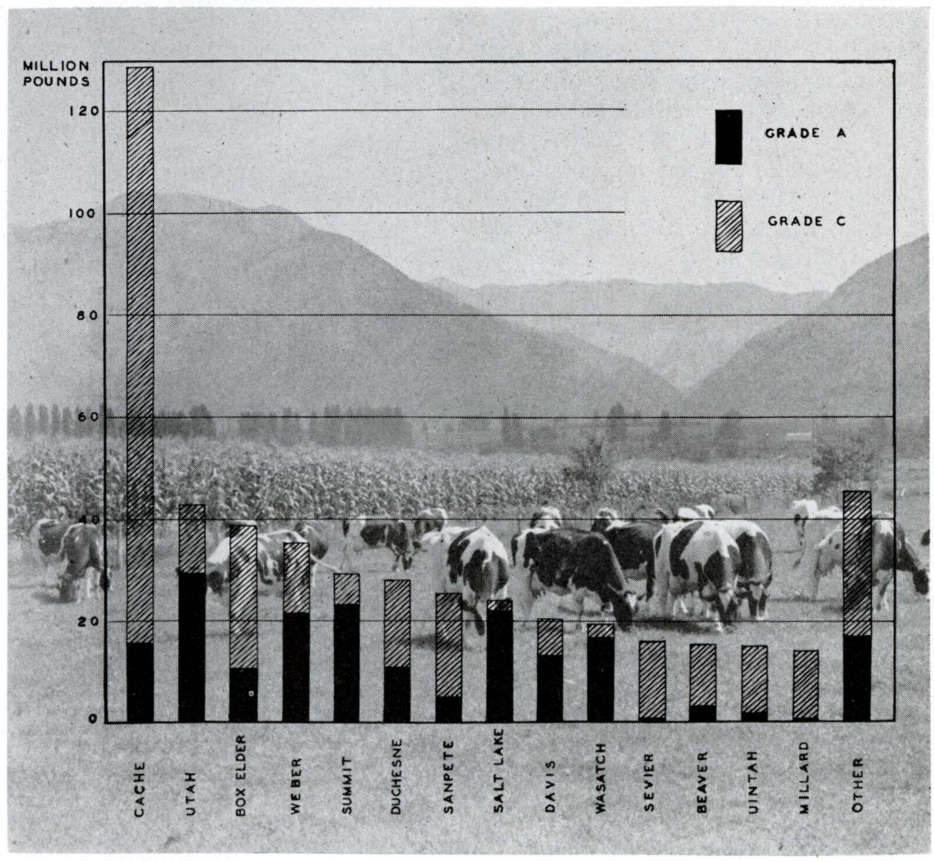
In addition to differences between the conditions under which grade A and grade C milk can be produced there is a substantial price difference to the milk producer. Average federated milk price quotations for 1950 listed 3.5 grade A milk at approximately $1.39 per pound butterfat. The class C average price for this period was approximately $ .78 per pound. Thus, the class A price was about 78 percent higher than class C.

These prices are followed by many dairy processing plants in Utah and are suggested by the Federated Milk Producers. This is a cooperative organization of dairymen, supplying grade A milk to a number of Utah dairies. There is considerable variation over the state in the amount the grade A price to producers exceeds the grade C price. This is because grade A producers are generally paid the grade A price for only a portion of their milk and also receive the "C" price for butterfat in milk above the 3.5 percent level. In addition some processors do not follow the federated pricing system. Thus the variation in price throughout the state in 1950 ranged between 10 and 75 percent more for grade A milk than for C.

Grade A Market Closed

A third characteristic of the milk market in Utah is that the grade A market is in essence a closed one for producers. As a general rule, the farmer not on grade A is not free to sell on this better market even though the quality of his product might qualify him or even though he is willing to make the necessary adjustments to qualify. One reason for this is that demand for grade A milk products is not generally sufficient to absorb the potential supply. The price for grade A milk is higher than for grade C and hence processors, as a rule, purchase only sufficient grade A milk, with a surplus margin for safety, to supply their demand for products which by law must be made from grade A milk. The ease of entry into the grade A market varies however with conditions

Fig. 1. Total sales of grade A and grade C milk by counties, Utah, 1948 (Unpublished data, Utah Agricultural Experiment Station)



WELLS M. ALLRED is assistant professor of agricultural economics. He joined the staff in July 1951 after completing the work for his PhD. at Cornell University.

in various parts of the state and with the policy of processors and cooperative milk producer associations.

Variation in Milk Production Among Counties

A fourth characteristic of the market is the wide variation in percent of milk produced which is utilized or sold as grade A milk in each of the counties (fig. 1). Although milk is produced in all counties of the state, production is concentrated in a relatively few counties. Approximately 503 million pounds of milk were sold by Utah farmers to dairy plants in 1948. Of this total, Cache County produced more than one fourth of all milk sold. This was nearly three times the amount of milk sold by Utah County, which was second in rank. Approximately half of all milk sold was produced in Cache, Utah, Box Elder, and Weber Counties.

