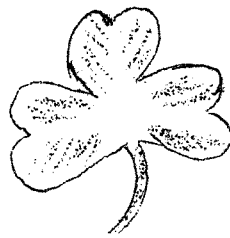


Nov. 3, 1944 Sent to all Commissioners

MINUTES
SIXTH ANNUAL WEED CONTROL
CONFERENCE



NEWHOUSE HOTEL
SALT LAKE CITY, UTAH
MAY 25-26, 1944

MINUTES OF THE SIXTH ANNUAL WESTERN WEED CONTROL CONFERENCE

Newhouse Hotel, Salt Lake City, Utah

Thursday Morning, May 25, 1944

The meeting was called to order by President Earl Hutchings (Utah), who introduced Mr. Tracy R. Welling (Utah), Chairman of the State Board of Agriculture.

Mr. Welling: The Governor was very glad to hear of the Conference. We realize the purpose of your conference and we know much good can come out of it. All of us here in Utah extend a welcome to you. I hope you get the maximum good out of your conference. I want you to enjoy your time here. Relax and have fun and enjoy some of our Utah sunshine.

I think the problem you have before you represents one of the great problems facing the industry. The effort we have put into control of weeds represents the greatest amount of production and item of expense. These weed commandoes take roughly 20% of our crop production and waste about 20% of our time. These figures are just rough, but it is conceivable that the loss sustained by this foe is tremendous. If you can reduce this loss as much as 1% you will probably save the industry and people in the west about one million dollars. I regard it as very important.

I know you realize the importance of the conference and that you appreciate the responsibility which you have to each other and to the area which you represent. You are doing a lot of good and I want to wish you good luck in your conference and I hope you will enjoy it.

Following Mr. Welling's address, the President asked that the Secretary call the roll.

Before calling roll, Mr. Ball made a few brief remarks about Professor Hyslop who had died since the last conference. Mr. Ball requested that all stand for a moment in silence, in memory of our very good friend and leader.

Roll Call

Official State Representatives present:

Arizona	- absent
California	- present - Walter S. Ball
Colorado	- present - Bruce J. Thornton
Idaho	- present - B. E. Kuhns
Montana	- present - E. Elwood Morris
Nevada	- present - Leo M. Burge
New Mexico	- absent
Oregon	- present - L. E. Harris
Utah	- present - Earl Hutchings
Washington	- absent
Wyoming	- present - George B. Harston

Following are the names and addresses of those in attendance:

D. W. Thorne, U. S. A. C.
Logan, Utah

B. E. Kuhns, Extension Agronomist
Boise, Idaho

L. E. Harris, Associate Agronomist, Oregon State College
Corvallis, Oregon

Keith Sime, Chipman Chemical Co., Inc.
512 American Bank Bldg., Portland, Oregon

Geo. D. VanDerhoff, Supervisor Owyhee County Weed Control
Homedale, Idaho

V. A. Cox, Superintendent Ada County Weed Control
Box 576, Meridian, Idaho

W. L. Hendrix, Chairman, Board of County Commissioners
1002 E. State Street, Boise, Idaho

R. J. Evans, Agronomist, Utah Agricultural College
Logan, Utah

Frank Jensen, Road and Bridge Supervisor
Caldwell, Idaho

Emerson Pugmire, County Commissioner
Hagerman, Idaho

C. O. McDannel, County Clerk
Caldwell, Idaho

H. Elwood Morris, Montana Agricultural College
Bozeman, Montana

Geo. L. Hobson, State Supervisor Weed Eradication
412 State Capitol, Salt Lake City, Utah

Norma Moss, State Seed Analyst
412 State Capitol, Salt Lake City, Utah

Victor P. Rasmussen, Utah State Department of Agriculture
Salt Lake City, Utah

Lee M. Burge, State Department of Agriculture
Reno, Nevada

Harry H. Jucksch, Wheeler, Reynolds & Stauffer
923 Creston Road, Berkeley 8, California

Reed Budd, Wheeler, Reynolds & Stauffer
636 California Street, San Francisco 8, California

H. A. Anderson, Weed Supervisor
Utah County, Utah

W. D. Hay, Federal-State Seed Laboratory
State Office Building No. 1, Sacramento, California

F. J. Fitzgerald, Weed Supervisor
Draper, Utah

LaVar W. Thatcher, Wasatch Chemical Company
Salt Lake City, Utah

L. H. Mitchell, Irrigation Advisor, Bureau of Reclamation
Denver, Colorado

L. W. Kophart, Bureau of Plant Industry
U. S. Department of Agriculture, Washington, D. C.

Walter S. Ball, Chief, Bureau of Rodent and Wood Control and Seed Inspection
State Department of Agriculture, State Office Building No. 1
Sacramento 14, California

N. T. Olson, Conservationist, U. S. Bureau of Reclamation
208 Federal Building, Salt Lake City, Utah

D. K. Hendry, County Weed Supervisor
Jerome, Idaho

W. A. Davidson, Chief, Seed Division, Grain Products Branch
War Food Administration, Washington D. C.
Jerome Evans, Agricultural Adjustment Agency
215 Capitol Boulevard, Boise, Idaho

J. D. Remsberg, (Farmer)
Rupert, Idaho

J. D. Matley, Standard Agricultural Chemicals
P. O. Box 1164, Fresno 15, California

R. W. Underhill, Dow Chemical Company
P. O. Box 224, Lafayette, California

M. M. Harris, Braun-Knocht-Heimann Chemical Company
1400-16th Street, San Francisco, California

J. K. Prima
1926 N. Alexandria Avenue, Los Angeles, California

R. N. Raynor, Botany Division
College of Agriculture, Davis, California

C. J. Medbury, Pacific Coast Borax Company
510 W. 6th Street, Los Angeles 14, California

Thomas Dix, Supervisor
412 State Capitol, Salt Lake City, Utah

M. B. Smith, County Wood Agent
R-1 North, Pocatello, Idaho

Clogg Raymond, County Commissioner
McCammon, Idaho

Ray Whiting, District Agricultural Inspector
722 C & C Building, Ogden, Utah

Wynn L. Davis, District Agricultural Inspector
C Building, Brigham, Utah

Louisa A. Kanipe, Oregon Cooperative Seed Laboratory
Corvallis, Oregon

Earl Hutchings, Supervising Inspector
State Department of Agriculture, State Capitol
Salt Lake City, Utah

George B. Harston, State Entomologist
State Department of Agriculture, Powell, Wyoming

Bruce J. Thornton, Associate Botanist, Botany Department
Colorado State College, Fort Collins, Colorado

It was moved and seconded that the Secretary dispense with the reading of the minutes, as all the State Representatives received them. The motion carried. Since there were no additions or corrections, the minutes were approved.

Mr. Ball: The financial report is as follows:

1942 Balance Forward	\$325.32	
1943 Collections	60.00	
Expended for Stamps and supplies \$ 8.22		
Balance on hand	377.10	
	<u>\$385.32</u>	<u>\$385.32</u>

Mr. Ball, Secretary-Treasurer, urged the payment of state dues.

The Chairman called for State Reports.

California. Mr. Ball: Weed control has continued to be of interest throughout the State. Unfortunately, much of the work has been restricted, due to the limitations of such chemicals as arsenic, chlorate, and carbon bisulphide--arsenic, of course, having been frozen while chlorates and carbon bisulphide have been available in some quantities. There has not been sufficient amount, however, to meet the demand. Shortage of labor, too, has been a factor. It is generally recognized that the demand was brought about by the fact that growers, on the whole, are making more money and, therefore, have more to spend on weed control. However, we are making use of all the material that we can obtain. We have continued the use of borax for the control of Klamath weed, or St. Johnswort, which has become one of our major weed problems. The AAA committees, both state and county, have taken a very active interest in this program; and through their cooperation we have been able to get thousands of acres under AAA Klamath weed programs--more than we would have otherwise.

The Pacific Coast Borax Company has introduced another form of Borax, known as Borascu, which is an unrefined material but seems to be almost as effective as the Agricultural Borax, which we have been using for some time. It is still in experimental stages, however; and I am not in position at this time to give final report on results.

After several conferences with the railroad officials of the State, we have found that they are very much interested in the weed control work; and, as a result of their interest, the Experiment Station and our office established a series of test plots with the use of Agricultural Borax for the control of general weed growth on passing tracks, storage tracks, and those areas which normally require a great deal of labor to combat the problems. These plots were established on the Santa Fe, Western Pacific, Sacramento Northern, Southern Pacific and Pacific Northwestern Railroads. Although the final results cannot be given as yet, the indications are that 20 pounds of borax or better per square rod is generally effective and will control annual weed growth for a period of a year. On some of these areas we have added 10 to 15 pounds on already treated areas of that same dosage in order to get the effects of annual application and accumulation of the material with the thought in view of soil sterilization. This material, being non-poisonous and not presenting a fire hazard, will surely find a place in many areas, such as lumber yards, around warehouses, etc. These tests, which we have made on the railroads where applications have been made from 10 pounds up to 30 pounds per square rod, will give us information that will be useful to those interested in sterilization work on such areas as mentioned above.

Sinox has been plentiful and has been used very extensively as a selective spray this past year. Some 85,000 gallons of this material have been used in grain, flax, onions and garlic. About 8,000 gallons was used on onions alone, which proved to be one of the most practical and economical weed control programs we have had in the State. Due to the shortage of labor and the cost of hand weeding onions, the use of Sinox has saved the growers hundreds of acres of onions. Commercial sprayers treated onions for from \$8.00 to \$10.00 per acre, whereas hand weeding costs from \$80.00 to \$100.00 per acre.

Although oil was restricted for weed control on railroads and highways, there was enough available for selective spray work for weed control in carrots. Several hundred acres of carrots were sprayed with fuel oil at the rate of about 75 gallons per acre with favorable results. Oil used as selective spray proved to be very economical and can readily be placed in the same category as Sinox as far as its practical use is concerned.

Among the new chemical products which we have been observing is Ammate, formerly Ammonium Sulfamate. Although this product is not too new, it is still being observed as far as tests and experimental work is concerned. Our observation has shown that it is quite effective on poison oak; and we have noted that, where applied at the rate of 7 pounds per square rod, it is effective on certain of our perennials and, where applied under and around orange and grapefruit trees, it has handled the weed pest quite successfully and has not injured the trees. We are urging the California Experiment Station to investigate this action of the material further.

Although the Dow Chemical Company has not placed any of their material on the market, we observe that some of their tests look very encouraging. It appears that effective work can be done at a minimum cost, especially on the contact and selective sprays. We are all in hopes that they will continue their interests in weed control and develop a chemical which will be just as effective on deep rooted perennials.

Another material which has interested us very much is Bonoelcor, which is proving to be effective in the control of certain of the aquatic plants, such as pondweed and other similar water weeds. As yet, the tests on cattails and tules have not been too satisfactory. There have been indications, however, that after more is learned relative to the amount of material needed and the methods under which it can be applied, this material may successfully handle these water weeds also.

We have continued to recommend cultural practices in weed control which at this time, due to the limitation of both materials and labor, we find is very practical and, in many cases, proving to be very successful. Under our conditions we find that by summer fallowing, followed by a planting of a winter crop, such as oats and vetch, some of our more persistent weeds, such as hoary cress, can be satisfactorily controlled and in some areas it has been eradicated. We have always felt that good farming and good cultural practices, where cultivation can be carried out, have been much more important than chemical weed control.

One of the most recent and, I believe, interesting control methods is being started in California, this being the biological control of Klamath weed by insects. For the past several years the University has been investigating and checking the results of this work which was carried on in Australia, and has just recently taken steps to begin the work in California. Although we recognize that this is a long-time program, there are those areas where chemical control is practically prohibitive and cultural practices impossible. If biological control can handle these areas, it will be one of the most economical and practical ventures yet undertaken. We all know, of course, that biological control has been successfully carried out in the control of cactus.

The last point which I wish to bring up is one that has become a very serious problem and, I think, one to which all of you should give a great deal of thought. I believe that you, in the other Western States, are in the same position as

California. Several thousand tons of Canadian Wheat infested with Canada thistle and quackgrass have been shipped into California by boat and rail. This wheat is being purchased by Commodity Credit Corporation and handled under the AAA program after arriving in California. Under the quarantine provisions of our Agricultural Code, we have rejected large amounts of the wheat, requiring recleaning; and, naturally, this has caused the CCC and the Washington Office to become very much concerned. A hearing was called in Los Angeles and all interested parties were in attendance. After thoroughly discussing the needs of the wheat for California livestock and poultry and a thorough discussion of the weed situation as far as California Agriculture is concerned, not only in the present but in the future, it was decided that CCC could either ship in clean wheat or make arrangements for this wheat to be cleaned at suitable mills at points of destination. We feel that this federal agency should cooperate and recognize our weed control problem, and we are in hopes that our stand and our enforcement will make them feel that it is necessary to cooperate and see our viewpoint. It was very encouraging to note that the livestock and poultry people, interested in getting this wheat, were determined that the grain should be cleaned; that they did not want noxious weed infested wheat.

We have been cooperating with the various mills in carrying out germination tests following different heat treatments for seed sterilization. We were very pleased to learn that germination of the Canada thistle seed which we tested was very low before treatment of any sort.

This, I believe, gives you the highlights of the California weed control problems. I am very glad to see so many of you here and especially glad to note the number of commercial men in attendance. I hope that somewhere in the program the Chairman will find time to call upon each of you in order that you may express anything you wish relative to weed control that may be of interest to you, or anything that presents a problem in your field on which we may be of assistance.

COLORADO. Mr. Thornton: The Colorado program on weed control was interrupted in 1940 and following that was put on an inactive basis for the duration. The following brief statements will serve to sum up the results apparent at that time, for the purpose of comparing such results with those common to other states.

Cultural Control

Tests completed in 1936 indicated shallow cultivation eight days after emergence, or approximately every two weeks, for two seasons, to be effective in controlling most perennial noxious weeds with bindweed the subject of most of the experimental effort. Some of the weeds so treated succumbed in one year. A single season's cultivation reduces bindweed about 75 per cent and makes possible the growing of a satisfactory crop the following season.

The major problem in cultural control is the matter of reinfestation from seed in the soil. This and means of farming with the bindweed need further study.

Chemical Control

Sodium Chlorate on Bindweed. In common with results obtained in other States, sodium chlorate is to date the most generally satisfactory and effective herbicide available and is more effective by itself than in any of the proprietary combinations. In a series of replicated tests there was no significant difference in results obtained from a series of given poundages of sodium chlorate and twice

these respective amounts of atlaide.

Application of the dry chlorate gives results equal to spray applications and is generally preferable.

Date of application tests indicated no significant differences in results obtained from applications made during the months July to November inclusive, with less favorable results being obtained from applications made during the remainder of the year.

The uniform application of from 3 to 4 pounds per square rod gives optimum results. Increasing the rate constitutes a waste of material under most conditions.

A single application per season of any given poundage is as effective as dividing the treatment into two or more applications during the season.

Applying a given amount of chlorate over two seasons is more effective than applying the total amount in one season, but not less than 3 pounds should be applied per square rod the first season.

In determining the total amount of chlorate required to effect 100 per cent kill as related to the amount applied the first season, it was found that there was no significant differences in the total amount of chlorate required following initial applications of 1, 2, 3, and 4 pounds respectively. Application of more than 4 pounds per square rod the first season resulted in marked increases in the total amounts of chlorate required for eradication.

At least two years is necessary to effect eradication of established infestations. In no case was 100 per cent kill obtained from a single season's application of any amount of chlorate up to 12 pounds per square rod, whether applied in a single application or split into multiple applications during the season.

The Acid-Arsenical Method

The acid-arsenical method developed by Dr. A. S. Crafts and associates at the California Station was given exhaustive tests both at the Colorado Station and in a custom-spraying program extending over three years and involving considerable acreage.

