STATE COLLEGE OF WASHINGTON
INSTITUTE OF AGRICULTURAL SCIENCES
AGRICULTURAL EXPERIMENT STATIONS

35TH ANNUAL FIELD DAY

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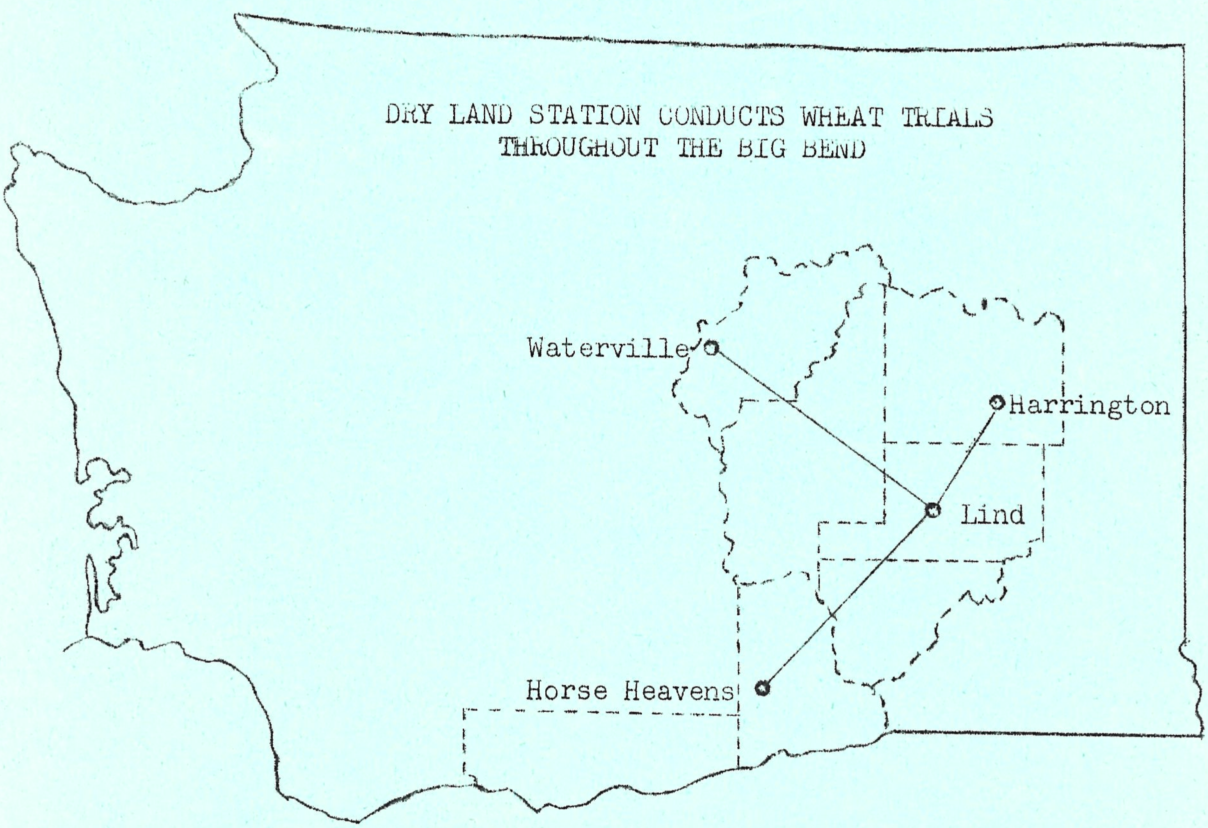

DRY LAND EXPERIMENT STATION
LIND, WASHINGTON

INTRODUCTION

The Dry Land Experiment Station, formerly the Adams Branch Experiment Station, first began in 1910 near Ritzville, when a ten-acre plat of land was leased and experiments with cereals, forage crops and certain phases of soils work commenced. Largely through the efforts of Spokane business men, the Milwaukee railroad, and Adams County a site was purchased approximately three miles northeast of Lind. Buildings were erected and the station moved to its present location in 1915. Originally, the station was operated with county, USDA and state funds. At present it is state supported, aside from a small labor fund contributed by federal agencies, the land being leased from Adams County. The farm consists of 320 acres of land, of which approximately 260 acres are devoted to crops production experiments, the remainder consists of grass and rough land. Early in 1949 the County of Adams deeded approximately 4 acres to the Board of Regents, Washington State College, and it is on this site that the new state financed office and greenhouse buildings were constructed. Under the leadership of the Washington Agricultural Experiment Station, the Dry Land Experiment Station has carried out a continuous program of research since its establishment.

Experiments are planned and conducted cooperatively with the different divisions of the Washington Agricultural Experiment Station at Pullman, Soil Conservation Service and Bureau of Plant Industry USDA, and with the U.S. Weather Bureau, Department of Commerce.

The field day is an annual affair held about June 15, for the purpose of acquainting farmers, ranchers and townspeople of Central Washington with the nature of the work being conducted and to furnish information collected from the many experiments in progress. The public is especially invited to attend these field days, although visitors are welcomed at all times.