The grade A milk sales indicated an entirely different picture. Cache County sold only 16 million pounds or 13 percent of its production as grade A milk in 1948. The relative importance of grade A sales in Cache County is probably greater at present because of the efforts of dairy interests to expand the grade A market. Salt Lake County sold 92 percent of its milk as grade A, compared with 65 percent for Utah County, and 60 percent for Weber. Some of the less populous counties sold the bulk of their milk as grade A. Wasatch County sold 82 percent of its milk as grade A in 1948, Summit 80 percent, and Duchesne County sold 40 percent of its production on the grade A market during this year.

Utah Surplus Milk Producing Area

Another characteristic of the market in Utah is that the state is a surplus producing area in the sense that more milk is produced than is now used in grade A products within the state. In 1948 only 38 percent of all milk was sold as grade A and the remainder, or 62 percent, was sold as grade C or as cream.

Some of the out-of-state markets are not so stable as the state market. This is because the local producers in out-of-state markets prefer to sell their milk as grade A as do Utah producers. In periods when the local supply increases or demand falls off, efforts are made to decrease the amount of milk shipped in from surplus areas.

In periods similar to the present when the demand for dairy products is high, the market appears sufficiently stable for the Utah dairy industry to function efficiently and with little friction. During periods of falling prices, however, there is more danger of the market becoming unstable resulting in price cutting below costs and similar practices to obtain new or hold existing markets, especially those for grade A milk.

The characteristics of the Utah milk market explained above would in some measure accentuate instability during periods of falling prices. This is because under such conditions farm costs generally fall less rapidly than prices of farm products. Coupled with this, the price of products made from grade C milk will as a rule fall more rapidly than the price of those produced from grade A milk. The latter prices are controlled to some extent. At least in Utah it appears that producers have considerable influence as a group in determining prices, much like a labor union in establishing wages.

Products made from grade C milk, on the other hand, are sold on the market in competition with similar products from all over the United States and other parts of the world. Hence, there is little possibility that prices of these products could be greatly influenced on a state basis.

Thus if conditions should occur in which farm costs remained high relative to prices received for most farm products and the price of grade A milk remained high relative to the price of grade C milk, there would likely be more pressure on the part of individual farmers not now selling grade A milk to get on that market. Furthermore, some of the areas which are now selling the bulk of their milk as grade C would likely begin to look elsewhere with more energy for grade A markets causing instability in the milk market detrimental to Utah dairy farmers and processors.

Some of the alternatives that might be taken under consideration to stabilize Utah's milk market, even in the face of falling prices, are suggested here:

(1) Increase the sales of grade A milk both within the state and in areas outside the state. This will increase the income of dairy farmers. Also, more dairy farmers in Utah can share benefits of the grade A market if these sales increase relative to grade C sales.

(2) Devise a marketing plan which will permit more producers in the state to share benefits of an expanded grade A market according to the quality of their product. The danger of instability resulting from agitation on the part of dairymen who sell grade C milk will lessen as additional farmers are able to dispose of their milk in grade A marketing channels.

(3) Develop a more competitive market for milk and milk products in which price is more receptive to conditions of natural supply and demand.

HOWELL FIELD STATION FOR HORTICULTURAL RESEARCH

The name of the horticultural farm at North Ogden has recently been changed to the Howell Field Station for Horticultural Research in honor of Judge J. A. Howell of Ogden who for many years was president of the Utah State Horticultural Society. It was largely through his efforts that the State Legislature appropriated funds for the purchase of the farm. The farm, a 71½ acre tract of land, was purchased June 30, 1943.

As an expression of his continued interest in horticultural research, Judge Howell has now made a gift of $1500 to the College to be used in the construction of an appropriate gateway to the farm.

PEACH VARIETIES

(*Continued from page* 4)

Fisher, Cumberland, Rochester, Alton, Carman, Early Mamie Ross, Golden Elberta, Colora, Illinois, Early Charlotte, Polly, Amador, Hiley, Belle of Georgia, Champion, Slappey, Kalhaven, Improved Late Crawford, and Scarlet Elberta fruited in 1951. They are listed above in the order of ripening. These varieties do not merit consideration by Utah growers because there are other varieties of their season which are definitely superior in fruit characteristics.

Table 1. A list of peach varieties fruited by the Department of Horticulture in 1951, showing ripening date, flesh color, freeness of stone, attractiveness, flesh texture, quality, size, and days ripening before or after Elberta