Results were variable running from little or no effect to almost 100 per cent kills with causes of the variation frequently not apparent. Average kill ran about 50 per cent.

Spraying bindweed infested plots in the fall with acid arsenical resulted in an increase of 156 per cent in the yield of barley planted the following spring as compared to the yield in untreated check plots. Similar results were obtained in other tests. These results together with the general satisfaction evidenced in the custom-spraying program seem to indicate the need for further development of the method or possibly the development of a similar herbicide of less poisonous character from the standpoint of human beings. Handling of the arsenical over a continuous period may result in rather serious consequences to the individuals constantly associated with the work.

Miscellaneous Chemicals

Although many other chemicals and chemical compounds, both proprietary and non-proprietary, have been tested, none has given enough promise under Colorado conditions to warrant its recommendation and but few have warranted further study.

IDAHO. Mr. Kuhns: Weed control operations throughout Idaho continued on a quite effective basis during 1943 in spite of the handicap of labor shortage. A rough survey of the work done indicates that about 7,000 acres were under the cultivation program, 1,134,407 lbs. of chlorates were used and 225,000 gallons of carbon bisulphide were poured. Two counties in Northern Idaho used 18,000 lbs. of borax.

About half of the agricultural counties have a well organized control program with a county supervisor in charge, paid by the county government. The rest of the counties, which are mostly the smaller and more lightly infested counties, maintain supplies of chemicals which are sold to the landowners on a cost basis. In these counties the County Extension Agent usually has charge of the program. About thirty tractors were used for weed control purposes during 1943 and five new tractors have been purchased this year.

State Appropriations

During the present biennium the State appropriated \$100,000 for assistance in noxious weed control work. The money is used to purchase chemicals, oil and gasoline and is divided among the counties on the basis of the amount of money budgeted in each county for weed control work. Under state law a county may levy a 10 mill tax to support weed control work. This right is used in varying degrees, some counties making the full levy and some none.

State Weed Control Organization

On request of the State Association of County Commissioners, a state wide association for noxious weed control was organized in March of this year.

The purpose of the organization is to exchange and disseminate information among the various counties and to more closely correlate the county weed programs. Five directors were elected to represent the five districts of the State and those elected a president and secretary-treasurer. Meetings were later held in each district which were attended by County Commissioners, Weed Supervisors, and County Agents.

All counties are cooperating in the weed control provisions of the AAA program this year. It is expected that the liberal practice payments made available by this agency will appreciably increase the amount of work done.

In general, it may be said that it appears that our present program is in most instances holding its own with weed spread and in some of the better organized counties the infested areas are being considerably reduced.

With regard to Mr. Ball's comments on the feed situation, we have not received a lot of wheat from Canada. That which we receive is supposed to be inspected at Great Falls, Montana. Last summer a shipment came in with an average of 80 morning glory per pound. Our State Department of Agriculture is attempting to enforce a

quarantine, having all the wheat inspected at point of origin before it comes into the State. We would rather ship weeds out than have them shipped in.

The research program is being carried on by a Mr. Seely of the Bureau of Weed Investigations. He is doing a very excellent job. The information he is getting is being carried out to the field and is of quite a lot of help to us.

I am attempting to follow Harry Spence and am looking forward to this meeting here and perhaps in another year I can give a little better report of Idaho.

Mr. Davidson (Washington, D. C.): Who makes the inspections on Canadian wheat?

Mr. Kuhns: These inspections may be made by a variety of people, even by the shipper himself, county agent, agricultural inspector, etc. There has been an arrangement to have an analyst at Great Falls who is to sample the shipments and notify the Commodity Credit Corporation, who can then divert these shipments to be cleaned where necessary.

Mr. Davidson: May I suggest to the different States that it would be worthwhile to contact the CCC and tell them what weed you especially do not want to come into your state. They take care of the cleaning at different points. Just recently I furnished to Mr. Whitlock samples of the weeds found in Canada wheat. Most of the wheat coming in through Canada now is distributed from Spokane, which is a central railroad point.

Mr. Ball: As far as our setup in California is concerned, our quarantine regulations have been enforced for years. The friction started when we held up shipments for cleaning. The mills did not want them and it became quite a confused affair. We were not asking for certificates unless they wanted to give them. We asked only that the seed comply with our regulations when entering the State of California. It was requested that the grain be cleaned at point of origin. An analyst in the North may take care of the problem to some extent. In California we have these provisions for the protection of agriculture and they have been enforced for a long time. CCC understood the situation before moving the wheat.

MONTANA. Mr. Morris:

Weed control work in Montana is carried out under two distinct programs.
1. Under a definite county program in which legalized weed control districts are created. The weed program is authorized by a board of three Weed Commissioners, and the field work supervised by the County Weed Supervisor. 2. In counties operating solely under the A. C. P., the weed control districts are outlined and authorized by the State A. A. A. committee, and supervised by the A. C. P. committee.

In some counties where neither of the above programs are operating, some demonstration work on weed control is done by various organizations which paves the way for work on weed control in the future.

The Post-War Planning Work Committees are giving consideration to weed control programs, and no doubt this will aid the weed control program generally over the State.

There are now 30 legal weed districts in the state, only one being organized in 1943. There are an additional six districts in process of organization in five counties.

In some of the districts the work has been maintained while in other districts it has been somewhat curtailed. Shortage of labor, and frequent changes of personnel have been the limiting factors in the control programs. The cost of the control work varies considerably in different counties due largely to type of machinery, cost of chemicals, labor costs, type of soil, concentration of fields under control, etc. The approximate cost of tillage 4 to 6 inches deep, per acre, per cultivation is \$1.00, chlorates 75¢ per square rod, and searing 20¢ per square rod, two searings and light chlorate treatment \$.75 to \$1.00 per square rod.

A brief summary of the Montana weed program in the organized legal districts in 1943 is as follows:

Appropriations	\$	97,739.00
Chlorates used		346,170.00 pounds
Acres treated		662.57
Carbon bisulphide		836.00 gallons
Acres treated		3.86
Other chemicals		28,600.00 pounds
Acres		15.60
Searing Oil		67,998.00 gallons
Acres treated		237.50
Cultivation F. Acres		689.00
Cultivation A. Acres		8,152.00
Controlled Acreage Seeded		
Row Crops		365.00 Acres
Pasture		35.00 "
Legumes		1,688.00 "
Districts		30
Acreage in Districts		3,395,197.50
Counties having districts		15

The treatment that appears to be the most promising at the present time is searing twice, first when in full bloom, second, about the middle to last of August, and an application of chlorate, 2 to 3 pounds, in September or October.

NEVADA. Mr. Burge:

(Mr. Burge confined most of his report to the new poisonous plant found in Nevada.)

HALOGETON GLOMERATUS, A NEW POISONOUS PLANT IN NEVADA, AND ITS
GENERAL DISTRIBUTION

For several years, severe and sudden sheep losses have been suffered in Elko County, usually in the fall when animals were being moved to the winter ranges. It was generally believed that poison of some kind was responsible, but not until the fall of 1942 was anything concrete established.

On November 21, 1942, Dr. C. H. Kennedy, District Veterinary Inspector for the State Department of Agriculture, located at Elko, made a post mortem examination of a sheep, one of 160 head lost by Nick Goicoa near Wells. The stomach contents of this sheep was almost 100 per cent Halogeton glomeratus. Feeding tests conducted later at the Nevada Agricultural Experiment Station showed that one and one-half pounds of this plant was sufficient to kill a sheep.

Halogeton glomeratus, which so far as is known does not yet have a common name, was first reported in Elko County in 1935 by Art Holmgren of the Division of Grazing. At that time it was believed to be a fair forage plant. Two collections were made later by P. Train in 1937 as part of a collection for the Division of Plant Industry, U. S. Department of Agriculture, and the University of Nevada.

As the feeding tests conducted by the Nevada Agricultural Experiment Station appeared to establish definitely that the annual losses of sheep in considerable numbers was caused by Halogeton glomeratus, the general situation came up for considerable discussion in livestock circles and the Division of Plant Industry of the State Department of Agriculture was asked to make a survey of the infested areas. The purpose of the survey was to be two-fold: first, to determine the extent and intensity of the infestations and, second, to consider the possibility of a control program. Accordingly, a survey was begun in July of 1943, which extended through August.

In view of the fact that little or no attention had been paid to this plant prior to the Goicoa losses, the present extent of its area is amazing. Why had the plant not been recorded generally in Elko County before? This question will no doubt be cause for considerable speculation and discussion and will probably never be satisfactorily answered.

Halogeton glomeratus infestations are not confined to any one given soil or plant association. We find infestations in soils where very little vegetation had been known before and in other locations where it is actually crowding into sagebrush and white sage areas. A favorite growing condition is along trails, railroads, sheep trails and bed grounds, white sage flats, bare loose knolls, and in general, in any area where a little cultivation has been given either naturally or artificially. Some infested areas are confined to narrow strips along roads, while in other locations the plant extends into brush and white sage acreages, acting as a competitor to native vegetation.

Some of the larger infestations measure several thousands of acres, indicating that the plant is becoming established by the aid of wind, erosion, water and other natural means of soil disturbance. In other areas where re-seeding efforts with

grass have been made with cultivated strips, Halogeton has taken complete control of the situation, resulting in solid infestations of hundreds of acres. Maps and a general outline showing location of infestation are attached. New areas are being reported constantly, indicating that the boundaries of the infestations are not yet established.

Generally speaking, the boundaries of the infested areas in Nevada extends from a point seven miles west of Toy, on the Victory Highway, east along this road to Elko, where the infestation widens and eventually extends up Mary's River. From this point it extends to Wells and over all of northeastern Nevada to the Idaho and Utah lines, thence south along the east slope of the Rubies to McGill in White Pine county, and at intervals, west on the Lincoln Highway to Austin. The area extending from Warm Springs in Ruby Valley, north through Wells to Contact, east to Montello, and south to Cherry Creek is virtually one infestation, all old roads and trails in the area acting as a means of dissemination.

In the Wells-Contact area cattle were observed feeding on Halogeton almost exclusively during the last week in July and the first week in August. No losses were seen, but loss in flesh was noted.

Halogeton is a prolific seeder and thrives in a wide moisture range. Individual specimens taken before the bloom stage on gravel soil weighed 7.5 pounds each and measured more than three feet across. In contrast, one-inch specimens taken on soil where little moisture had accumulated were producing seed. This factor will be an important one in any control operations.

Control operations are being considered for 1944 in certain check areas. Small plots have been chemically treated in 1943. However, large scale areas must be treated before economic control measures can be developed. In general, any control operations should in the beginning be confined to the outer edges of the infested areas to prevent further spread. Efforts can then be made to control the plant in heavily infested areas.

Control efforts should involve the energies of all agencies charged with any responsibility of the public domain and regulatory activities in the State. Any post-war program that is now being considered should include this weed problem. The life of the sheep industry may depend upon development of a method of controlling this plant; or perhaps, as has been suggested, the sheepmen may learn to live with the problem.

SURVEY OF HALOGETON GLOMERATUS INFESTATIONS IN NEVADA

ELKO COUNTY

Wells-Metropolis Area

Along upper road Wells to Metropolis as far as first summit one and one-half miles north of Wells. Extends into brush area one-fourth mile.

Along Wells-Metropolis lower road (Railroad right-of-way) distance of four miles into brush and hillsides one-fourth mile. Single plant found in turn of road south of Metropolis slough. Several rods at turn in road one and four-tenths miles south of Metropolis.

Wells-Hubbard-San Jacinto

General vicinity of Wells on all old roads and into brush one-fourth to one-half mile.

Along road at intervals and on sidehills from point 13 miles west of Hubbard on O'Neil road to highway at CCC Camp 108.

At Camp Hubbard full length of north-south runway of Airfield. East-West run clear.

From Hubbard Camp extends 13 miles south along main road to point one mile south of Thousand Springs Creek.

Scattered on all old roads and brush in general vicinity of Thousand Springs Creek and up Loomis Creek four miles.

Along all old roads three miles north of Wells and one-half mile into brush.

Elko Wells

In general vicinity of Elko on old Tuscarora road at city limit at gravel pit one mile west of Elko on new Mountain City road. On east side of river on Lamoille road.

Scattered along Highway 40 one-half mile east of Ellison Ranch (Bing Crosby).

From point one mile east of Moffat ranch along old road (40) east of Ryndon Station (1 mile).

Extends from Ryndon Station along Division of Grazing road north three miles and one-half mile wide through White Knoll hills. Heavy along old 40 Highway right of way between Moffat and Tally station. The three mile area above is through high brush where Division of Grazing has made cleared strips east and west at 50-100 foot intervals. These strips are heavily infested and plants spread out into adjoining brush, making a solid infestation over a two mile area. This infestation extends east through hills and along roads and power lines four miles to Tally's Station and Devil Gate Road.

Infestation extends along road from Tally's to Devil Gate ranch 13 miles and west 4 miles to Devil Gate road. Extends over area 3-4 miles around Devil Gate ranch. Cattle feeding on plants one-half mile west of Savage house. (Devil Gate Ranch).

From point on east side of North Fork River and Highway 40, the infestation extends 1.5 miles east to Elburz road and south through brush to railroad. Also along 40 and north into brush one-fourth to one-half mile.

Individual plants along Highway 40 (east) to Midway gravel pit; heavy patches found at gravel pit and along underground telephone line. Between gravel pit and Midway station patches extend one-half mile into brush and along road.

Occasional plants between Midway station and Deeth. Extends from point 8.5 miles north of Deeth one and one-half miles along Charleston road and into adjacent hills one mile.

From point where Mary's River road takes off, Charleston infestation extends up Mary's River three miles and 1.5 miles west to above boundary.

On cuts between Quillici Ranch on Highway 40 and Wells and south to power line and north to railroad.

Elko-Beowawe

Cuts at Carlin and east of Beowawe on Highway 40.

San Jacinto-Hubbard

Several patches at entrance to San Jacinto ranches on old dump. Two acres in brush one-half mile north of entrance (Twin Falls side) to San Jacinto. Two and seven-tenths miles north of above entrance one acre along highway. Several rods along highway between two entrances to San Jacinto.

From Highway 93 west along Brown's Bench road occasional plants for first mile; next one-half mile numerous patches. Patch at one mile south of Vineyard Ranch on 93; at point two miles south of Vineyard Ranch. Five acre patch along Pilot Hut road one-half mile east of 93 Highway.

Cattle feeding on plants at Hubbard and Thousand Springs Creek.

Wells-Currie

Extends along 93 south of Wells six miles then east along old road one mile, and in brush one-fourth mile north. From Wells west three miles up Angel Lake road and west along power line and sheep bed grounds.

From six mile point above infestation extends 21 miles south to Warm Springs CCC Camp. Along full length of this road, it extends into bare areas and sage. Area one-fourth mile square on CCC grounds and .8 mile west of Camp along old road and scattered plants next .5 mile west.

Extends from Warm Springs CCC Camp to one mile south on Ruby road and two miles west into hills past Division of Grazing water tanks and fenced plot one mile square.

Extends from Polar Star Junction and Ruby road 2.5 miles to Shafter-Ruby Valley road and generally over hills from west of Ruby road (7 miles square). Along Ruby Valley road to junction of Ely cutoff, then along cutoff east to Highway 2.5 miles scattered plants through the brush.

Wells Tobar

Infestation is general along all roads, Western Pacific railroad, sheep bed-grounds, white sage areas east of Wells-Ely highway four miles into hills south of Tobar. At Tobar, the area widens out to approximately 1,000 acres. Infestation extends east along roads and railroads several miles.