Note: Data presented hereafter in this report are not for publication without consent of the Washington Agricultural Experiment Station and cooperating agencies.

Walter L. Nelson

Walter L. Nelson, Superintendent

CLIMATIC INFORMATION

Table 1. Annual Rainfall near Lind, Washington - 1897-1951.

Data Obtained by Dan Krehbiel		Data Obtained by O. W. Goodenough		Data Obtained by the Dry Land Experiment Station			
1897-98	6.34	1909-10	8.74	1916-17	7.60	1932-33	8.39
1898-99	8.76	1910-11	8.10	1917-18	6.64	1933-34	9.79
1899-00	12.00	1911-12	10.33	1918-19	8.10	1934-35	7.48
1900-01	15.34	1912-13	8.24	1919-20	6.56	1935-36	8.09
1901-02	12.33	1913-14	10.50	1920-21	7.01	1936-37	8.93
1902-03	13.67	1914-15	10.54	1921-22	6.99	1937-38	11.89
1903-04	15.03	1915-16	13.59	1922-23	10.92	1938-39	5.32
1904-05	11.34			1923-24	6.62	1939-40	13.01
1905-06	12.01			1924-25	8.32	1940-41	18.00
				1925-26	6.65	1941-42	12.29
				1926-27	12.65	1942-43	11.65
				1927-28	10.83	1943-44	8.60
				1928-29	5.77	1944-45	10.05
				1929-30	4.88	1945-46	11.80
				1930-31	6.91	1946-47	8.02
				1931-32	9.79	1947-48	23.07
						1948-49	7.00
						1949-50	9.89
Average	11.86		10.00				9.40

Average for 50 years: 9.93
Rainfall September 1, 1950 to June 15, 1951: 9.11

Approximately 55% of the rainfall received occurs during the winter months, 30% in summer and 15% in the fall.

Climatic measurements are made daily, and consist of readings made with standard U.S. Weather Bureau instruments consisting of maximum and minimum thermometers, a manual precipitation gage, sling psychrometer, and evaporation instruments. In addition, a continuous record of soil and air temperatures, relative humidity and precipitation is taken by means of automatic recording instruments.

CEREAL INVESTIGATIONS

With the new facilities now available, actual breeding as well as selection and introduction of new varieties for the Big Bend is now possible. New hybrids developed here and at other stations are tested for yield, lodging resistance, shattering, threshability, and disease resistance. The more promising selections are tested for milling and baking quality at the Wheat Quality Laboratory at Pullman. Selection of suitable milling and baking characteristics are further tested at Lind, and the outlying testing areas. The results of these trials determine whether a new variety will be released.

In 1950 a new cereal testing program for the Big Bend Area was initiated by the Dry Land Experiment Station. Three new testing sites were established through cooperative agreements with farmers. These locations were selected on the basis of rainfall and soil type. The project was designed to test as adequately as possible the Big Bend Area. The testing sites are located on the Ben Nelson farm at Waterville; Leonard Schultz farm, Harrington; and Horrigan Farms, Prosser. A total of 900 plots of winter and spring wheat were planted at these locations in 1950-51.

Winter Wheat: Yield and test weight data for selected winter wheat varieties are given in Table 2.

Table 2. Yield and Test Weight of Winter Wheat Varieties Grown at the Dry Land Station.

Variety	Years Tested	Ave. Yield Bu./Acre	Average Test Wt.
Hymar	7	28.7	58.5
Elgin	7	28.5	58.3
Elmar	3	28.5	57.7
Triplet	7	25.5	60.1
Orfed	7	25.2	61.7
Kharkof (Turkey)	7	25.0	60.6
Rio	7	24.4	60.9
Golden	7	21.7	57.5
Rex	7	21.5	59.3

Hymar, Elgin, and Elmar have been consistently higher yielding than Rio or Turkey. Under the semi-arid conditions of the Big Bend, these varieties are relatively high in protein. Flour made from these varieties when the protein is above 7 to 8% is unsuitable for either bread or pastries. Because of this poor quality, these varieties cannot be recommended. Triplet is susceptible to smut and is not recommended. Orfed lacks winter hardiness for this area. Rio is the only winter wheat recommended for the hard red winter area. Rio is equal in yield and quality to Turkey and has resistance to some races of smut, but not dwarf smut. In areas where dwarf smut is severe, Wasatch is recommended.

Brevor has not been included in Table 2. Brevor has not been adequately tested at this Station. In 1950, Brevor yielded as well as Elmar. Two previous years' data indicated Brevor was no better than Rio. Brevor has fair quality at high protein and is suitable for pastry when low in protein. It has satisfactory smut resistance to all the present races of smut, but has only fair winter hardiness. It is not recommended for the Big Bend Area.

Spring Wheat: As shown in Table 3, Awned Onas has consistently outyielded Baart at this station by 8 to 10%. In addition it is superior in lodging resistance. Its poor milling characteristics have restricted its recommendation for release. Lemhi has a good yield record at the station, as well as Idaed; both being slightly better than Baart. Lemhi usually produces a poor quality wheat under Big Bend conditions and is not recommended. Marfed has not yielded as well as Baart, and is considered to be too late for the Big Bend.