Variety	Date ripe		Days before Elberta	Flesh color	Freeness of stone	Attractiveness	Flesh texture	Quality	Size in inches
	Ogden	Logan							
Mayflower	7/12		62	W‡	cling	poor-moderate	juicy, stringy	poor to fair	2
°Cherry Red	7/23	8/8	51	Y	cling	quite	firm, juicy	good minus	2-2½
°Erly Red Fre		8/8	51	W	free	moderate	slightly juicy	fair-good	2¼-2¾
Hales Early	7/23		51	W	cling	excellent	juicy, stringy	fair-good	1¾-2
Christopherson	7/23		51	Y(gr)		good	juicy, stringy	fair-good	2¼-2¾
°Early East	7/27		47	Y	cling	very	juicy, stringy	good	2½-3
Early Rochester	7/30	8/13	44	Y(gr)	cling	poor	juicy, stringy	fair	2¼-2½
°Starking Delicious	8/3		40	Y	free	moderate	juicy, stringy	good	2½
°Prairie Sunrise	8/7	8/13	36	Y	free	moderate	juicy, melting	good	2¼-2¾
°Prairie Daybreak		8/13	36	Y	free	quite	juicy, stringy, slightly tart	fair	2¼-2¾
Dixie Gem		8/20	36	Y	free	very	juicy, stringy	good	2-2¾
°Red Haven	8/7	8/22	36	Y	free	very	juicy, slightly stringy to buttery	fair to good	2½-2¾
°Herb Hale	8/7	8/29	36	Y	free	moderate—plus	very juicy, stringy, melting	good	2¼-2¾
Jerseyland	8/7	8/17	36	Y	free	moderate	juicy, stringy, coarse, tart	fair	2¼-2¾
Raritan Rose	8/7	8/25	36	W	free	good	very juicy, firm, melting	good-fair	2¼-2½
U.S.A.C. #1	8/10	8/22	33	Y	free	moderate	slightly juicy, stringy, coarse	good	2-2¾
°Fair Beauty	8/14	8/22	29	Y	free	moderate	juicy, firm	good	2-2½
Eureka	8/14	8/26	29	W	cling†	poor	juicy, stringy, aromatic	fair-good	2-2½
Wild Rose	8/17	8/27	26	W	free	moderate	juicy, stringy	good minus	2-2½
New Day		8/26	26	Y	cling†	moderate	juicy, stringy, tart	fair-good	2¼-2½
Stark #751	8/19	9/6	24	Y	free	moderate	juicy, stringy	good minus	2½-2¾
°Triogem	8/19	9/3	24	Y	free	quite	juicy, stringy	good	2¼-2¾
°Prairie Rose	8/19	8/27	24	Y	free	moderate	juicy, stringy	fair-good	2½-2¾
Stark #919	8/19	8/31	24	Y	free	moderately	juicy, stringy	good minus	2½-2¾
P.H.S. 37 D	8/19	9/7	24	Y	free	moderate	juicy, stringy, strong	poor	2¼-2¾
Golden Jubilee	8/21		22	Y	free	moderate-poor	juicy, stringy, bruises easily	good	2½-2¾
°Loring	8/21		22	Y	free	moderate	juicy, stringy	good	2-2¾
°Fire Glow	8/21		22	Y	free	quite	juicy, stringy	good	2½-2¾
Clark Haven	8/21	8/22	22	Y	free	moderate	juicy, stringy, slightly strong	fair-good	2¼-2¾
Stark #976	8/21	8/31	22	Y	free	moderate	slightly juicy, very stringy	fair-good	2½?
Stark #881	8/21	9/6	22	Y	free	moderate—plus	juicy, stringy	fair	2¼-2¾
°Early Halehaven	8/21		22	Y	free	moderate	juicy, stringy	good	2¼-2¾
°Southland	8/21	9/3	22	Y	free	moderate	juicy, stringy	good minus	2½-2¾
°Fairhaven	8/21	9/3	22	Y	free	quite	juicy, stringy	good minus	2¼-2¾
°July Elberta	8/21	8/29	22	Y	free	moderate	juicy, stringy	fair-good	2½-2¾
#37016	8/21		22	Y	free	moderate	juicy, stringy, slightly strong	fair-good	2½-2¾
Coe #1	8/21		22	Y	free	poor	juicy, stringy, strong	fair-good	2-2½
Stark #932	8/21	8/29	22	Y	free	poor	juicy, stringy	poor	2-2¾
Stark #918	8/21	8/29	22	Y	free	poor	juicy, stringy	fair-good	2-2½
Stark #889 (99)	8/22	8/29	21	Y	free	moderate	juicy, quite stringy	fair-good	2-2¾
Golden East	8/24	9/8	19	Y	free	moderate	juicy, stringy	fair	2½-2¾
July Gold	8/26	9/6	17	Y	free	poor	juicy, stringy	fair-good	1¾-2¼
Imp. Crawford	8/26		17	Y	free	moderate	juicy, stringy	fair-good	2-2¼
Southhaven	8/26		17	Y	free	moderate-poor	slightly juicy, stringy, melting	good	2½-2¾
K 111	8/26	9/3	17	W	free	poor	juicy, stringy	fair-good	2¼-2½
#37146	8/26		17	Y	free	moderate	juicy, stringy	fair-plus	2¼-2½
Vedette	8/26	9/8	17	Y	free	moderate	juicy, stringy	fair	2¼-2½
Stark #952	8/28		15	Y	cling	moderate	stringy-rubbery	fair	2¼-2½
Valiant	8/28		15	Y	free	moderate	slightly juicy, very stringy	fair-good	2½
°Hale Haven	8/28	9/6	15	Y	free	moderate	juicy, stringy	good minus	2¼-2¾
New Babcock	8/28	9/6	15	W	free	quite	juicy, stringy	fair-good	2¼-2½
Midway	8/28	9/7	15	Y	free	moderate	juicy, stringy	fair-good	2-2½
Sdlg #3	8/28		15	Y	free	quite	juicy, stringy	fair-good	2½-2¾
Sunhigh	8/28	9/3	15	Y	free	moderate	juicy, stringy	fair-good	2-2½
Veteran	8/31	9/7	12	Y	free	moderate	juicy, stringy	fair-good	2¼-2¾
Red Elberta	9/2		10	Y	free	moderate	juicy, very stringy	fair-good	
Summercrest	9/4	9/22	8	Y	free	moderate	juicy, stringy	fair-good	2-2½
Laterose (B)	9/7		5	Y	free	moderate	juicy, very stringy	good	
Sun Gold	9/7	9/13	5	Y	free	very	juicy, slightly stringy, slightly strong	fair-good	2½
°Early Elberta	9/9	9/24	3	Y	free	moderate	juicy, stringy	fair-good	2-2½
Early Crawford	9/10	9/13	2	Y	free	moderate	juicy, stringy	good	2-2¼
Burbank Giant	9/10		2	Y	free	very	not juicy, very stringy, flat	fair	2½-2¾
Brilliant (HH)	9/10		2	Y	free	quite	juicy, stringy	fair-good	2-2½
K 56	9/10		2	Y	cling	quite	juicy, stringy, strong	fair	
Halberta Giant	9/10		2	Y	free	very	juicy, stringy, slightly flat	fair	2½-3
#37147	9/12		0	Y	free	moderate	slightly juicy, stringy	fair	2¼-2½