Wells-Currie - 93-50 Junction

Extends from Ruby Valley cutoff and Highway 93 for distance of 6.3 miles south along road and adjacent bare areas, thence along Spruce Mountain road. From Spruce

Mountain road junction and Highway 93 four miles south general along road and adjoining brush. Next seven miles on 93 spots with occasional large 2-5 acre areas. Next seven miles south three spots along road.

From point eight miles north of Currie to Currie, spots numerous on road and into brush areas. Townsite and railroad at Currie heavily infested. From Currie nine miles south on 93 scattered spots along road. Next two miles heavy along road; next two miles heavy for 100' wide. Next two miles no plants; next mile light spots on road. One mile south none. One mile north of highways 93-50 junction plants scattered along highway.

Highway 50 to Cherry Creek

Few plants one mile west of Highway 50 on Cherry Creek road. From point four miles west of above junction on Nevada Northern Railroad general infestation on road and brush. Scattered plants at Johnson ranch area.

On Highway 50 nine miles north of McGill single plants. On gravel pit (3-4 acres) at three miles north of McGill.

LANDER COUNTY

On Lincoln Highway 13.5 miles east of Austin, 1.5 miles on each side of road.

Twenty miles south of Battle Mountain on Austin road, 15 rods.

Thousand Springs-Montello

General on old roads adjacent to Thousand Springs Crossing and in bare areas of brush both sides of road one-half to one mile wide east 23 miles. At Twelve Mile ranch and north five miles on Hall Mountain road.

At CCC Spike Camp on Montello road infestation general over hills and east scattered on road and in brush. General infestation around ranches. At Montello infestation covers several hundred acres. Distance from Highway 93 to Montello 53 miles.

Montello-Oasis

General infestation at Montello ten miles west on Cobre road. From Cobre along railroad south 8-9 miles. At Cobre on Oasis Road 8 miles to Highway 40 spots numerous.

Solid infestation along Highway 40 and in brush from Oasis to Wells except 4 mile area in Hills at Moor. Infestation widens out on flats into brush one-half to one mile.

Halleck-Secret

Several acre area around Halleck west of tracks. Extends from east side of river at Halleck through hills one mile north and along Secret road. There is a break and then a second 3-4 mile area on Secret road.

Butte Valley

General infestation east of Blue Jay Spring on Long Valley side (along roads and bare spots).

Antelope (East of Currie)

General infestation on roads and in brush.

PERSHING COUNTY

Along road one mile (Highway 40) east side and railroad at Toy. This area has been bladed by the State Highway Department. Seven miles west of Toy on Highway 40, both sides of road for ten yards.

HUMBOLDT COUNTY

General vicinity of Golconda along railroad and Midas road one mile east of Golconda. Along cuts one mile east of Golconda on Highway 40. In cuts and brush three miles east of Golconda Summit several spots. On Herron Flat at point one mile east of junction old and new roads (Highway 40).

OREGON. Mr. Harris: The weed projects in the various counties in the State have been curtailed somewhat as compared to the amount of work done just preceding the war. However, the amount of funds appropriated by the various counties for weed-control projects have continued about the same since 1938. The summary of the weed funds in the counties of the State is as follows:

County Appropriations for Weed Control

<u>1938</u>	<u>1940</u>	<u>1942</u>	<u>1944</u>
\$38,380	\$39,630	\$37,220	\$40,000

These appropriations represent money expended for organization in carrying out the weed projects, and at no time has there been any counties in the State attempting to use county or State funds to carry on large scale weed control projects. The money used has generally been for labor or supervision, and the farmer or land owner has always paid for materials, whether it be for chemicals or other treatments that were used on his particular farm. In a few counties in Eastern Oregon weed control districts have been formed, and in others the weed program has been carried out on a county wide basis. These include a few counties that started the cultivation program rather extensively and purchased equipment and hired tractor operators to follow the cultural program, as recommended by the experiment station. The funds appropriated for 1944 are about equal to the amount of money spent at any time since 1938. Most of the counties are making an effort to maintain some form of the organization and to carry on the work as much as possible. They hope that the progress made in the past will at least be maintained until such a time that the work can be expanded.

The acreage of woods treated during 1943 was less than some of the preceding years; as a matter of fact, was approximately half the acreage that was treated by all methods during 1941.

Acreage of Weeds Treated

<u>Method</u>	<u>1937</u>	<u>1939</u>	<u>1941</u>	<u>1943</u>
Cultivation	9,458	11,389	14,976	7,613
Chlorates (including Atlacide)	770	791	97	884
Diesel Oil	140	132	187	115
Carbon Bisulfide	7.5	12	24	40
Other methods, including salt, grubbing, acid, arsen- icals, borax, etc.	25	35	75	50
TOTAL	10,404	12,360	15,360	8,702

Of the total acreage of weeds treated, by far the greatest number were under the cultivation program, and includes the large infested areas or fields. The summary of the various treatments for 1943 is as follows:

Summary of Weed Control Methods for 1943

<u>Acres</u> <u>Cultivated</u>	<u>Chlorates</u> <u>(Pounds)</u>	<u>Carbon</u> <u>Bisulfide</u> <u>(Gallons)</u>	<u>Diesel</u> <u>Oil</u> <u>(Gallons)</u>
7,613	600,000	12,919	44,130

The experimental area on bindweed or wild morning glory that has been in progress near Pendleton for the past five years has developed so favorably that the Umatilla county court has reconsidered their views regarding control of this pest and have replaced two different fields on the tax rolls. These fields had been taken off the rolls because of the heavy infestation of this weed, it was considered the land was of no value. At the beginning of these experiments in 1939 this particular field had an average yield of wheat of from ten to fifteen bushels per acre, whereas during 1943 the majority of the experimental plots yielded fifty to sixty bushels of wheat per acre. The results of these experiments have been summarized and were published last winter as an Experiment Station Circular of Information. It is anticipated that this work will continue for the next five-year period.

During the past two years a number of miscellaneous weed problems developed and new work was initiated on these with very satisfying results. One of these problems is caused by the infestation of Sticky laurel, Ceanothus sp., on logged-off or burned-over forest land. This plant is a rather large woody shrub and in some areas has come in to such an extent that the land is practically worthless for grazing, and inhibits, if not entirely prevents, reforestation. One of the largest infestations was so extensive that eradication of the entire area is impracticable, but it was necessary to stop the spread or confine the infestation as much as possible. Various treatments were tried and the most successful was to treat each individual plant with dry sodium arsenite made up to ten per cent solution. Method of application was to make from two to three cuts on either side of the stem or at equal spacings around the stem and apply a small portion of the arsenite solution directly to the cut. In all cases the treatment produced kills which average at least 99 per cent. Refinement of the method of making the cut on the stems will facilitate the application, as the greatest cost for this treatment is labor.

Another plant that is beginning to spread in a number of locations in Western Oregon is Tansy ragwort, Senecio jacoboea. Infestations occur in waste areas or hill land pastures and in the pasture brush land of the coast range section of Western Oregon. The plant is somewhat poisonous and in a few cases losses in dairy herds occurred. Limited trials in 1942 on a rather extensive infestation showed 100 per cent control with either Atlacide or ammonium sulfamate. However, the use of Atlacide is more advantageous than the ammonium sulfamate, due mainly to the differential in cost of the two chemicals. In addition, the grass stand one year after treatment was equal if not better on the plots treated with Atlacide. The results of these trials were so favorable that dairymen in the area purchased sufficient quantity of Atlacide in 1943 to treat approximately fifty acres scattered over a small valley. Additional treatments are anticipated in other sections of the Willamette valley during 1944 if Atlacide can be made available.

Control measures with chemicals on St. Johnswort have been started in some sections of Eastern Oregon where this plant is gaining a foothold. No extensive control measures are being undertaken in Western Oregon as the plant covers such a wide area on the foot hills and logged-off forest lands. In Eastern Oregon, however, it is considered practicable to control a number of infestations and prevent its spread. A number of treatments are being made with Borax and it is anticipated that other chemicals will be used. Limited trial plots have shown that both Atlacide and sodium chlorate at two pounds per square rod are equal if not superior to eight to ten pounds of Borax per square rod. In addition, in areas of steep hill land where transporting of materials would be a problem, the chemicals that will give the best control with the least number of pounds per unit area is obviously more desirable.

There has been some discussion concerning the DuPont weed killer known as Ammate, and from our experience, both as to the effectiveness of the chemical and its cost, the only place we feel where this material can be recommended is for treatment of poison oak. A number of trials established with this chemical have shown very promising results for poison oak eradication. Comparable trials with Atlacide, however, has shown approximately equal results. Experimental treatments with Ammate are being initiated on wild blackberries, rosebriars and other plants.

The plant that is causing increasing concern among stockmen in the Eastern part of the State is Larkspur. It is estimated by stockmen that in Harney County alone the loss of cattle caused by this plant average 1,000 head per year. The spread of the plant is increasing and has reached such proportions that it has become necessary for some control measures to be adopted. Frankly, we are at a loss at the present time for anything that might prove effective or feasible. Certain experimental procedures, however, are being initiated this season. Very limited trials with chemical sprays on Larkspur were made during 1941. The results were not at all satisfactory, due to the generally poor results, as well as to the cost of most treatments.

The selective weed spray program is now on a State wide basis and is generally used under the recommended procedure. The principal materials used is the solution of Sinox ammonium sulphate. We consider that the combination of these two chemicals has the greatest efficacy when used as a spray, and under our conditions, is superior to Sinox used alone. In Western Oregon, for example, during the spring season when the spray program is in operation, the rainy and cool weather usually encountered makes for poor weed kills unless ammonium sulphate is added with the Sinox. In addition, on a number of crops rather large quantities of ammonium

sulphate, as much as 100 pounds per acre, can be used in the solution to produce fertilizer effects. The addition of that amount of sulphate, however, is limited to crops of grains and grass seed crops. The greatest use of the selective sprays is on the fiber flax crop and it is estimated that at least 90 per cent of all the fiber flax grown in Oregon is sprayed to control weeds. Practically all of the grass seed producing areas are using this method to control not only the annual weeds but many of the perennial weeds that start during the first year the grass crop is seeded. These farmers have learned that spraying the grass plantings a few days after the crop has emerged will reduce the infestation of such weeds as false dandelion, buckhorn and other perennials to a considerable extent. In many areas a number of growers are spraying old established stands of grasses with Sinox and 100 pounds of ammonium sulphate per acre. They are convinced that not only is seed purity increased but have indicated that the germination tests are averaging appreciably higher since starting the spray program.

Most of the onion producing areas are spraying with this solution. Other areas are starting the spray program during the present year. The benefits derived from this method are very pronounced, even in years without labor shortage. Some canning peas are being sprayed with this solution for the control of many broad-leaved annual weeds. It is possible that the treatment can be expanded on this crop.

A considerable start was made last year for the control of weeds in such crops as carrots and dill by using stove oil. The method is receiving considerable attention at the present time and it is estimated that a high percentage of the acreage of these crops in the Willamette valley will be sprayed with oil during the present season. The average dosage of oil is fifty gallons of stove oil per acre. A number of trials have been established where the oil has been fortified with phenol and other compounds and although the weed kill is greater, the injury to carrots or dill also increases and at the present time it does not appear practical to use anything other than the straight stove oil.

UTAH. Mr. Hobson:

Organization

The Weed Eradication Program is conducted by and under the direction of the State Correlation Committee, which membership consists of: Director of the Extension, Commissioners of Agriculture, Director of the Experiment, Agricultural College Agronomist, Officer of the State Farm Bureau, Director of Vocational Education, Representative of the Utah Association of County Officials, Representative of the Utah Crop Improvement Association, Representative of the AAA and advisory members as well as the State Supervisor of Weed Eradication.

Each County has an organization consisting of: County Commissioners, County Agricultural Agents, District Agricultural Inspectors, County Farm Bureau President, County Crop Improvement Association, County Planning Board, Member of the District Soil Conservation Committee, Representative of the AAA, State Road District Supervisor and County Weed Supervisor. All State funds are under the direction and in full charge of the State Department of Agriculture. The County Supervisor is paid from State funds.

Cultivation

There are 36 tractors used for weed eradication and are owned and operated by the various counties. These tractors are of various sizes. 7,000 acres are being cultivated. About 3,000 acres released each year. 27 out of the 29 counties are

participating, most of which own tractor equipment. Various kinds of weeders are used consisting of: Duck Foot, Straight Blade, Disk type, etc. Most weeders are attached to the tractor and are hydraulically controlled. These cultivators are adjusted to cut to a depth of from 4 to 8 inches, depending upon requirements. Each cultivation is in the opposite direction from the preceding one. Where possible we attached a leveler behind the weeder to smooth out all the furrows. We aim to release land that shows a 95% eradication and urge the planting of row crops following the release and if this is observed the small percentage of uneradicated plants will be killed by the process of cultivation of the crop. We aim to chemically treat fence lines, and ditches during the period of cultivation. The last operation in the season is a deep plowing.

Sodium Chlorate

In 1943 Sodium Chlorate was used, the first for a number of years. Some users preferred not to use it because of its fire hazard. In 1943 we used approximately 500,000 pounds, mainly on fence lines, ditches and canals. Larger operators used power spraying machines. Counties not having the equipment used it in the dry form. There seemed no practical difference in its effectiveness. Generally when this chemical is applied late in the fall or early in the winter the results have been much better than earlier in the season. Many farmers apply Sodium Chlorate themselves. Each purchaser is instructed how to apply. In all cases we advise follow up work. The demand for Sodium Chlorate continues to increase.

Atlacide

In 1944 we will use Atlacide entirely, amounting to approximately 500,000 pounds. In our experience with Atlacide it has not been as effective as Sodium Chlorate. There have been reports, however, that its effectiveness is just as good as Sodium Chlorate. The difference in the effectiveness in comparison with Sodium Chlorate ranges from 20% to 30%. Atlacide, like Sodium Chlorate is also used on fence lines, ditches, canals and small field patches. This chemical has also been found to be most effective when used in the fall or early winter, although experiments conducted in the state show that the time of the year or the age of the plant is not important. Like Sodium Chlorate it is used both in a dry form and a solution.

Carbon Bisulfide

Approximately 10,680 gallons of Carbon Bisulfide were used in 1943 and indications for 1944 show that about the same amount will be used. Carbon Bisulfide is very definitely successful, especially in cases where no follow up work is done. There are a great many of its users who are willing to pay a little more for the chemical in order to avoid sterilization of the soil for a long period of time and to enjoy the quick results of its work. Its use has been very much curtailed because of the amount of labor available. Regardless of this, in some Counties this chemical is being used more widely and in greater quantities than other types of chemicals.

Salt

In 1943 approximately 96,000 pounds of salt was used. Its effectiveness was not gratifying. It has been used in this State for a number of years and its use is diminishing very rapidly. It is our experience that even though we can get the salt at no cost, the cost of transportation makes it more expensive in comparison with other chemicals.

Burning

We believe that burning definitely has its place in weed eradication work. Many counties have small hand burners. Salt Lake County has a power burner capable of burning two acres per day. This burner was perfected in Idaho and adopted by Salt Lake County. It has proven very satisfactory. The material used in this burner is distillate or crude oil. The burner can be purchased at a cost of approximately \$125.00; it is very light and does not require expensive equipment to handle it. It has not been used long enough to determine its eradication possibilities.

WASHINGTON. Mr. Gaines:

(Report of Weed Control Work in Washington, Mailed to the Secretary By Mr. Gaines, Washington Representative.)

Weed control and experimental work have been continued in the State of Washington during the past year in spite of war time handicaps. Ammonium sulfamate has been used in considerable quantities to kill wild vetch in three counties. The primary objective of this work has been to prevent increase of the Pea Moth. Incidental information is being gathered on the effects of this chemical on various kinds of weeds. One area almost covered with Canadian thistle last year was sprayed with the result that this year the same area has a heavy growth of orchard grass with only an occasional weak Canadian thistle plant.