Table 1. A list of peach varieties fruited by the Department of Horticulture in 1951, showing ripening date, flesh color, freeness of stone, attractiveness, flesh texture, quality, size, and days ripening before or after Elberta, continued

Variety	Date ripe		Days before Elberta	Flesh color	Freeness of stone	Attractiveness	Flesh texture	Quality	Size in inches
	Ogden	Logan							
Sullivan Elberta	9/12		0	Y	free	moderate—minus	slightly juicy, stringy	fair-good	2½-2¾
*Elberta	9/12		0	Y	free	moderate	juicy, stringy	fair-good	2-2¾
New Cheer	9/12	9/25	0	W	free	poor	juicy, stringy, flat	fair minus	
Red Hale	9/13		0	Y	free	poor	slightly juicy, slightly tart	fair	2
Dripstone	9/13		−1	Y	free	quite	slightly juicy, slightly stringy	good minus	2½-2¾
Candoka	9/13		−1	Y	free	moderate	juicy, stringy	fair-good	2½-3
*J. H. Hale	9/13		−1	Y	free	quite	juicy, stringy	good minus	2¾-3¼
Corvallis	9/15	8/29	−3	Y	free	poor	juicy, stringy	fair-good	2¼-2½
Redskin	9/15	9/21	−3	Y	free	moderate-quite	juicy, stringy, strong	fair-good	
White Hale	9/15		−3	W	free	quite	juicy, stringy	fair plus	2½-3
After Glow	9/15		−3	Y	free	moderate	juicy, stringy	fair-good	2½-2¾
Fertile Hale	9/19	9/25	−7	Y	free	moderate	slightly juicy, stringy	fair	2¼-2¾
Honey Gem		9/25		Y	almost free	moderate	juicy, stringy	poor (flat, insipid, no acid)	2-2¼

* Standard varieties or ones that are promising for trial plantings.
† These varieties are slightly clingstone.
‡ W refers to white flesh, Y to yellow flesh and Y(gr) to greenish yellow.

NITROGEN FERTILIZER FOR SUGAR BEETS

(*Continued from page 7*)

ply 10 to 15 ton of manure per acre for sugar beets. If manure is not available, maintain a comparatively high nitrogen level in the soil with commercial nitrogen even though a slight reduction in percentage of sugar may result." While this recommendation is based on field experiments it is obviously a rough estimation. Felds vary widely in their fertilizer requirements. Suggestions from California are to the effect that chemical analyses of plant samples from the same fields should be made at regular intervals and used as a guide in adjusting the fertilizer program for succeeding beet crops. The difficulty here is that between one beet crop and another (five to eight years) many things happen to modify the fertility level of a given field. The word from Michigan is to make current green tissue field tests for available nitrogen and side-dress the indicated fertilizer requirement. Such information comes too late for many beet growers as far as the fertilizer effects on the current crop are concerned.

Tests at Utah Station

A series of field experiments were conducted at the Utah Agricultural Experiment Station in which observations were made on the nitrogen requirement of sugar beets.