Regular experimental work using various chemicals along with the cropping and cultivation methods is beginning to show definite results. Local and County seed districts have continued their seed programs in so far as possible. Interest in seed control seems to be definitely increasing in spite of war conditions. There are some five counties actively operating weed districts, and in one case the entire county has been declared a weed district. There are some four additional counties now considering weed control projects. Various organizations have incorporated weed control as part of their programs.

It is probable that there will be employed within a short time a full-time State Weed Specialist, who will promote Local and State wide interest in weed control.

Chemicals now used include chlorate, carbon bisulphide, ammonium sulfate, ammonium sulfamate, diesel oil, and borax. The use of chlorate on open ranches has resulted in the death of some livestock. This presents a problem in connection with treating watershed areas adjoining irrigated land. It also presents a problem in connection with the treating of weed infested areas on non-fenced pasture lands. A study is being made in the use of non-poisonous materials with the particular thought in mind of protecting these open areas from losses in livestock.

Dr. T. A. Harvey:

(Report of Weed Control Work of Washington Agricultural Experiment Station)

The work on the weed projects of the Washington Agricultural Experiment Station continued in 1943 along the same lines as reported in previous years. In the fall of 1943 the lease was terminated on the area near Topponish where most of the experiments were located and the work was moved to the Irrigation Branch Experiment Station at Prosser, Washington. Certain of the plots at Topponish are still under observation but the cultivation and cropping work on white top has reached completion. The white top problem in the Yakima Valley is far from solved but it was felt that

the important information on cultivation and cropping methods had been obtained. An interval of three weeks between cultivations using duck foot blades has consistently resulted in eradication of the white top in two seasons. None of the crops tested completely eradicated white top but a rotation of alfalfa, corn, and sugar beets was successful in holding the weeds in check and in effecting an actual reduction in weed stand and quantity of white top roots in the soil. Four years was the optimum length of time for alfalfa in the rotation since the stand thinned out rapidly the fifth year and the white top began to invade the field again.

Further work with flooding shows that Russian knapweed is eradicated with about two months of either continuous or intermittent flooding but white top requires almost three months for complete eradication. New experiments were also run on divided spray applications of sodium chlorate on white top but the variability of results makes the methods of doubtful value. No significant kill of white top was obtained with ammonium sulfamate either dry or as a spray and only a small per cent of Russian knapweed was killed.

Experiments were started on the eradication of European bind weed in asparagus plantings where this weed is causing considerable damage. Preliminary treatments indicate that it may be possible to eradicate this weed in asparagus without serious damage to the asparagus. These experiments are being continued.

WYOMING. Mr. Harston: The State of Wyoming is becoming increasingly alarmed by the seriousness of their noxious weed problem. Particularly is it becoming serious in the irrigated areas, which are relatively small in comparison with adjacent range lands. The problem becomes more complicated and difficult to handle as the river bottoms, creek beds and upland meadows become infested with noxious weeds. The grazing of cattle on infested range areas increases the spread when the cattle are brought into the irrigated meadows, fields and feed lots bringing with them some weeds adhering to their bodies and in their digestive tracts.

The noxious weeds do not present such a serious problem to the Stockman in most areas, as they do to the irrigated farmer adjacent to him. The irrigated farmer is dependent on cash crops. Most of the irrigated farming in Wyoming is done on a relatively large scale, wherein large acreages are controlled by one, or a few operators. Frequently the encroaching noxious weeds are neglected until they spread to the point where their eradication is not practical, as it would be on higher priced land. Consequently there is constant demand for more economical methods of weed control, which would put it on a practical basis from the standpoint of the farmer.

Those who have worked with the weed control program in Wyoming for the past decade have become greatly alarmed at the rapid spread which is taking place. They recognize the need for more research directed toward finding more economical methods of eradication. Although they recognize that the funds spent have been put to the best use that knowledge permitted, some mistakes are also recognized. Much of this could have been prevented by the expenditure of a few thousand dollars for research.

Common methods of control and eradication being employed in the State of Wyoming at the present time are: clean cultivation, use of chemicals, burning and use of smother crops. All these methods seem to have their place in the program, either for eradication or seed control. All of them, however, are too costly in

many areas as previously indicated. In years past it was hoped that light searing or burning of weeds would prove both economical and effective in areas where clean cultivation was not practical. The results from burning have been so varied under different conditions, that the method is now recognized as having chiefly seed control merits.

In one of the counties Sinox was used on perennial weeds for the major part of one season and is being tried again during 1944. This selective spray proved to be more economical and definitely more efficient than burning; especially, on the young tender foliage, but it loses much of its value when the plant reaches the seed stage. Its effect was not very satisfactory, however, on field bindweed.

Legislation is generally intended to enhance the weed control program, and has done a considerable amount of good in Wyoming by providing for State, County and landowner co-operation. The State appropriation has been matched by an equal amount from the County and an equal amount in addition from the landowner who has had control work done on his place. The assistance to the landowners has been in the form of county crews and equipment to clean-cultivate his weeds and to apply chemicals or to provide chemicals for his own use, and to burn. The law is now considered to be inadequate by some because of insufficient funds to give it sufficient force and effect, and to carry out the program as specified by the law.

One of two answers to the problem seems to be forthcoming; either greater responsibility will be placed upon the landowner, or greater appropriations, enabling an extension of the program to more landowners in need of weed control. Perhaps both will be necessary before the problem is solved.

Following the State reports, Chairman Hutchings appointed the following committees:

Resolutions Committee:

Leo Burge, Chairman
Lin Harris
George Hobson

Nominating Committee:

H. E. Morris
B. E. Kuhns
R. N. Raynor

Mr. Ball suggested that it would be of interest if we could obtain some information from the chemical representatives present as to the possible supply of chemicals, something on the price, and any comments they might have on the weed control programs.

Mr. Jucksch (Wheeler, Reynolds & Stauffer): The quantity of carbon bisulphide that we are going to put out is problematical at this time. We are short of labor. We must have crews that will go right through with us. Our supply is going to be rather limited, but we will do the best we can to supply you. We got along all right last year and we will just have to try our best this year. Right now everything is taken up by order for at least the next 30 or 45 days as we have a wide range to serve. I think we will be able to take care of just about the same capacity as we did last year. If empty drums were returned more promptly, we would be able to get the material out quicker.

Mr. Sime (Chipman Chemical Company): The chlorate situation is limited entirely on WPB allocations which are granted to us quarterly. For this group, we furnish chlorates both from Niagara Falls and Portland, Oregon. I think that each state gets its deliveries from the East and has been notified of the approximate amount of material they will receive. We have kept every user pretty well supplied. However,

WPB allocations for weed control work with chlorates will control the available supply. That is about all we can say about it. You can rest assured we are dividing this material as equitably as we can. Perhaps some counties will have to borrow from their neighbors. We are doing the best we can and hope that our allocations in the third and fourth quarters will be enough to take care of the needs.

Dr. Evans: Last year we got 5,000 pounds of Sodium Chlorate and this year none. They are sending us nothing but Atlacido. Why?

Mr. Sime: When the Portland Plant was built it was to take care of the Northwest and California needs. That was the original set-up. It so happened that, with the war, changes were necessary. A portion of the production goes to lend-lease, munitions, and other purposes. Last year the needs of Idaho were not as heavy and the lend-lease needs were not quite as heavy; therefore, we had available sodium chlorate to ship to Utah, which we did. This year the allocations were such that we had no additional chlorate. We may not even be able to take care of the northwestern states. Atlacido is the only available thing we have for you. We are giving you the best we can and what we have available.

Mr. Ball: I understand that the lend-lease has taken all of our allocations for the first two quarters.

Mr. Sime: A good portion of sodium chlorate from Portland, for the four quarters of last year, was allocated for other than weed killing purposes which has created the present shortage. They allocated a large portion in the first quarter for other than weed killing work which has hurt the California program, Idaho and also Utah. The second quarter has been practically all for agricultural chlorate. We think practically all of the third quarter will be also.

Mr. Ball: Is there any way that this situation may be shifted so that we could get more chemicals for seasonal needs?

Mr. Sime: There is a very definite need of seasonal allocation. Lend-lease is a 1-A organization, however.

Mr. Hobson: How short are the various states? We are 50% short of our demands here in Utah.

Mr. Davison: Relative to the question of allocation, the amount is given on the basis of use before the war. If your program has increased since the war began you are just out of luck. You have got to stick to what you were using prior to the war.

Mr. Thatcher: I think the allocation is very injurious. Our past ration has been increased but our allotment is still smaller.

Meeting adjourned for lunch.

Thursday afternoon, May 25.

The Chairman continued to call upon Commercial Representatives.

Mr. Medbury (Pacific Coast Borax): So far, we have been able to meet all our orders. We now have another product called Borascu which we are offering as an alternative. Borascu costs less than Borax.

Mr. Primm (Du Pont & Company): I do not believe there is going to be any difficulty in supplying Ammate. A couple of years ago the government put on an allocation order; but the last word I got, there would not be much difficulty on the situation of supply.

Mr. Underhill (Dow Chemical Company): As yet the Dow Chemical Company has nothing for sale as a weed control chemical. They will have something probably by next year.

Mr. Thatcher (Wasatch Chemical Co.): We handle Borax, Carbon Bisulphide, Sinox, and Chlorates, and have plenty of Ammate.

Mr. Harris (Braun-Knecht-Heimann Co.): I am in the same position. We handle a good many of the materials. In addition, I would like to say that the price of Ammate is going to go down.

Mr. Matley (Standard Agricultural Chemicals): We have been able to keep most of the California growers happy. We have plenty of Sinox on hand for the coming season. Unless the situation changes, we will be able to meet all demands.

Following the comments of the commercial representatives, Mr. Hutchings appointed Lin Harris, Oregon State College, to lead the discussion as programmed for Friday morning.

The Chairman continued with the program and called upon Mr. L. H. Mitchell, U. S. Bureau of Reclamation, who showed slides and gave the accompanying lecture:

CONTROL OF LAND WEEDS

Introductory

This slide lecture has been prepared by the Branch of Operation and Maintenance of the Bureau of Reclamation to acquaint irrigation farmers with the source and habits of noxious weeds and the practical measures for controlling and eradicating them.

Slide #1. Many weed seeds originate from plants growing along streams that furnish irrigation water. Here you see white top, sometimes called hoary cress, on the shore of a stream which several miles down stream is diverted for irrigation purposes. Seeds from these and other weeds find easy transportation to the farm. It has been estimated that irrigation water has been responsible for 80 per cent of the weed seeds carried onto the farm.

Slide #2. Canal banks permitted to grow up to noxious weeds become flourishing weed "nurseries" and distributing headquarters for noxious weed seed. This canal passes through patches of Canada thistles up stream from project lands. Observe

the rank growth of the Canada thistle extending from the high water mark to the edge of the canal bank. Seeds dropping into the water will be carried to the farms below.

Slide #3. Farmers' head ditches are also nurseries for noxious weeds. White top, which may have arrived by the water and got its start on the fertile slopes of this ditch bank, now completely covers the bank, running from the water's edge over the outside slope and into the adjacent field. Seed profusely scattered by winds and irrigation water have started up infestations over the entire farm.

Slide #4. The purchase of certified seed is a good investment. The planting of weed seeds in crop seeds is a source of weed spread. If a farmer plants his own seed he should set aside a small acreage just for seed purposes. Time allotted for removing weeds from these plots will be well spent. Plant only clean seed.

Slide #5. Worn-out pastures provide land "open for entry" for noxious weeds and may be a source of contagion to the entire farm. Bindweed, also known as creeping Jenny or wild morning glory, has taken over this pasture because the pasture plants were not sufficiently sturdy and aggressive to hold their own.

A soil-building program and a pasture management plan are important to enable pasture crops to compete successfully with weeds.

In a five-year experiment conducted at the Experiment Station at Lethbridge, Alberta, it was demonstrated that in old alfalfa fields overrun with dandelions there was a phosphate deficiency. Applications of phosphate fertilizers stimulated the growth of alfalfa to such an extent that the alfalfa plants completely overshadowed the dandelions and yielded an excellent crop of hay.

Slide #6. Noxious weeds along a highway spread to nearby farms and many distant ones. Creeping perennial weeds in such places increase not only by seeds but by the spread of their roots into the soil of the adjoining field.

This Russian knapweed along the highway gradually enlarged its area because no one did anything about it. Taking over more and more ground, it soon established itself in the edge of the farm.

Slide #7. The mature seeds in this patch of Canada thistle infesting a wheat field are equipped with parachute-like contrivances and are ready to "take off" with the first breeze. Their "landing field" may be a fertile farm where the farmer assumes he is safe from the intrusion of such enemies.

Slide #8. Threshing outfits and other farm equipment are ready facilities for transporting weed seeds from farm to farm or even over a single field. Whether grain or beans are being harvested, every care should be exercised to have threshing machines and wagon boxes thoroughly cleaned before moving them from a field, especially if a field contains noxious weeds.

Slide #9. This tree space is growing bindweed, in full view of passing town folk and farmers. Weed seeds in town are as good travelers as weed seeds elsewhere. They can be carried on the shoes and clothing of man and on the feet and hair of animals.

Slide #10. Railroad rights-of-way are favorite headquarters for many noxious weeds. This bindweed is one of our most widely distributed and destructive weeds.

Here its twining vines have spread even between the rails. If left unmolested, it produces seed to scatter to nearby farms.

Slide #11. The most serious noxious weeds on irrigated projects today are the creeping perennials. This is a young perennial Canada thistle. It spreads not only by seed but by lateral roots which live for many years, extending in all directions and starting up new colonies along the way. Observe the length of the main root as compared with the growth above ground. The horizontal roots have not yet started. When mature they will extend several feet in all directions.

Slide #12. Before horizontal roots have set on, but while in the seedling stage, perennial weeds are just as easily eradicated as seedlings of other weeds, provided they are uprooted by cultivation within one month after starting. Of course the sooner they are cultivated after emergence the easier they are uprooted. Here a farmer-of-tomorrow is uprooting perennial seedlings.

Slide #13. An area of perennial weeds that exceeds about 1/4 acre can best be killed by shoot-cutting, sometimes termed the clean cultivation or starvation method.

Research has shown that the leaves of all plants manufacture food necessary for plant growth and that perennial plants, like this bindweed, store food in their roots for later use. Also, that leaves of perennial weeds do not manufacture and store food during a period of about ten days following emergence. It has also been determined that new shoots growing under ground and for the ten-day period following emergence, are drawing on stored food. Therefore, if the new shoots are cut off under the ground with a hoe or duckfoot cultivator before the new leaves start making food, the storage of food is prevented, the supply of food already stored in the roots is gradually exhausted, and the weed is killed.

This is the object of shoot-cutting. As it can be done most economically by the least number of cultivation operations, the depth of cutting plays an important part. Experiments have shown that for the most practical operations weed shoots should be cut off four or five inches under ground.

The time of year to start shoot-cutting operations is not important, but once started they should not be put off for more than two weeks as there is danger that some plant food might be stored and much of the labor lost.

Shoot-cutting equipment moving over rough ground cuts some shoots too deep and some go uncut. Tight, hard soil makes shoot cutting impractical with ordinary farm equipment. Plowing, generally the first operation in a shoot-cutting program, loosens soil and puts it in ideal condition for smoothing.

Slide #14. There are several types of shoot-cutting equipment. The size is governed by the area infested and the power available. A few scattering perennial weeds can be killed by timely cuttings with simple garden tools. If the weed area is too large for the hoe method, and too small for a tractor, then a one-horse outfit can be used.

Slide #15. Large infested areas are economically cultivated by using this type of a homemade tool.

Slide #16. A duckfoot cultivator which has several small overlapping V-shaped blades is also a good implement for shoot-cutting.