The data in table 1 show the effect of too little and too much nitrogen, with and without barnyard manure, on the yield of beets and on gross sugar, as well as on the quality of sugar beets. It will be noted that on Millville fine sandy loam soil at Newton, 80 pounds of commercial nitrogen is effective in stimulating yield of beets without appreciably depressing su-

Table 1. Effect of manure and commercial nitrogen on yield and quality of sugar beets and seasonal nitrate-nitrogen content of petioles, 1946

	Fert. nitrogen per acre	Yield of beets per acre	Sucrose	Coeff. app. purity	Gross sugar per acre	Nitrate-nitrogen in petioles			
						June 17	July 22	Aug. 19	Sept. 23
	pounds	*tons*	*percent*		*tons*	*ppm*	*ppm*	*ppm*	*ppm*
No	0	15.0	16.8	91.9	2.51	1266	1555	322	–
manure	80	19.0	17.0	91.3	3.24	1566	1711	122	–
	160	20.7	15.8	88.1	3.27	1433	2955	2578	–
	0	18.6	17.2	91.1	3.20	2132	695	266	111
Manure	80	22.0	17.0	89.8	3.73	1683	2344	389	122
	160	23.4	16.0	87.5	3.74	1983	1677	3022	1141
L.S.D. @ .05		0.51	0.15	0.40	0.17	142	243	116	92

Table 2. Effect of manure and fertilizer nitrogen on yield of sugar beets and seasonal petiole composition, 1947

	Fert. nitrogen per acre	Nitrate-nitrogen in petioles						Yield per acre
		June 25	July 9	July 23	Aug. 5	Aug. 20	Sept. 5	
	pounds	*ppm*	*ppm*	*ppm*	*ppm*	*ppm*	*ppm*	*tons*
No	0	4,825	3,650	2,505	160	125	100	21.73
manure	80	–	–	6,800	1,600	562	125	27.05
	160	21,000	16,900	9,700	4,725	2,650	1,012	26.21
	0	3,925	3,875	2,375	357	925	62	23.63
Manure	80	17,200	15,300	4,925	1,425	1,075	225	27.57
	160	19,200	15,400	7,500	3,800	3,162	1,675	26.99
L.S.D. @ .05		2,320	1,724	1,913	660	661	496	0.88

crose percentage. This appears to be true regardless of additions of barnyard manure. One hundred sixty pounds of nitrogen tends to increase yields more than does 80 pounds, but the higher nitrogen fertilizer simultaneously depresses sucrose percentage to such an extent that the yield of gross sugar is similar for both treatments. Barnyard manure results in increased yields at all three nitrogen fertilizer levels with small influence on the sucrose percentage and coefficient of apparent purity. The net result is that both barnyard manure and commercial nitrogen up to 80 pounds per acre were found profitable practices on this soil.

It will be noted that the nitrate-nitrogen content of beet petioles was in general in the order of nitrogen fertilizer applied. Except for the plots treated with 160 pounds of nitrogen, the nitrate content of beet petioles decreased as the season progressed. It was a little surprising that petioles from plots treated with 80 pounds of nitrogen should be so low in nitrate-nitrogen by mid-September. These data along with the data on yield and quality indicate that possibly 100 pounds of nitrogen may have been a profitable treatment on this soil.

In 1947 a field was selected in the Garland area. This field had been in regular crop rotation for many years. The data in table 2 show the effect of manure and commercial nitrogen on yield of sugar beets and composition of sugar-beet petioles in this field.

A marked increase in yield was obtained with 80 pounds of nitrogen. No further yield increase was obtained with an additional 80 pounds. There was a tendency for a second 80 pound application to decrease yields slightly.

The composition of beet petioles was in general in the same order as the rate of nitrogen fertilization. It may be surprising to observe that barnyard manure had so little influence on the nitrate-nitrogen content of beet petioles. The nitrogen nutritional status appears to depend largely on applications of commercial nitrogen. This fact was easily recognized in the field by the yellow color of beet leaves on plots not receiving commercial nitrogen, especially during July. At the August 20 sampling there was a strong tendency for all manure plots to have a nitrogen nutritional advantage over non-manure plots. At the July 23 sampling this tendency was in favor of the non-manured plots. These tendencies are not strong enough to be significant statistically except on the no nitrogen plots at the August 20 sampling. Similiarly, the only statistically significant yield difference between manured and non-manured plots is where no commercial nitrogen was applied.

Table 3. Yield and quality of sugar beets and seasonal petiole composition as influenced by nitrogen fertilizer, 1948

Nitrogen applied per acre	Yield of beets per acre	Sucrose	Coeff. app. purity	Gross sugar per acre	Nitrate-nitrogen in beet petioles				
					7/13	8/2	8/23	9/18	10/9
pounds	*tons*	*percent*		*tons*	*ppm*	*ppm*	*ppm*	*ppm*	*ppm*
0	17.61	16.72	92.27	2.94	4,725	2,975	962	220	132
20	18.87	16.75	90.63	3.16	6,850	5,550	947	238	36
40	19.73	16.39	91.35	3.23	8,100	9,850	2,230	224	48
80	19.69	16.28	90.54	3.21	8,200	10,650	3,581	232	456
80 (½ in Aug.)	20.10	14.93	88.37	3.00	8,100	9,850	3,370	2,740	1,536
160	19.79	15.15	87.09	3.00	8,850	13,100	9,775	1,780	792
160 (½ in Aug.)	21.57	13.25	83.97	2.86	8,200	10,650	4,925	5,830	2,476
320	19.45	12.96	83.93	2.52	8,850	15,300	14,050	4,790	1,848
L.S.D. @ .05	1.72	0.83	1.29	N.S.	1,918	2,388	2,734	1,687	688

A nitrogen fertilizer recommendation for the two fields studied in 1946 and 1947 would probably be 100 pounds of nitrogen fertilizer per acre with or without barnyard manure on the Newton field. If manure is available, it should be used. Based on the available evidence, 80 pounds of nitrogen is all that could be recommended on the Garland field.