Slide #17. A sharp blade is very essential; otherwise, some of the tough shoots will be merely pushed over or sidewise. Especially is this true in dry soil, and the blade shears more effectively in damp soil.

Slide #18. By irrigation soil can be maintained in a healthy condition so that the shoots will grow faster. Some weeds, especially white top, go dormant when the soil is dry and warm. Such weeds can be kept growing throughout the summer by keeping the soil moist and cool. Also, weed seeds will germinate much quicker in moist soil than dry soil.

Slide #19. If bindweed infestations include several farms or communities, weed districts are sometimes formed. Most western state laws provide that for the protection of all land owners noxious weeds must be eradicated. This involves wholesale operations. This tractor duckfoot outfit is in continuous operation from the time weeds start growing in the spring until they quit in the fall. It goes from one infested farm to another cutting weed shoots at two-week intervals.

<u>Slide #20.</u> Estimated number of shoot cuttings per season	11
Approximate cost of cuttings, each	85¢
Total for season, 11 x 85¢	\$9.35

Slide #21. This farmer, in a weed district, assumed that he could do the work himself cheaper than if done by the district. As can be seen, he is now shoot-cutting the bindweed in full bloom and in the process of storing food in the roots. This storing of food has been going on for many days and, therefore, his efforts have been lost. Experience, though expensive, taught this farmer that shoot cuttings must be timely.

Slide #22. This farmer considered the clipping of the bindweed shoots more important than the cutting of his alfalfa. Here he left his alfalfa field to give the bindweed patch its timely shoot-cutting. On a few irrigated projects bindweed and other noxious weeds are being controlled by the individual farmers, and the formation of a weed district has not been necessary. This accomplishment has been made possible through the efforts of the county agent and superintendent who have cooperated in carrying on educational weed work.

Slide #23. You see the upper portion of the root system of a Russian knapweed, another creeping rootstock perennial. Not only are these ropelike roots tough but the weed is a tough one to kill.

On the right are the roots of a normal Russian knapweed with the shoots that have formed plants above ground. At the left are the roots of a Russian knapweed showing the effect of shoot-cutting operations in one growing season.

The length of time required to kill a perennial by the shoot-cutting method depends on the root system, the age of the infestation, stage of growth at the time cutting is started, and moisture conditions of the soil. Occasionally they are killed in one year but generally two years of shoot cutting is required. Rarely is it necessary to continue shoot-cutting operations the 3rd year.

Slide #24. Should noxious weeds get established along highways where they can easily spread by seeds and roots to adjoining farms they become a community problem, similar to an epidemic of disease. County and federal officials cooperate in doing their part and control weeds along highways.

Slide #25. Here sodium chlorate is being applied to a patch of bindweed along the highway. The cost of this is borne by the county.

Slide #26. This patch of white top is receiving an application of sodium chlorate but the work here is being done by the officials of a weed district. Whether or not the eradication of weeds along highways and other isolated places shall be done by officials of a county or by representatives of a weed district must be decided by the people; that is, if weeds are not being controlled along highways and other farm areas, as well as in the field, then the formation of a weed district is resorted to.

Slide #27. Before it is possible to determine if the area of noxious weeds is increasing or decreasing, surveys are necessary. These surveys should be made at least every five years. They can be made by ditchriders, but before starting out on a weed survey the enumerator must be familiar with the weeds in the area.

To facilitate the enumerators in making their weed surveys, special forms have been prepared. This is one side of the form.

Slide #28. The reverse side is a diagram that is used by the enumerators in describing the location of the weed infestation.

Slide #29. Sodium chlorate is used more extensively than any other herbicide where cultivation is not practical. Here it was applied along a fence with very good results.

The dosage will depend principally upon the kind of weed, soil type, and moisture; but 6 pounds per square rod is recommended for average conditions. The cost of treating an acre of soil is from \$50 to \$75.

Water is necessary to leach the chlorate downward which can be done effectively and quickly by irrigation. Where this is not practical the applications should be made prior to the fall and winter rains.

THE FOLLOWING PRECAUTIONS
SHOULD BE TAKEN WHEN USING CHLORATE

1. Store chlorate in tightly covered metal container only.
2. Open containers and mix material in the field. Never open cans in a building or barnyard.
3. Wear rubber boots when spraying.
4. Do not allow clothing wet with chlorate to remain on body until dry. Such clothing constitutes a dangerous fire hazard. Wash it thoroughly.
5. Use metal equipment so far as possible when spraying with chlorate. Wash after using.
6. If lime sulphur has been used in the sprayer, clean it out thoroughly before putting in a chlorate solution.
7. Do not walk or draw farm implements through treated areas or allow livestock to run through them until after a heavy rain, as even slight friction is apt to ignite the vegetation and cause serious damage.

8. Do not spray near buildings where the fire hazard may result in loss of property.
9. Keep livestock well supplied with salt on farms where chlorate is being used. Do not allow livestock to graze on newly treated areas.
10. Do not allow chlorate to come in contact with trees or plants that you wish to save.

Slide #31. Carbon bisulphide, a liquid that vaporizes easily, has proved to be ideal for eradicating small patches of noxious weeds in the field. It is inflammable and should be handled with care.

A special tool can be used to automatically inject two ounces of this chemical to a depth of not over six inches. The application should be into holes spaced 18 inches apart each way and the rows should be staggered. When it is injected into and sealed in the soil it forms a gas heavier than air that will penetrate the soil and kill all roots with which it comes in direct contact. Experiments indicate that satisfactory kills may be made at any season of the year, but a smaller dosage is required when the application is made during the summer months. It does not injure the soil; to the contrary, it tends to reduce alkalinity and has a fertilizing effect. It will cost about \$1 for sufficient carbon bisulphide to treat a square rod area.

Slide #32. When a farmer has an entire field badly infested with perennial weeds it is not necessary, and often not advisable, to have all of it out of production for one, two, or three years while carrying out a shoot-cutting program. A better plan would be to completely eradicate the perennial weeds on a portion of the field and "live with" the weeds on the remaining area.

By living with them is meant growing sturdy competing crop plants as this farmer is doing. This is a crop of red clover growing in a field badly infested with wild morning glory. Prior to seeding the clover the soil was fertilized with manure and commercial fertilizer. Just before seeding, the ground was plowed deep, 8 to 10 inches, to allow the clover as much time as possible to get a foothold before the weeds could send up new shoots.

While a few weed vines could be found in the clover, they were yellow and sickly. What was accomplished here with red clover can be done with alfalfa and other similar smother crops which produce a thick, luxuriant growth that shades the weeds and gives them keen competition. This is weed control.

Slide #33. Strawberry clover, one of the most alkali-tolerant crops, properly fertilized and irrigated, is a good smother crop for the control of white top. It likes wet feet. Similar to other smother crops, good management practices must be followed. It being a pasture herbage, overgrazing weakens it, while white top and other undesirable weeds (being undisturbed) thrive. Similar to any well managed pasture, timely clippings are very essential.

Slide #34. Searing prevents the formation of seeds of all kinds of weeds under fences and on head ditches. Prevention of seeds forming is much better than burning them after they are mature. Where clipping is not practical weeds should be seared on or before the bud stage.

For economical operation a special weed burner is used on ditch banks. Here it is necessary to destroy weed seeds so close to the ground that they cannot be mowed, like this white top.

If poisonous weeds, like water hemlock, grow on ditch banks they should be killed before weed-competing grasses are seeded.

Water hemlock has been killed in one season by a few searings of the tender tops, that is, scorching them. The first searing is in the spring or early summer when the tops are 12 to 18 inches tall. After the second growth is about the same height, it is seared. If there is a third growth it gets the same treatment. Later an examination of the roots shows that there is no life.

Slide #35. The cheapest and most effective measure for the control of noxious weeds is to prevent their becoming established. This is true on the farm, along highways, and on ditch banks.

The growing of aggressive weed-competing grasses and clovers is recommended as a practical weed prevention measure. Grasses can easily be started on ditch banks by placing small pieces of sod just above the high water mark in the canal. This sod can be obtained by plowing a strip along the edge of a pasture where grass is already established. Be sure that the sod contains no weeds.

On the inside slope of this head ditch bunches of bromegrass sod, a few inches in diameter, have been placed at about 18-inch intervals.

Slide #36. Large ditch banks should be leveled and smoothed, as for a pasture, so that power mowers may be used to clip the weeds. A seed bed should also be prepared. Water-loving grasses are seeded where the banks are damp. Seeding is done in late fall or early spring. Clipping weeds in the bud stage is very essential, especially before the grasses are well established.

Slide #37. From an established stand of bromegrass, a piece of sod has been shoveled up and placed by the fence post so you may observe its dense, spongelike root system. You can readily see why bromegrass gives weeds aggressive competition.

Slide #38. No weeds are growing on this ditch bank and weed seeds traveling with the irrigation water will find no soil for a seed bed.

Some have raised the question as to whether a stand of grass, with its mat of roots and foliage sufficiently thick to keep out weeds, would not retard the flow of water and increase the cost of cleaning ditches.

Slide #39. Here is the answer. Unless water in irrigation ditches is required for culinary purposes (there are only a few projects where this is necessary), grasses, clovers, and all other growths on ditch banks, except those of a poisonous character, should be used for supplemental pasture in conjunction with other pastures on the farm. Properly grazed ditchbank pastures control weeds and willows, furnish considerable good forage, and reduce maintenance costs. If the ditch right-of-way does not furnish enough forage to carry a few head of livestock it is a good practice to add sufficient contiguous farm land, as was done here.

Slide #40. Many cases have come to light which indicate livestock were poisoned and killed by eating poisonous weeds on ditch banks, but often these losses were assigned to other causes.

Slide #41. To show the effect of water hemlock roots when eaten by livestock, a test was made by feeding 7 ounces of the root to a range sheep.

Slide #42. In one hour and a half the sheep died.

Slide #43. Boys wandering about, as these lads are, and unaware that water hemlock is deadly poisonous, often want to know what plants taste like. Too often water hemlock is erroneously named wild parsnip. The boy at the left is standing alongside wild parsnip plants, a land weed. The boy at the right is beside water hemlock, a semi-water weed, which is growing at the water's edge. Some of the roots of water hemlock generally extend out into the water.

Slide #44. This shows the difference between wild parsnip and water hemlock. At the left you will note the wild parsnip which has one stem and one root. The seed of this plant is fan-shaped like the seed of a tame parsnip. The water hemlock, at the right, contains many stems and roots. The seed is very small, orange-shaped, and grows in clusters. When the roots of water hemlock are cut open a yellow sap oozes out.

Slide #45. Which is preferable--a ditch like this which is truly no man's land, where the seeds from the white top find easy transportation to the farm,

Slide #46. or a ditch like this seeded to pasture grasses and clovers? This ditchbank pasture is furnishing considerable forage. There are no weeds and the maintenance cost is practically nothing.

The Chairman called upon Dr. R. J. Evans, Utah State College, to give a progress report of weed research in Utah.

UTAH. Dr. Evans: In rather recent years the following experiments have been carried on in Utah:

1. One three acre field of perennial sow thistle located at Vernal, Utah was divided into experimental plots consisting of 32 treatments and included cultivation, chemical, and cropping treatments. The land was rather damp with a water table varying around two feet below the surface.

2. A similar experiment was conducted at Midway on Canada thistle with identical treatments under similar soil conditions.

In general cultivation up to intervals of 20 days were effective in killing the weeds in one full season. Sodium chlorate and Atlacide were effective when applied in 4 pounds per square rod quantities at any time during the growing season.

Carbon bisulphide was effective when applied where the ground water was not too close to the surface.

Reed Canary grass and smooth brome were more effective in keeping the weeds under control than were alfalfa, oats, and peas, or a grass mixture.

3. A five acre field of white top at Richfield was designed as a balanced experiment with cultivation, chemicals, and competitive crops included. One half of each plot was irrigated as needed and the other one half was left without irrigation.

Reed Canary and smooth brome grasses were more effective in control than western wheat, winter wheat, alfalfa, sweet clover, or a mixture of other grasses.

Sodium chlorate and Atlacide at 8 pounds per square rod were fairly effective in killing the weeds. Best results were had when applied in powder form.

Cultivation at 14 day intervals proved the best but required 2 full years.

There was little difference between the irrigated and non-irrigated plots.

3. Similarly designed experiments were conducted on wild morning glory at Ephriam and at Bothwell and a little later at Manila in Utah County.

The chlorates were effective in quantities of 4 pounds per square rod and the 2 week cultivation intervals were most successful, but required two years to be effective.

The same competitive crops were successful.

5. A seven acre field of white top was set up as an experimental farm in 1941 at Palmyra. This consisted of two parts:

A five acre field designed to test various combinations of cultivation and cropping. Each crop tested was planted from scratch with just an ordinary seed bed preparation; others after various lengths of time of cultivation before planting. This has been a very interesting experiment but final results will not be obtained until the end of the present year. Crops included barley, wheat, sorghum, soybeans, corn, sugar beets, alfalfa, Reed Canary grass, smooth brome grass, and a complete pasture mixture, and a two acre field was devoted to interval cultivations as follows: at emergence, 5 days after, 10 days, 15 days, 20 days, 25 days, 30 days and 35 days after. All plots were sampled for root residues twice during the experiment. The experiment is complete but results are not yet available.

6. An identical experiment was conducted in Cache County on wild morning glory. These experiments are in about the same stage of progress.

A uniform crop of silage corn was grown in both of the cultivation fields in 1943 and yields from each plot determined.

Mr. Hendricks: What were the results where you irrigated?

Dr. Evans: We found no difference in the chemical applications but difference in the competitive crops. So far as Reed Canary grass is concerned, it will not compete with white top and morning glory on a field. The more water you can put on Reed Canary and smooth brome grass when used as a competitive crop, the better will be the result. In Cache County we gave them plenty of water but when we plowed them up last spring we found that there was no eradication. When you plow them up and give them a few months, they are still there. We can keep the weeds under control. We are encouraged in the fact that we really have done a lot and are doing some fine experiment work right now.

Mr. Kuhns: What are you doing about irrigation?

Dr. Evans: We looked around for weeks trying to locate a place for our last experiments. Without irrigation these weeds grew uniformly throughout the year.

White top is a cold weather plant but morning glory is just the opposite. White top grows dormant if you leave it alone in the summer.

Question: After your chemical treatments, how many years does it take before you can plant crops?

Dr. Evans: We have had effects five years after where we irrigated, and on others the second year the chemical has been pretty well out of the soil.

Mr. Hobson: What time of the year is best to apply chemical?

Dr. Evans: We found no difference from spring to fall. We found that, generally speaking, if we split the 8 pounds of chemical between 5 and 3, we could be sure to take all of the weeds on the second application if not on the first. As long as you get the chemical to the roots by washing or hoeing it in you can kill the weed. We tried experiments with arsenic and acid combinations. We cannot repeat the results that they have had at the College, which illustrates the fact that you cannot accept anything from any other state or region. You have to do all your own experimenting for your own conditions.

Mr. Hutchings called for a report on recent developments of weed control in California.

Mr. Raynor: Contributions to this report have been made by several members of the Division of Botany, of which Dr. W. W. Robbins is Head. Several of the more important contributions are by Dr. A. S. Crafts. The project on hoary cress control was begun in collaboration with Dr. R. S. Rosenfels, formerly Assistant Physiologist in the Office of Cereal Crops and Diseases, U. S. Department of Agriculture. Mr. H. A. Hannesson, formerly Associate in the Experiment Station, developed the method for determining the permeability of field samples of soils.

Petroleum Oils as Selective Sprays

The first weeding of commercial plantings of carrots is now generally accomplished in California by spraying with stove oil. The oil is applied when the carrots have from 2 to 4 true leaves, and at a rate of around 75 gallons per acre. We have prepared a mimeographed circular in which further details of the procedure are discussed. It may be obtained by writing to the Division of Botany, College of Agriculture, Davis, California, and asking for the circular titled "Chemical Weeding of Carrots with Stove Oil Sprays."