These data do not establish 100 or 80 pounds as the most profitable rate of supplemental nitrogen on these plots. In 1946, 120 pounds of nitrogen may not have been too much. In 1947, 40 pounds may have been sufficient for most efficient use of supplemental nitrogen. In order to obtain more definite information on the effects of supplemental nitrogen on quality and yield of sugar beets, eight nitrogen fertilizer treatments were studied in 1948. The soil used had received 15 tons of manure, 80 pounds of nitrogen, 100 pounds of phosphoric acid, and 60 pounds of potash per acre in 1947 previous to planting beets. Beet tops were left on the soil in the fall of 1947. Following this treatment it was not expected that a marked response to nitrogen fertilizer would result. The data in table 3 show the effect of nitrogen supplement on the 1948 crop.

It will be observed in the second column of table 3 that significant yield increases were obtained over unfertilized plots in all instances where 40 or more pounds of nitrogen was applied. Significant depressions in sucrose percentage and purity occurred where more than 80 pounds of nitrogen was used. When 80 pounds was applied in a split application a depression occurred similar to that obtained for more than 80 pounds. A large excess of nitrogen gave no adverse effect on yield but sucrose percentage was so noticeably lowered that the highest rate of nitrogen tended to produce less sugar than untreated plots. The most profitable returns on this soil were obtained from 40 pounds of nitrogen. It is interesting to observe that yield, sucrose percentage, and purity were not appreciably affected by an additional 40 pounds of nitrogen unless applied late in the season. It was definitely a waste of fertilizer to apply more than 40 pounds of nitrogen per acre and it was unprofitable to apply as little as 20 pounds.

When the nitrate-nitrogen content of beet petioles falls below 1,000 parts per million in August, yields tend to be adversely affected (table 3). When more than 1,000 parts per million are present in petioles in October, quality is lowered. It appears that the nitrate-nitrogen content of beet petioles should fall below 1,000 parts per million by mid-September. From August to harvest time the nitrate-nitrogen content of sugar beet petioles was roughly in the same order as the quantity of nitrogen fertilizer applied.

What the Data Show

It is evident from the data presented that either a deficiency or an excess of available soil and fertilizer nitrogen may be intolerable in sugar beet production. Consequently, it is important that a beet farmer know precisely how much nitrogen he should apply to supplement the soil nitrogen available to his sugar beet crop. It is evident from the results given herein that plant tissue analyses are useful in apprasing the nutritional status of sugar beet plants.

Sugar beet growing could become more profitable if a direct soil test for nitrogen-potential could be developed. Such a test would permit good estimates of supplemental nitrogen requirements so that better yields and higher sucrose percentages would result. It seems that the basis for devising a satisfactory direct soil test has been found. Plant tissue analyses has been developed to a point where it could be used as a reference to judge available soil-nitrogen conditions. The use of these tests, in combination with greenhouse pot tests and microbiological soil incubation tests, seems to offer possibilities for classifying soils as to their nitrogen-supplying ability.

Until some more useful measure of the nitrogen-supplying power of a soil is standardized, petiole analyses in conjunction with yield and quality data may be employed to furnish an approximation of supplemental nitrogen requirement. On the basis of such data presented above it appears as though 40 to 100 pounds of commercial nitrogen per acre should be applied on typical soils of northern Utah. Barnyard manure applied in the spring of the year in which beets are grown should be supplemented with commercial nitrogen, unless the soil is known to have large quantities of available nitrogen.

It should be pointed out that the solution to the nitrogen fertilizer problem is probably not an easy one. Nevertheless, it is the most important fertility problem with which many beet growers are faced at present. A reasonably accurate and precise answer to the question of how much supplemental nitrogen a beet grower should use on his crop would be a great boost to the industry.

PEACH PRUNING RECOMMENDATIONS

(*Continued from page* 9)

At harvest time, the fruit was picked as nearly as possible at the firm ripe stage, which necessitated three pickings on most of the trees. The individual fruits were sized.

Yields of Fruit

Total yields of fruit 1¾ inches and above in 1949 and 1951 are shown in table 1. In both years trees pruned by the corrective method produced higher yields than those pruned by the other three methods. However, in 1951 yields from trees pruned by this method were not statistically higher than from trees pruned by the long or thinning out method. In both years trees pruned by the severe method gave lowest yields.

The accumulated total yields of fruit 1¾ inches and larger for the plots to date are of great interest (table 2). The high yields for the "corrective" plots average approximately 362 bushels per acre per year for the crop years 1948, 1949, and 1951. These high yields are for trees that were only four, five, and seven years old. At the other end of the production scale, the "severe" trees for the same years produced an average of only 143 bushels per acre. The production for the "severe" plots almost approached the state average of 177 bushels per acre.