Spraying with stove oil is also a safe and effective method of weeding celery seed beds. A recent report from the Salinas Valley states that all the celery growers there have sprayed this year.

Other umbelliferous crops that are known to be tolerant of stove oil are parsnips, parsley, dill, coriander, and caraway. Anise, at least in the seedling stage, has a very low tolerance. The foliage of a few crop plants in other families is somewhat resistant to oil sprays. Guayule nursery beds are effectively weeded with dilute emulsions of stove oil; and guayule plantations with diesel oil applied at rates up to 75 gallons per acre.

In experiments on asparagus seed beds, seedlings about 2 inches high, with only the primary shoot exposed, survived spraying with 100 gallons of stove oil per acre. Some of the seedlings showed only slight injury; others were completely killed to the ground line. In all, however, new shoots developed rapidly, and there was but little retardation of growth.

Onions also will survive spraying with oils, particularly gasoline or other lighter fractions.

Toxicity of Oils

Studies on the toxicity of oils to weeds and crop plants have been along two lines. One line of investigation has sought to determine what commercially available oils, in addition to stove oil, might be suitable for selective spraying of carrots and other crops. The other, and more fundamental line of investigation, has been the determination of the chemical nature of the toxic compounds in petroleum oils. The results obtained to date are reported in a mimeographed circular by Dr. A. S. Crafts and Dr. H. G. Reiber, of the Divisions of Botany and Chemistry, respectively. Copies of this report, "Toxicity of Oils to Carrots and Weeds" may be obtained by writing to the Botany Division.

Toxicity of oils to plants is of two types: (1) acute toxicity, manifested by a rapid killing of all tissue with which the oil comes in contact, and (2) chronic toxicity, resulting in a slow death of tissues. Acute toxicity is caused by the aromatic compounds in the oil fraction, and is strictly a chemical effect. Chronic toxicity is characteristic of all oil fractions having a boiling point above that of ordinary gasoline.

Carrots are injured or killed by oil fractions that are very high in aromatic compounds, and fractions heavier than stove oil may cause injury of the chronic type, although they may be low in aromatics.

Commercially available fractions, in addition to stove oil, that are suitable for spraying carrots are kerosene distillate (not refined kerosene), engine distillate, and gasoline.

Activation of Herbicides

The mechanism of activation of the sodium salts of substituted phenols has been studied by Dr. Crafts, and his conclusions are incorporated in a paper that has been submitted for publication. His results support the hypothesis that activation produces undissociated molecules of the parent compounds; and that these molecules are more toxic than the ions.

Undissociated molecules are produced in solutions of the sodium salts by addition of acid salts such as sodium bisulfate and aluminum sulfate, and by the ammonium salts of strong acids such as ammonium sulfate. They are also produced by hydrolysis in simple solutions of the ammonium salts of the substituted phenols.

Experiments fail to confirm the report that sodium pentachlorophenate activates sodium chlorate and sodium arsenite. In all tests, the total toxicity of the mixtures has been, in each case, equal to the sum of toxicities of the separate ingredients.

Experiments in Chemical Weeding of Onions

Chemical treatments of weeds in onions may be divided into four classes, on the basis of age of the crop. These are (1) pre-emergence sprays, (2) sprays applied at the cotyledon stage, (3) sprays applied in the 1 to 3 true-leaf stage, and (4) sprays during the 4-leaf to bulbing stage.

Petroleum oils are safer than water soluble chemicals for pre-emergence weeding. Oils kill grasses as well as broad-leaved weeds and have no residual effect on the soil. Sinox and other water-soluble compounds may injure onion seedlings when they emerge.

Onions in the cotyledon stage will tolerate low concentrations of selective sprays, especially under dry atmospheric conditions. Low volumes of oil may also be used. Although oil kills the exposed portion of the cotyledon, onion seedlings recover as they do from burning, if the volume of oil is kept at a minimum for coverage, say 30 gallons per acre. Even lower dosages of oil are effective if fortified and emulsified with water.

Onions in the 1 to 3 leaf stage will withstand relatively high dosages of aqueous sprays, provided the foliage is not already wet. They also have a limited tolerance toward low-boiling petroleum fractions such as gasoline.

When onions become so large that the leaves are no longer vertical, sprays applied to the entire foliage may injure the plants enough to lower yields. However, the lower portion of the leaves are more resistant than the tips. It is possible to kill low-growing weeds in the row by directing nozzles at each side of the row so that the spray hits only the sheaths of the onion leaves.

Varietal Resistance of Onions to Sinox

Of 12 varieties tested, only one, early Grano, was markedly susceptible to Sinox and other dinitro sprays. The following varieties showed no undue injury when sprayed with the commonly used concentrations of Sinox: California hybrid red number 1, Stockton G36, San Joaquin red number 21, crystal wax, Danvers, Australian brown, sweet Spanish, yellow Bermuda, and Southport white globe.

Permeability of Soils to Carbon Bisulfide

It will be recalled that investigations of the permeability of soils to carbon bisulfide vapors, as determined on laboratory packed samples, were reported to the conference meeting at Berkeley in 1939 by R. M. Hagan; and additional data on similarly prepared samples were reported in a paper by H. A. Hannesson read at the meeting in Salt Lake in 1941. In essence, their conclusions regarding the effect of certain soil characteristics were: (1) permeability is highest in sandy textured soils, intermediate in loams, and lowest in clays; (2) permeability of a soil at field capacity is but a small fraction of that of the air-dry soil; (3) compaction is also an important soil characteristic influencing permeability.

More recently, a method of measuring permeability to low-pressure air flow has been adapted to use on cores taken in the field. The results of measurements made on field cores taken at successive depths to 3 or 4 feet on 15 soil types show that soil structure is also a factor, and may, in some cases, overshadow the effects of texture and of moisture. Among the more significant findings are the following:

(1) In some series at least, the sands are less permeable than the loams or clays.

(2) The permeability may vary severalfold in different sections of the profile. The plow sole is the least permeable layer, except in soils that have not been plowed for some years, where the surface two or three inches may be less permeable.

(3) Within a given profile, permeability is generally correlated with compaction. This confirms the conclusion reached in the studies on artificially packed cores.

(4) The increase in permeability that occurs on passing from field capacity to the air-dry condition is greatest in those soils that are relatively permeable even when wet. Thus a loam or clay that is permeable when wet might become excessively permeable on drying; and on the other hand, an impermeable sandy loam may not be appreciably more permeable when dry than when at field capacity.

Although these findings indicate that relations between texture and permeability, and between moisture and permeability as found in structureless laboratory-packed soil cores do not hold in all cases for soils in the field; yet there is reason to believe that in other cases the laboratory findings may apply more directly. There are soils in which, because of the type of colloid present, structure is poorly developed.

Hoary Cress Control

Experiments on the control of lens-podded hoary cress (Lepidium Draba var. repens) by cultivation, searing and spraying gave the following results on sub-irrigated land where the root system penetrated to a depth of 30 inches:

1. Cultivating 16 times at 3-week intervals for 2 seasons gave 99 per cent control.
2. Cultivating 12 times at 4-week intervals for 2 seasons gave 95 per cent control, and 4 cultivations in the third season completed the process.
3. Wild morning glory, Russian knapweed, and alkali mallow growing under the same conditions were not reduced by cultivating at 3 or 4-week intervals.
4. A comparison of vaporizing and non-vaporizing burners for searing shows no difference in results.
5. Searing at 3-week intervals from mid-March to early December, a total of 13 times, controlled hoary cress on ditchbanks.
6. Searing 10 times at 4-week intervals during the same period reduced the stand approximately 70 per cent.
7. Searing 5 times at 5-week intervals during the first season and 7 times at 4-week intervals during the second season resulted in but 15 per cent reduction in stand.
8. Searing appears to be strictly a process of depleting root reserves by repeated defoliation. The number of operations required, and the optimum interval between operations are of the same order for the searing method as for cultivation.
9. Spraying with diesel oil, or with a blend of diesel oil and 14° API gravity residual fuel oil containing not more than 25 per cent of the latter, gave 95 per cent control when repeated 8 times during two years, the interval between applications approximating 60 days.

10. Although oil spraying requires fewer and less frequent repetitions than other reserve depletion methods, the cost of material is high. In the instance cited above 24 gallons of oil per square rod were used in 8 operations.

11. Spraying with Sinox required more operations at shorter intervals than did spraying with oil. Ten repetitions during 2 years at intervals averaging 40 days resulted in 97 per cent control. The cost of materials was about half that of the oiling treatment.

Experiments on General Contact Herbicides

In California petroleum oils have been used as general contact sprays for controlling mixed weed growth on uncropped land, to the almost total exclusion of other herbicides. A search for other materials that will kill mixed vegetation, including grasses, as effectively as oil was prompted by several considerations. First, the use of fuel oils for spraying weeds on road, street, highway and railway rights-of-way is temporarily prohibited by Petroleum Distribution Order 13. Second, it would seem unnecessarily wasteful of natural resources to use fuel oils for spraying weeds, even in peace time. Third, changes in refining practices have made the grades of fuel oil ordinarily used less effective as herbicides than they formerly were.

Several spray formulas have been developed that either require no oil, or that reduce the amount of oil required to a minimum. There appears to be no hazard to persons, livestock, or property in using these sprays on public rights-of-way.

Of the completely aqueous solutions tested, one containing the ammonium salt of dinitro ortho secondary butyl phenol at a concentration of $\frac{1}{2}$ per cent (4 pounds per 100 gallons) plus a wetting agent is the most satisfactory. Fire strips sprayed on state highways in central California in April burned well enough after 2 or 3 weeks to provide adequate protection for adjacent grain fields and pastures.

Sodium pentachlorophenate at rates between 4 and 8 pounds per 100 gallons, activated with $\frac{1}{4}$ its weight of aluminum sulfate and with a suitable wetting agent, is not as good as the ammonium dinitro ortho secondary butyl phenol formula for killing grasses. The addition of 2 gallons of diesel or stove oil per 100 gallons of spray improves the kill of grasses considerably.

Emulsions of oils with dinitro ortho cresol, pentachlor phenol, or dinitro ortho secondary butyl phenol are generally as good as straight oil, and in most cases are cheaper. A formula that gave excellent results in experimental spraying of fire strips along highways consisted of 4 pounds pentachlorophenol dissolved in 6 gallons of diesel oil, emulsified in 94 gallons of water containing Vatsol OT as an emulsifying and wetting agent.

Fortification of oils, without emulsification, also reduces the quantity required to kill the vegetation on a given area. The same three compounds recommended for emulsions may be used in smaller quantity for fortification of straight oil. In one case where 150 gallons of diesel oil per mile was required to spray ditches in the Sacramento River Delta, 75 gallons of diesel oil fortified with 3 pounds of dinitro ortho cresol produced better results.

A more complete report on these experiments is contained in a mimeographed circular written by Dr. Crafts.

Meeting adjourned at 5:15 P.M.

Friday morning, May 26.

Chairman Hutchings called the meeting to order at 9:30 A.M. and requested Mr. W. L. Hendrix, President of the Idaho Noxious Weed Control Association, to tell us about the organization of the Association and how it operates.

Mr. Hendrix: The Idaho Noxious Weed Control Association was organized in Twin Falls, Idaho, in February of this year. This was an outgrowth of a resolution presented and passed by the County Commissioners and Clerks at their annual meeting in December of 1943.

This Association is a voluntary one, organized for the benefit of citizens of Idaho without profit.

Purpose of Association

Gathering information for weed control and eradication. Give information to its members, the press and public. Study our weed seed laws, amend weed laws so they will fit our present needs. Cooperation between counties in weed control work. Each County in the state is entitled to two members in the Association, one of these being a member of the Board of Commissioners, and the other to be appointed by the Board of County Commissioners.

Associate members, State Commissioner of Agriculture and Extension Agronomist and County Agents. The state was divided in five districts with a director in each of the five districts. A president and secretary was elected by the Board of Directors and meetings have been held in all of the districts. These districts are set up according to climatic, topography, and farming operations. We feel that these meetings have been very beneficial in my judgment, and have helped all Commissioners and weed men in the state to a better understanding of the weed problem in all parts of Idaho.

Land Owners Responsibility

Ada County has declared that Noxious Weed Infestation on any piece of land in Ada County is the responsibility of the land owner whether he be individual, partnership, corporation, municipal, rights of way, drainage, or irrigation districts.

We believe this to be a fundamental declaration, and in our opinion this should be state wide in its scope.

Our state noxious weed law implies this, but does not specifically state it. We believe this law should be restated to clarify this part of the law. We can never hope to successfully combat this weed problem until we have a definite right to place responsibility on the land owner and thus to bring him to account, if he fails to cooperate in control or eradication.

Ada County has had under cultivation approximately 800 acres of land. Main infestations were white top, and morning glory. About 350 acres of this were returned to crops this spring. This does not mean that these lands will not become infested again if the same farming practices are used as in the past, because we have not destroyed all the seeds that have become impregnated in the soil, but the root systems have been destroyed and the land owner or operators can with reasonable diligence keep that particular piece of land free from noxious weed infestation.

In almost all cases we have doubled the production of crops on these pieces of land returned to crop production in the last two years. The greater part of our efforts in Ada County in the last two years have been placed on the roads as there was approximately 250 miles of infestation which ran from sparse to heavy infestation. We have used the burning method, along with the use of chlorate to bring these roads under control.

We use the burning method for several reasons:

1. Because we can accomplish more work with less manpower.
2. It is less costly per rod per season than any other method. Approximately 30¢ per rod, which includes labor and material.
3. This method absolutely controls seed spread. It checks root spread and eradicates the newer infestations. The burning method early in the spring will greatly aid shallow seed germination because it immediately warms up the ground and causes the seedlings to start and of course at the next burning they are destroyed.

We do not attempt to completely burn the plants but rather do we sear the foliage causing the plant to die down both from the searing and also the residue of carbon that is sprayed on the plant.

Our great infestation in Ada County is white top, and this method has been largely used on this weed. Canada thistle and knap weed respond very well to this method but morning glory does not seem to respond as far as root spread is concerned and immediately will start regrowth. However, we do burn twice per year for control of seed.

Use of chlorate following a season's burning will give a 100% kill in practically every instance.

We do not believe that the burning method is the answer to weed eradication but it certainly has a definite place in the weed program, because it affords a cheap and effective method of control with a minimum of manpower.

Let us all strive for more uniform methods of control and eradication throughout the state, keeping in mind these essential factors; climate, geographical location and soil conditions.

Control of Noxious Weeds

The following is information to land owners as to policy of the Ada County Noxious Weed Control, which is operated under the jurisdiction of the Ada County Commissioners:

Infestation of noxious weeds on any land is declared to be the responsibility of the land owner, whether it is owned individually or by partnership, corporation, association, municipality or the state.

Infestations on rights-of-way such as state highways, county roads, highway districts, streets or alleys within corporate limits of cities or villages, rights-of-way of railroads, ditch or drainage companies are declared to be the responsibility of the officials or directors of such organizations.

It shall be the policy of the Ada County Weed Control to aid and assist in noxious weed eradication. In operations performed by the county, one-half of the cost of labor, materials and chemicals will be borne by the county; the other half to be paid for by the land owner.

The services and advice of the Weed Superintendent shall be without charge to the land owner and subject to the orders of the Board of County Commissioners.

In the process of eradication by cultivation, tractors and equipment with operators shall be furnished by the county on all cultivation contracts at a cost of 50¢ per acre per cultivation but not to exceed \$6.00 per acre per season. Lands under cultivation contract will be classified for assessment purposes as waste land and will be assessed for only \$1.00 per acre as long as such cultivation contract is in effect.

For the convenience of land owners who have a small infestation and who desire to do their own chemical treatment, weed guns are available at the rate of 50¢ per day at the warehouse in Meridian.

Statements for labor, materials or chemicals will be mailed to all land owners on August 15th of each year, and if payment is not made by September 15th, such charges will be added to the tax rolls and collected in the same manner as other taxes.

Mr. F. F. Yost, State Weed Supervisor of Kansas, was invited to attend our meeting. After the meeting was called to order the following wire was received by the Secretary: "ILLNESS FORCED ME TO RETURN HOME AFTER REACHING DENVER ENROUTE TO MEETING. REGARDS TO ALL AND BEST WISHES FOR A GOOD MEETING. F. F. YOST"

The Secretary wrote to Mr. Yost, who was kind enough to send us the following report on the extensive program underway in his State. With the report he also submitted the "Six-Year Progress Summary" of the Kansas Bindweed Program.

"We are sorry it was impossible for a Kansas representative to attend the 1944 Western States Weed meeting at Salt Lake City. The writer was caught sick enroute and was forced to return home post haste. We are glad to report that we are well and working at the weed job again. Hope we can make it all the way next time. Mr. L. W. Kephart of the U. S. Department of Agriculture, who called on us soon thereafter, reported that you had a splendid meeting, that was both interesting and instructive from beginning to end. Your request for a short report on our changes in practices in our program has been received and will be complied with especially with reference to the short part.

"Erosion Control

"The most important practice change in our program since our present setup was inaugurated in 1937 took place during the past year. This change in practice has to do with the control of erosion in the cultivation method of treatment. Our cultivation recommendations which were set up seven years ago provided for a cultivation operation each two weeks for a two year period which in most cases resulted in eradication of the old root system. The tool recommended was the ordinary duckfoot or field cultivator with proper overlap or some type of straight or sloping blade. This procedure did produce the desired results in destroying the bindweed but at the same time it frequently produced a very undesirable condition; i.e., varying degrees of soil loss due to either blowing or washing.

"Six years of experience under Kansas soil and climatic conditions have proved that the plan of a cultivation each two weeks for two years will leave the soil very loose and subject to serious erosion. This is more especially true when the trash and vegetative matter is destroyed or plowed under before the cultivation procedure is inaugurated. In recent years we have found that where possible, the vegetative matter should be retained on the surface which will aid materially in controlling erosion by washing or blowing. The question now arises what kind of cultivation equipment is there that can be used that will sever the roots or new shoots and at the same time keep the vegetation on the surface as previously mentioned. It is a well known fact that the duckfoot formerly used equipped with 10 to 15 or more small sweeps (depending on size of machine) will not handle very much dry vegetation on the surface. A machine equipped with three to five sweeps, 24 to 30 inches in width and each sweep equipped with a rolling coulter will handle such a situation and get the job done in good shape. The rolling coulters will cut the trash and permit it to clear between the beams and shanks. I have personally seen such machines go through a heavy growth of corn stalks and dense growth of tall weeds without clogging the machine. This, of course, could not be done with a machine equipped with small sweeps. Rolling coulters are not practical when attached ahead of small sweeps. Machines with wide sweeps are already on the market by one or two of the machinery companies.

"In Kansas we have also decided that perennial weed eradication should be part of a good farming system and be planned to include a cropping system especially where erosion is considered serious. In order to present this new information to our farmers the state department of agriculture has published a new bulletin entitled "Bindweed Eradication by Cultivation and Cropping with Special Reference to Soil Erosion." This publication also contains graphic illustrations and description of the six best methods of eradication recommended for our state. In all, 15,000 copies of this publication were printed and allotted to the various counties on the basis of number of farmers who had sufficient bindweed to cultivate. Distribution to farmers was assumed by counties.

"State Weed Experiment Station

"The Kansas legislature in 1941 set up a special fund of \$5,000 per year in the State College Experiment Station budget for the establishment and operation of a Weed Experimental Station. The appropriation was again made in 1943 for another two years. The station was established and actual work started in 1942. It was located in the approximate center of the state and also in the heavily infested bindweed section. The station work is in charge of a competent and full time research man who is well schooled and experienced in weed research. He keeps in close touch with the needs of the state eradication program. Some excellent and practical results are already available which will be helpful and usable in the statewide effort to fight weeds. Some work is also being done with some of our other important weeds. Eighty acres of heavily infested bindweed land is gradually being devoted to well planned experiments which should bring forth valuable information needed in our fight against weeds.

"Outlying Cooperative Weed Experiments

"The state noxious weed division and the county weed supervisors have cooperated with Mr. F. L. Timmons, Associate Agronomist, Bureau of Plant Industry, U.S.D.A., who has been in charge of noxious weeds investigations at the Ft. Hays, Kansas, Experiment Station since 1935, in the conduct of outlying weed experiments with sodium chlorate, borax and salt and each with bindweed, Johnson grass, Dogbane and

Hoary Cress as well as tillage experiments with Johnson grass. The experiments include locations on highways, railroads and cultivated fields. These experiments include 45 tests in 18 different counties. This work has been in progress for four years and the plots are inspected once in the spring and once in the fall for the purpose of checking, retreating, and making notes of results. One interesting result secured in three counties showed that solid stands of old Johnson grass could be eradicated by cultivation at two to three week intervals in one season and also checked by our state station at Canton in 1943. We feel that this is a distinct contribution to information available on Johnson grass eradication. We were pleased to have Mr. L. W. Kephart, U.S.D.A., Washington, and Dr. L. M. Stahler of Minnesota check this work with us during May, 1944. Also a set of special highway experiments were established in the fall of 1943 with the State Highway Department, State Noxious Weeds Division and the State Weed Station at Canton cooperating. The tests were designed to compare the use of salt, borax, Atlacide and sodium chlorate for highway work in the treatment of bindweed. Special tests were set up to study best methods for treating bindweed on shoulders of paved highways where it has been especially hard to eradicate in our state.

"Operation of County Cultivation Outfits

"Through the war period we have in Kansas made a special effort to encourage the purchase and operation of county owned cultivation outfits. In such cases, county bindweed departments purchase complete cultivation outfits by the use of tax funds. These outfits are used to cultivate bindweed for landowners on a contract and actual cost basis and according to state official methods and recommendations. In most cases charges are based on (a) per acre per season (b) per acre for each cultivation or (c) per hour.

"During 1944 there are 47 counties which are operating 55 outfits. During 1943, 39 county outfits operating in 36 counties worked on 1088 farms, cultivating 5686 acres of infested land. This constituted about 20 per cent of the bindweed under proper cultivation in the state during the year. All of the outfits are speedy, row crop type tractors on rubber and equipped with tool bar cultivating equipment.

"Our principal difficulties in Kansas have been primarily due to labor shortage which has seriously effected the securing of qualified county weed supervisors, tractor operators and in securing needed help for applying chlorate on farms and salt on highways and railroads. We believe that the post war period will see the Kansas weed program operating on a much stepped-up basis. We hereby extend our good will and best wishes to each of the Western states in their weed work."

KANSAS
BINDWEED PROGRAM

SIX-YEAR
PROGRESS SUMMARY

1938 - 1943

T. F. Yost
State Weed Supervisor

NOTE: All information given in this report is based on facts reported in county annual bindweed reports submitted by county commissioners and county weed supervisors. Figures pertaining to acres, number of farms or pounds of chemicals are supported by accurate listing sheets giving name, address, and land description of owners. These listing sheets are on file in each county weed office and with the State Board of Agriculture, State House, Topeka. This report does not include Cowley, Gray, Lyon and Meade.

Table I.

BINDWEED SITUATION
(On Farms Only)

No. Farms with Bindweed	46,859
No. Farms Added in 1943	1,567
Acres Bindweed on Farms	200,402
Total Farms in State	150,250
Per Cent Bindweed Infested	30.7

Table II.

CULTIVATION WORK AND COMPLETE ERADICATION

(On Farms Only)

Year	First Year		Second Year		Eradicated	
	Farms	Acres	Farms	Acres	Farms	Acres
1938	2,556	22,303	xxx	xxx	133	995
1939	5,374	35,033	2,073	15,013	839	7,104
1940	3,439	20,637	4,884	30,764	1,885	12,396
1941	3,430	24,226	5,188	29,960	1,901	11,026
1942	3,083	23,212	4,005	27,664	1,534	8,457
1943	1,560	12,795	3,169	22,055	1,336	9,375

During the last five years, bindweed has been eradicated at an average rate of ten thousand acres per year for the state by cultivation only. The total acreage eradicated by cultivation as shown in the last column is 49,353, which is 25% of all reported bindweed in the state. The figures in the table include work done by landowners and also that by county-owned equipment. During 1942 county-owned equipment did 16% of all the bindweed cultivation work in the state. The above table will show that labor shortage on farms in 1943 reduced the acreage of bindweed under cultivation to about one-half of the previous year.

Table III.

BINDWEED ERADICATED & UNDER TREATMENT
(Both Cultivation and Chemical)

(On Farms Only)

		No. Farms	Acres	
A. ERADICATED:				
1. By Cultivation		xxx	49,353	
	No. Patches			
2. By Chlorate	30,613	xxx	3,660	
3. By Special Methods	2,832	xxx	577	
4. Total Eradicated	33,445	xxx	53,590	
B. UNDER TREATMENT:				
1. By Cultivation	xxx	3,395	25,464	
2. By Chemicals:				
1943	11,378	4,218	2,000	(Est.)
3. 1938 - 1942 (Incl.)	19,791	xxx	4,000	(Est.)
TOTAL (A4 - B-1-2-3)		64,614	xxx	85,054

Figures on this table are conservative, as in most counties some bindweed is eradicated or under cultivation by landowners not known by supervisor. Table pertains only to bindweed on farm land. This information shows that almost 50% of bindweed acreage is under control, 63% of which is classed as eradicated except for the seedling problem. Table on Farm Participation shows that 75% of landowners having bindweed have cooperated in the effort to stamp out their infestations. X indicates where figures cannot be given without including applications.

Table IV.

CHLORATE TREATMENT WORK

(On Farms Only)

Year	No. Farms Original	No. Farms Follow-Up	No. Patches Retreated	Lbs. Chlorate Used
1938	6,354			1,393,999
1939	4,461	2,200	4,400	1,217,645
1940	4,732	2,476	4,940	1,168,874
1941	4,817	1,981	3,734	1,023,371
1942	4,178	1,734	4,075	1,043,581
1943	4,218	1,143	3,118	1,084,745

The start and spread of small patches is probably the greatest menace to the bindweed program. The treatment of small patches by the use of sodium chlorate is important to the success of the bindweed effort. To be satisfactory, chemicals must be used at the right time and in the right way. Likewise when a bindweed patch is once treated, it should be inspected and retreated each year until it is eradicated. After eradication it must be inspected frequently for seedlings, and the land must be properly handled to control seedlings. The figures in Table IV under follow-up indicate that counties have not given sufficient attention to follow-up or retreatment work, as these cases average considerable less than one-half compared with original treatment of the previous year.

Table V.

FARM PARTICIPATION

	1943	1942	1941
1. All Bindweed Eradicated* (Chemical and Cultivation)	14,904	12,601	9,397
2. All Bindweed on Farm Eradicated or Under Treatment	7,998	9,729	9,803
3. Part of Bindweed on Farm Eradicated or Under Treatment	7,426	8,814	8,764
4. Non-Cooperators	10,804	11,266	14,313
5. Unclassified	5,859	2,614	1,357
Total Farms with Bindweed	46,859	45,024	43,634

This table gives a comprehensive picture of how landowners are cooperating in the eradication of bindweed on their land. The number of non-cooperators is gradually decreasing each year. Those unclassified are due to inability of county to furnish chlorate and inability of supervisor to see all landowners and therefore properly classify them. Landowners who cooperated in years prior to 1943 but who still have untreated bindweed have been classed as non-cooperators if they did not use state approved chemicals for original treatment or cultivate in an approved manner. *Almost one-third of the landowners in the state having bindweed are included under No. 1.

Table VI.

BINDWEED TREATED
ON COUNTY HIGHWAY SYSTEM
(1938 - 1943)

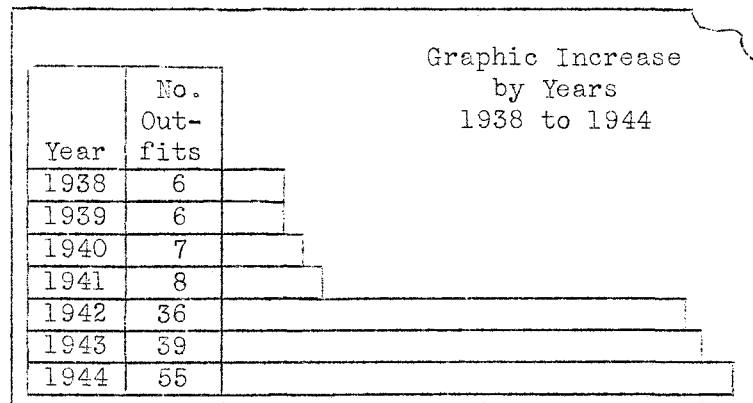
61 counties have treated 100 per cent
25 counties have treated 90 - 100 per cent
19 counties have treated under 90 per cent

Lbs. chlorate used in 1943 85,003
Lbs. salt used in 1943 1,759

There are 17,625 miles of county maintained highways in Kansas. Most counties have done an excellent job of taking care of the bindweed on all county lands, including the county highway system. A few have considerable work yet to do. This is mostly in the heaviest infested counties. Counties should make every effort to eradicate their own bindweed as soon as possible. Most counties have wisely chosen to use salt as the best bindweed chemical for bindweed on non-agricultural lands. Salt is considered the best chemical for highways because of its permanent effect. The effect of sodium chlorate will wear out in three to four years, after which the bindweed seeds in the soil will again start a new stand of bindweed. This will not happen where salt is used according to recommendations. In all, 31 counties used salt exclusively, whereas 34 counties used chlorate exclusively. Fourteen counties cooperated with the State Highway Department in treating bindweed on state highways.

Table VII.

COUNTY OWNED CULTIVATION OUTFITS
(1938 - 1943)



No. counties with outfits	1943	.....	39
No. new counties operating outfits in 1944	.....		8
No. outfits operated	1944	.....	55
No. farms worked on	1943	.....	1,088
Acres bindweed cultivated	1943	.....	5,686

Five years of experience in ownership and operation of county bindweed cultivation equipment has proved that this is a practical procedure in the conduct of the Kansas noxious weed law and program. There are various reasons why counties need such equipment: (1) to cooperate with absentee and other landowners who cannot do their own work (especially during war period) and (2) to enforce the law where landowners fail to cooperate and thereby protect adjoining landowners. It is anticipated that the number of counties purchasing and operating outfits will increase rapidly as soon as the machinery supply is again normal.

Table VIII.

Condensed Report of Township Cooperation: There are 101,460 miles of township highways in the state which are maintained by township officials in 12,951 townships. Township officials usually give good cooperation in treating bindweed on their highways. There are 1,552 townships in the state. Twenty-five counties having 257 townships are on the county highway unit plan. Only 112 of the remaining townships did not give satisfactory cooperation during 1943. The cooperation given by years is shown here.

	1939	1940	1941	1942	1943
Lbs. Chl. Used	206,635	172,746	114,526	55,255	56,076
Tons Salt Used	440	1,178	2,130	1,875	1,652
Acres Treated	345	323	285	180	170

Table IX.

Condensed Report of City Cooperation: There are 625 incorporated cities in our state. Only 9 of these cities gave no cooperation in 1943. Most cities have given excellent cooperation and are making substantial progress in their efforts to free their lands from this hated weed.