When yields of fruit above 2¼ inches diameter are considered, however, there has been no significant difference between the corrective and the long or thinning out methods (table 3). In both 1949 and 1951 yields from trees pruned by the long or thinning out method were higher than those of trees pruned by the corrective method.

Table 1. Effect of system of pruning on yield in 1949 and 1951 of fruit 1 3/4 inches and above of Elberta peach trees planted in 1945

Type of pruning	Acre yield on basis of 100 trees	
	1949	1951
	bushels	
Corrective	372.0	577.1
Long or thinning out	253.2	544.4
Conventional	169.1	384.6
Severe	86.3	316.2

Table 2. Effect of system of pruning on the total yields of Elberta peach trees 1948, 1949, and 1951

Type of pruning	Yield per acre on basis of 100 trees
	bushels
Corrective	1085.7
Long or thinning out	905.9
Conventional	632.9
Severe	430.0

Ripening Dates

Peaches from trees producing higher yields ripened earlier and usually the entire crop was picked in the first two pickings, while from 20 to 25 percent of the crop on the more severe pruning treatments had to be left for the third picking.

Fruit Removed in Thinning

In 1951 the fruit removed in thinning from individual trees was counted. An average of 2193 fruits was removed from trees pruned by the corrective method, 1972 from trees pruned by the long or thinning out method, and 1291 from trees pruned by the conventional method. No thinning was done when trees were pruned by the severe method.

Data gathered during the three years when a commercial crop of fruit was produced show that the lighter the type of pruning, the heavier is the total yield of fruit. It is evident that it is better to prune less severely and to thin properly, as the higher yield

Table 3. Effect of pruning treatment on yield of peaches above 2 1/4 inches in 1948, 1949, and 1951

Type of pruning	Yield per acre			
	1948	1949	1951	total
		bushels		
Corrective	69.7	209.7	392.2	671.6
Long or thinning out	61.8	237.0	479.6	778.4
Conventional	52.0	153.4	349.9	555.3
Severe	34.4	56.3	251.5	342.2

will more than pay for the additional cost of thinning. The conventional and severe methods of pruning represent a financial loss to the grower.

The corrective and the long or thinning out method resulted in complete distribution of fruits over the entire tree in all three years. With the conventional and severe methods the fruits were clustered and were absent in some parts of the tree.

The data emphasize that pruning alone to reduce the set of fruit is unsatisfactory. Proper thinning must be used to insure the desired size of fruit. Light methods of pruning are dangerous unless thinning is properly done. Trees in the orchard treated with a chemical thinning spray and not hand thinned yielded as high as 15.9 bushels. But the trees broke down. It is important to examine each tree and thin to the number of fruits that it can properly size.

Quality of Fruit

Careful observations indicated that color was poorest on the most severely pruned trees and best on the lightest pruned trees. The excess wood and foliage produced by trees in response to the severe and conventional methods of pruning so shaded the developing fruits that they did not have enough light to color properly and to develop quality.

What Happens in a Year With Late Spring Frosts

In 1950, late spring frosts destroyed much of the Utah peach crop. The pruning plots were pruned before that time. In the upper portion of the orchard, there was practically no fruit on any of the plots, but in the lower portion two plots produced considerable fruit. The total yields of 1¾ inch and larger fruit from these plots in terms of bushels per acre pruned to the various methods were; corrective, 617.7; long or thinning out, 202.6; conventional, 99.8; and severe, 39.3. These yields illustrate that in years when there is considerable low-temperature damage to flower buds, the lighter methods of pruning may result in a crop of fruit, while the more severe methods produce practically no crop or a poor one. Growers with a small acreage could well afford to delay pruning until after bloom.

NITROGEN FOR SWEET CORN

(*Continued from page 5*)

nitrogen produced cobs well filled with kernels. Ears from the low nitrogen plots were small and not well filled (fig. 2).

At all moisture levels nitrogen increased the stover yield. This increase as shown in table 3, was most pronounced on the wet plots. As can be seen in fig. 1, the water seems to regulate the height of the plant. Plenty of nitrogen and proper moisture encourage tall heavy plants with more large full ears.

Table 3. Yield of green stover as influenced by moisture and nitrogen fertilizer

Soil moisture condition	Pounds of nitrogen applied			
	0	50	100	200
	tons	*tons*	*tons*	*tons*
Wet	7.37	11.50	16.25	22.25
Medium	5.75	9.75	13.62	16.00
Dry	5.87	8.25	10.62	11.50

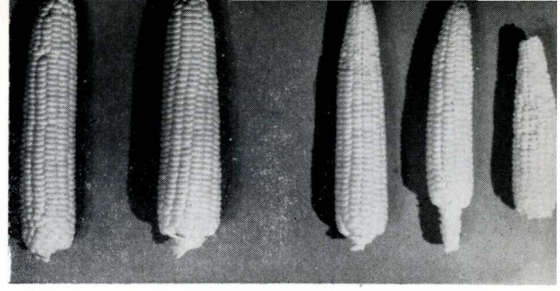


Fig. 2. The two ears on the left were from high moisture "wet" plots that received 200 pounds of nitrogen. The other three were from wet plots that received no nitrogen fertilier

Measurements on the soil moisture indicated that water was not removed by the roots at a depth of four feet. Even on the dry plots little water was taken by the plants at 36 inches. Sweet corn is a shallow-rooted crop and responds to frequent light applications of water when the fertility is favorable. Corn, although needing plenty of water, is harmed by even short periods of water logging and it must be grown on land having good drainage.