	1939	1940	1941	1942	1943
Lbs. Chl. Used	202,081	201,313	237,875	175,716	161,655
Tons Salt Used	142	263	1,088	1,481	1,365
Patches Hoed or Cult.:					
a. Private Prop.	1,095		1,864	3,463	848
b. City Prop.	220		613	478	801

Table X.

Condensed Report of Railroad Cooperation: There are 8,467 miles of main track railroads in Kansas. In general the railroads have given excellent cooperation in treating bindweed on their property. It is our opinion that this job is about 75% finished. Below are given figures showing the amount of chlorate and salt used each year since 1939.

	1939	1940	1941	1942	1943
Lbs. Chl. Used	284,912	174,800	104,922	151,414	88,620
Tons Salt Used	596	14,788	9,862	6,146	3,835

Mr. Hutchings now turned the meeting over to Mr. Harris to lead an open forum discussion on general weed problems. Since Mr. Harris was called out, the Chairman asked Mr. Ball to begin the discussion.

Mr. Ball: The AAA program has been very helpful in California. Our State organization seems to have difficulty, however, in getting weeds established on their list for the annual program. Last year two of our important weeds were taken from the list--one being the Gaura, which in the southern part of the State is very serious. I should like to hear from the AAA representative as to what might be new and the most recent developments relative to weed control programs.

IDAHO. Mr. Evans: With our production practices we are giving quite a little bit of leeway in the way we administer it. That is, our Washington office sets down certain rules and regulations which are very general. We, in turn, administer that in the field as we see fit. I might be able to answer your question in connection with weeds that were not included in the Triple A program this year. The Secretary of Agriculture designated certain weeds in the United States as a whole that we might eradicate. They felt that if they did not designate only those weeds which were the most dangerous it would be possible that we in the field would exceed the appropriation which was given to us for this purpose. We have the same problem in Idaho. We have requested several times that they in Washington include two or three weeds for us. I do believe that this organization is one of the very best to support suggested changes.

A farmer is given a certain allowance limitation according to the acreage and farm land which he owns. This year that limitation does not apply. In Idaho we have made it a policy of ours that in weed control districts it will be necessary

that all weed control work meet with the approval of the county weed supervisor. He approves any control work for payment. The weed organization has stated that they would cooperate with us to see that no money was expended unnecessarily.

We do have a little Klamath weed problem in the State of Idaho. I do not believe it will ever reach major proportions there because of climatic conditions. We have approximately 1,000 acres of it in the northern part of the State. We have been attempting for the last 1-1/2 years to get a good educational program in that area so that we could get started on the eradication of this weed. We are not able to cultivate this land due to the topography of the land in this area. On our forest service lands and Indian Service lands primarily designated for forests we have not been able to get all the cooperation necessary.

Mr. Ball: What do you think our move should be relative to action that could be taken to let those people in Washington know the importance of weeds to Western agriculture?

Mr. Evans: We have always had trouble convincing the Indian Service and Forest Service to combat this weed problem. They simply have not had money to put on this sort of thing. They could get the money if they were convinced relative to the need for weed control. Strongly petition the Forest Service and give pressure, and approach them in a very serious way. The Department of Agriculture does not have the setup by which we can approach them very well. Where you have organized weed control work going on, the more impressive it is to them.

Mr. Ball: In the past I have been instructed to write certain individuals in Washington on certain things in behalf of this group. I cannot seem to find the proper person to whom I should write.

Mr. Evans: I can find out.

Mr. Ball: On the AAA setup our problem now is the list of weeds exceptable under the AAA program which will cover our entire problem. We work through our state organization, which cooperates 100 per cent, but they maintain their hands are tied. It is difficult to convince Washington AAA officials that we need this sort of thing.

Mr. Evans: It is a common occurrence that decisions are made that are not entirely correct. I am sure that if they had asked us for advice a better arrangement would have been made.

Dr. Evans: Why do we get appropriations to eradicate Bermuda Grass when we have other weeds so much more important? I think we will have to get some organized pressure to let the folks higher up see that we need some help.

Speaker: We have a western man heading AAA. He ought to know our problems.

Mr. Kuhns: Wouldn't it be better to give us a certain amount of money and let our district associations decide how to best use it for the weed work? It seems that our Resolutions Committee should make some such resolution.

Mr. Ball: Isn't it true that the original thought of AAA was to organize State Committees and under these committees, County Committees, all problems under the program to be state and county controlled?

Mr. Evans: Yes. They want our recommendations from the state and county for the correlation of the program for 1945. Our State Committee will be making these recommendations. Why certain states for the entire United States, are designated, leaving out some weeds that are bad in the West, I cannot figure out.

Mr. Ball: I would like to suggest a discussion regarding cooperation with railroads in the various states; also with the State Highway Departments. I believe that we are in the position to help these people a great deal. We have insisted that they clean up state highways and railroads because the farmers are cleaning up their weeds, the result being that railroad and highway officials are and are eager to get help, giving them some of the principles of weed control. The Chipman weed train has done a lot of work which indicates that the railroad officials are willing to spend money, but they in turn want results.

Speaker: We fixed up a spray train for the railroad and found what had to be done. We try to apply about 500 gallons to the acre and to adjust this by the various speeds of the train. You have to have equipment that is variable enough to meet every type of soil and weed condition.

Speaker: I notice in South Idaho we have a lot of white top and morning glory along the railway. Several times during the weed season they spray and they are getting good results to the length of the 10 to 12 feet from the rail.

Mr. VanDerhoff: We have done a lot of work on these weeds on the railroad and they have agreed that where the farmers adjoining their railroad will work on his weeds they will be glad to cooperate. They have been very cooperative with me, but we need uniform cooperation.

Mr. Harris took up the discussion from this point.

Mr. Harris: I would like to have some comment on the burning method of eradication.

Mr. Morris: We are using burning a lot in Montana where it seems impossible to put on a good control program. As far as eradication of perennial weeds is concerned, burning is about equal to cultivation and a little more expensive if the grounds can be cultivated. In many sections in Montana we are getting results. We burn two times then give the soil a light chemical treatment and get good results.

Mr. Harris: Reclamation projects have done some burning of willows and obtained very good results.

Mr. Mitchell; The Bureau of Reclamation has decided that weeds should be divided into three classes.

1. Land weeds
2. Water weeds
3. Semi-water weeds

We found to our surprise that the cost of white top and semi-water weeds was at least \$100,000 a year. Therefore, we started out trying to do our own experimenting.

I think the best way to kill willows is to cut them and put the livestock on the land. They put livestock on the ditch banks and got wonderful results on 75% of their ditches. Livestock is absolutely the best method. We have to demonstrate to the farmers that it is to their advantage in dollars and cents to do these things

as a means of eliminating willows. On this water weed proposition, we have another challenge. It is merely a question of education. The Fish and Wild Game Division will help us once they learn what to do.

Mr. Harris: What about the question of land ownership?

Mr. Cox: We have had this problem in our county because much land is owned by absentee owners. We need laws where we can definitely place the responsibility of weeds on the owner of the land. There must be a basis of responsibility if we are going to combat the situation in our western country successfully. We have had very fine cooperation with the railroads.

Mr. Morris: We gave this responsibility to the owner. If the owner is absent, the county weed committee controls the weed and sends the bill to the owner. That law has now been in operation for about five years and we are convinced that it is a mighty good provision.

Question: Do you go on the land without the consent of the owner and then send them a bill? Do you serve notice to the owner?

Mr. Morris: Yes. If within a certain stated time they do not do anything about the work, the weed committee goes in and does the work, submitting the bill to the owner. We have not had any court protests against this procedure.

Mr. Hutchings: In one case we had trouble with an owner. Finally we got the County Attorney to take it into court. The owner declared the law unconstitutional and succeeded in getting it thrown out of court. We were successful in getting it back into the court and we prosecuted the man after about three years of work on the case. From then on we have had successful backing in serving our regular notices. While the fine was not very heavy when we did prosecute, it served the purpose which we intended.

Mr. Ball: We have had lots of laws for a long time and I believe in enforcement but there should be an effort made toward education and understanding before we go into abatements too extensively. We have had a couple of cases which we won without too much trouble. When you win your first case it carries a lot of power.

If we are going to go into this postwar situation as I think we will, we are going to have a lot of foreclosures and the banks will be owning a lot of the land. We should educate the bankers themselves to weed control. Get that group of people to see the economic benefits of this program and our legal notice will be a fine instrument with which to work.

Mr. Harris: Everyone is talking about postwar planning and how to use a lot of men. There is a possibility of a lot of work to be done on weed control.

Mr. Hendrix: I think that one of the things we can do is to get the cooperation of the various counties in our state.

I think, primarily on weed control work, we can do a lot after the war. We can amend our laws and attempt to get more appropriations for this work if necessary. I think one of our resolutions should be to give more consideration to weed work after the war.

Men do not object to paying for programs when they have the money. It is probable that legislation will pass appropriations for the postwar planning and this sum of money held for use after the war.

Mr. Harston: We do not find it practical to take care of the weeds in some of the territories of our state, due to the terrain, etc. I think in order to control weeds and safeguard the work that has been done in these small areas, it is going to take cooperation from the Federal agencies.

Mr. Ball: Our postwar problems are going to be somewhat different than many expect. We will have to help the many new farmers who have never had farm experience before to control and keep weeds out.

Mr. Hobson: I think we can do a lot of guiding of the program, especially from a standpoint of Federal appropriations. We should attempt to place Federal appropriations into channels where we can utilize 100% of this appropriation for our use.

Mr. Kephart: When the postwar time comes along you have to have plans made so that you can tell these people how to control these weeds. Of course we need to know how to kill the weeds in the first place. Therefore, a research program is very vital.

We need a strong centralized group through which we can get action on some of these things that we think we need.

Mr. Mitchell: We need to know how many acres of weed infested land we do have. We need to make some careful surveys of what the situation really is and we need to know the acreage of weeds up stream!

Mr. Ball: We should get suggestions from Mr. Kephart who is in position to keep us up-to-date on what is happening in Washington and who to contact on these federal owned lands.

Dr. Evans: I have two suggestions. First, with respect to the matter of equipment which the government is going to make available to the farmers after the war, such as tractors, etc. Second, I think that this weed problem on these public lands is our real problem and we need to get the consent of the Federal agencies to go on public lands.

National County Officials Office in Washington, D. C. represents all of the counties in the nation. We need to give these men intelligent information regarding our needs and problems so that we can get the proper consideration.

Mr. Kephart: One of the things we need to work on is research on various weeds and we intend to set this up on a regional basis.

Dr. Evans: We need to expand the powers of our Bureau. There is no reason why such a program cannot be adopted.

The discussions were discontinued and Mr. Ball made a few remarks: I would like to have the approval of this group by vote giving the secretary authority to express the thought of this group when corresponding with Federal agencies or others, whenever necessary. We are going to get more strength in this matter if we act as a group.

MOTION: It was moved that Mr. Ball, or successor as Secretary of the Western Weed Conference, be granted authority to write letters to various groups or agencies expressing the support of the weed conference. Motion was seconded by Mr. Burge, and carried.

Dr. Evans: I would like to have information on financing our organization.

Mr. Ball: The annual dues are \$15 from each state of the 11 Western States officially represented.

Dr. Evans: I would like to know from what sources the various States get their dues.

Mr. Morris: There is no provision by which we can get these dues. It has been paid by one of the local associations in Montana.

Mr. Hutchings: In Utah we just submit the bill to the State Auditor along with the statement.

Mr. Kuhns: Idaho payments come from the State Department of Agriculture.

Dr. Evans: We can submit a report and publication and get the State to pay \$15 for it to cover our dues.

Mr. Harris: Contact officials in your State and see if there is not some way of finding means of sending these dues to the Secretary-Treasurer.

Mr. Burge gave the report of the Resolutions Committee:

WHEREAS, livestock are known carriers of weed seed and cause extensive spread of noxious weed infestations, and

WHEREAS, little effort has been expended to correct this means of spread;

NOW, THEREFORE, BE IT RESOLVED that the Western Weed Control Conference assembled at Salt Lake City, Utah, May 25 and 26, 1944, bring this condition more forceably to the livestock industry and solicit their aid in preventing the spread of noxious weeds by movement of livestock from infested to non-infested areas.

Mr. Burge moved that this resolution be adopted. The motion was seconded and carried.

WHEREAS, the importation of feed grains from Canada has been necessary to supply the demand of livestock and poultry producers in the Western States, and

WHEREAS, importations of feed grains coming into the various states have contained considerable quantities of noxious weed seed, and

WHEREAS, the Western States have expended hundreds of thousands of dollars for weed control;

NOW, THEREFORE, BE IT RESOLVED that the Western States Weed Control Conference, assembled at Salt Lake City, Utah, May 25 and 26, 1944, request that the Commodity Credit Corporation or any other agency responsible for the importation or distribution interstate of feed grain certify that said grain be free from noxious weed seed and otherwise meet the requirements of the laws of the states to which it is destined.

BE IT FURTHER RESOLVED that this condition be brought to the attention of the members of Congress from the Western States.

Mr. Burge moved the adoption of this resolution. The motion was seconded and carried.

POSTWAR RESOLUTION

WHEREAS, there are in many of the Western States large acreages infested with noxious weeds which are detrimental to the livestock and agricultural interests, and

WHEREAS, much of this area is on the public domain, as well as on privately owned and United States irrigation district lands, and

WHEREAS, following the war it will be necessary to furnish employment for men now engaged in war industry and the armed services;

NOW, THEREFORE, BE IT RESOLVED that the Western Weed Control Conference, assembled at Salt Lake City, Utah, May 25 and 26, 1944, request the State and National Postwar Planning Committees to include weed control projects in their planning, especially in areas where present weed control programs are inadequate.

Mr. Burge moved the adoption of this resolution. The motion was seconded and carried.

AAA WEED CONTROL

WHEREAS, the local Agricultural Adjustment Agency heads have given their full cooperation in weed control efforts, and

WHEREAS, Agricultural Adjustment Agency payments have been a great factor in the success of weed control projects, and

WHEREAS, certain noxious weeds have been removed from the list of weeds qualifying for payments by Agricultural Adjustment Agency without consideration to local conditions;

NOW, THEREFORE, BE IT RESOLVED that the Western Weed Control Conference, assembled at Salt Lake City, Utah, May 25 and 26, 1944, request the National Agricultural Adjustment Agency through this Committee to leave open the list of noxious weeds that will qualify for Agricultural Adjustment Agency payments with instructions to local Agricultural Adjustment Agency Committees to cooperate with the proper state officials in formulating lists of weeds that will qualify for payment.

BE IT FURTHER RESOLVED that this conference express its appreciation to Agricultural Adjustment Agency officials for the fine support which they have given to the weed control program, and request the continuation of Agricultural Adjustment Agency participation in weed work, and that the Secretary forward letters of appreciation to the various state Agricultural Adjustment Agency chairmen.

Mr. Burge moved the adoption of this resolution. The motion was seconded and carried.

MOTION: That our thanks be extended to the Utah officials and that Mr. Ball send letters of appreciation to the hotel management, etc. Motion seconded and carried.

The Nominations Committee submitted the following report:

L. E. Harris - President
L. M. Burge - Vice-President
W. S. Ball - Secretary-Treasurer

The recommendations of the Nominations Committee were unanimously passed.

Mr. Hutchings thanked the group for meeting in Utah.

Mr. Ball suggested that the future meetings be held earlier in the spring and also expressed appreciation for the fine response by the members of the group.

It was agreed by everyone that they approved the procedure of the Conference and decided to conduct the meetings next year in about the same manner.

Meeting adjourned.

WALTER S. BALL
Secretary-Treasurer

NOTE: Mr. Lin E. Harris, who was elected President, resigned on July 6, 1944. He has become affiliated with the Chipman Chemical Company, Inc., as an agronomist.