WEBER BASIN

(*Continued from page 3*)

A small part produces dry land crops and a small part is unused. Nearly all the land is in private ownership.

Studies Made by Agricultural Agencies

The Agricultural Experiment Station and the U. S. Department of Agriculture personnel have worked only on the agricultural features of the project. Their primary objectives have been to determine if a satisfactory system of agriculture could be developed from the proposals, and that satisfactory social and economic rural conditions would result. They have not investigated the adequacy of water for storage or the cost of providing the facilities. They have, in cooperation with the Bureau of Reclamation, made a detailed study in the field and the laboratory of the lands proposed for irrigation. On the basis of the work done all land was placed in one of 6 classes. Classes 1 to 3 are considered suitable for general arable irrigated agriculture, class 4 is best adapted to pasture or fruit production in the foothill area, while classes 5 and 6 were eliminated from the project.

The Station and the U. S. Department of Agriculture also studied the need and the feasibility of draining lands with a high water table. They were permitted to review the work of engineers of the Bureau of Reclamation and also made independent field checks and studies. They also participated in the determination of the water requirements for different crops and different land classes. An engineer from the Farmers Home Administration, USDA, made a study of the problems and costs of domestic water in the several areas.

Utilizing the findings of the irrigation and drainage engineers, and the soil technicians in addition to the data collected by themselves, the economists analyzed the economic possibilities of the project. They made a personal survey of about 250 irrigated farms within the outer boundaries of the project area. For these farms they obtained such information as acres of land in diffierent uses, cropping system, crop yields, sales, numbers of each kind of livestock, livestock production, sales of livestock and products, other income, expenses, and data on management practices. As far as possible these data were related to the three general areas and also to land classes.

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These specially collected data were supplemented by data from a number and variety of secondary sources. Some were from earlier studies in the area.

Based on all available data, farm budgets showing the organization, income, and expenses of farms likely to develop were prepared for each land class and in each area. From these budgets the net returns to water for each land class in each area were calculated. Economists of all three agencies cooperated in the collection of data and in determining most of the basic input-output standards used.

Reports to Determine Budget Recommendations

The Bureau of Reclamation, however, prepared an independent report which has been submitted to Washington. Based on this, the Secretary of the Interior is expected to make recommendations to the Budget Bureau and the President.

The Bureau of Agricultural Economics and the Utah Station have cooperated in the preparation of a preliminary general report. Reports have also been prepared on soils and drainage conditions.

These reports will be submitted to the Secretary of Agriculture who will in turn make recommendations to the President pertaining to the desirability of the agricultural phases of the proposed project. The President may then recommend to Congress that funds be appropriated for construction of the project.

It is assumed that the reports of the Bureau of Reclamation and the U. S. Department of Agriculture will also be made available to the Congressional Committees who study these matters prior to acting upon requests and recommendations for funds. Considerable factual data are available to those who must make the decisions.

If the action taken in Washington is favorable to the project it is likely that the Utah Agricultural Experiment Station will prepare additional reports for the use of local people. These reports will be designed to assist the people on the land to make decisions regarding their participation in the project.

CONTRIBUTIONS TO RESEARCH

November 15, 1951 to February 15, 1952

Columbia-Geneva Division, U.S. Steel Corporation	$6900 for studies of the effect of fluorine on the growth of calves
American Dehydrators Association	$2000 for studies on supplemental feeding of range sheep
Judge J. A. Howell, Ogden	$1500 for construction of entrance to Howell Field Station
American Potash Institute	$500 for fertilizer research
American Smelting and Refining Company	$75 for making available records of insects of this region now in Zoology Department files
Johns-Manville Sales Corporation	1500 square yards of asphalt impregnated asbestos canal lining material
Farmers Grain Cooperative, Ogden	4 tons range pellets for studies on supplemental feeding of range sheep
Milton G. Pence Grain Company, Ogden	5100 pounds of hay for studies on supplemental feeding of range sheep
Julius Hyman & Company	6 gal. emulsifiable concentrate 2 gal. Dieldrin emulsifiable concentrate 2 lbs. Dieldrin wettable powder 1 gal. Aldrin emulsifiable concentrate 1 qt. Aldrin wettable powder for insect control investigations
Lederle Division American Cyanamid Co.	50 pounds Aurofac (antibiotic) for use in experimental rations for hogs.
Ray Ewing Company	25 pounds B-Meg vitamin B_{12} supplement for animal nutrition studies
Velsicol Corporation	Heptachlor dust and spray Chlordane emulsion concentrate