Table 3. The average yield and test weights of selected spring wheat varieties grown at the Dry Land Station for the last 5 or 6 years.

Variety	Years Tested	Ave. Yield Bu./Acre	Average Test Wt.
Awned Onas	6	27.8	57.3
Lemhi	6	27.2	56.3
Onas	6	27.0	56.3
Idaed	6	26.4	58.3
Baart	6	25.8	59.6
Federation	6	25.8	57.7
Baart 38	6	24.6	59.9
Marfed	5	24.5	57.8
White Federation 38	6	21.7	58.1

Henry, a new variety introduced from Wisconsin, is the most promising hard red spring. Henry has been the highest yielding hard red spring at Pullman. Henry was tested last year at Lind, and yielded as well as Baart. This variety is in all trials in the Big Bend this year. One more year's data will be needed to determine the future of this variety for the Big Bend Area.

The Dry Land Experiment Station in cooperation with the Agronomy Department at Pullman, is testing for resistance to race 15B stem rust, new spring wheat hybrids bred for 15B resistance. These nurseries are being grown at St. Paul, Minnesota and Winnepeg, Canada. If 15B stem rust becomes prevalent in this region in future years, it is hoped that through this project, a resistant variety will be available that is adapted for this region and can be released in quantity.

YIELD RESPONSE TO FERTILIZERS

In years when more than average moisture is present, a yield response to nitrogen fertilizer may be expected in the Big Bend Area. Results of fertility trials in the Lind - Ritzville area in 1950 indicated a good response to nitrogen up to 40#. In five tests the increase varied from 8 to 17 bushels per acre at the 40# rate with both Rio and Orfed. Protein was increased 1% to 2% at the rates of 40# to 60# N per acre. Protein content did not increase much until the maximum yield efficiency of the nitrogen was reached. Apparently any substantial increase in protein will require excessive rates of nitrogen.

Placement of nitrogen at a depth of 4 to 6 inches in late summer and fall before seeding, appears to be more satisfactory in the Big Bend Area, than broadcast application. The Dry Land Station is conducting fertilizer trials in 1951 and will continue these trials. Only limited recommendations can be made at this time. If summer fallow moisture is good, in the 9 to 12 inch rainfall area, a yield response may be expected with nitrogen up to 30# per acre. Burning can be expected in years when spring precipitation is below normal, at rates above 20# Nitrogen per acre.

FORAGE INVESTIGATIONS

Forage Adaptation Tests: Grasses and legumes for soil and moisture conservation are being tested at the Dry Land Experiment Station in cooperation with the Soil Conservation Service, Nursery Division.

The initial testing is done at Pullman; Lind is one of a system of outlying nurseries under different soil and climatic conditions to carry on secondary testing.

The following data supplements material presented at previous field days. Fall 1943, Dryland Grass Plots. Eighteen grasses were selected on the basis of past performance at Lind and seeded in the fall of 1943. The purpose of this planting was to compare conservation uses and hay yields for the 10 to 14-inch rainfall area. In dryland rotations grass roots add organic matter to the soil. This maintains fertility and improves the physical condition. The soil is more resistant to wind and water erosion when it is well supplied with fibrous grass roots and active organic matter. Hay yields along with root production, longevity, drought resistance, ground cover and availability of seed should be considered in selecting grasses for conservation seeding. The following grasses have been outstanding under dryland conditions at Lind:

Dryland bunchgrasses:	Crested wheatgrass
	Whitmar beardless wheatgrass
Sod-forming grasses:	Pubescent wheatgrass
Dryland bluegrasses:	Sherman big bluegrass
Fine-leaved fescues:	Sheep fescue P-274

From results obtained on this station and other dryland areas the following grasses can be recommended in the wheat-fallow area from 8 to 14 inches annual rainfall:

Range and Pasture

1. Crested wheatgrass - 6 lbs. & Bulbous bluegrass - 2 lbs.
2. Whitmar beardless wheatgrass - 8 lbs. & Bulbous bluegrass - 2 lbs.

Hay

1. Sherman big bluegrass - 4 lbs. & Ladak alfalfa - 2 lbs., Seeded in alternate rows
2. Sherman big bluegrass - 4 lbs.

Methods of Planting Grasses: Among the several methods of planting grasses, the most satisfactory stands have been obtained by using a drill in a clean summerfallow. The drill can be adjusted to seed any desired rate and depth. If the stubble land is clean, grass can be successfully established by seeding the stubble in early fall. Since the grass grows very slowly during the seedling stage the seed bed should be free from weeds.

The rate of seeding grass most suitable for pasture purposes is 5 to 8 pounds per acre. This will establish a stand uniform enough to prevent invasion of weeds. The depth should not be over one inch; preferably it should be from one-quarter to one-half inch deep. Proper depth can be secured by using depth regulators on the furrow openers or having the hose fastened outside of the furrow openers. A drag chain may be used with the latter to cover the seed with about one-quarter inch of soil.

The best time to seed grass is in the fall of the year. If moisture conditions are suitable, it can be sown from as early as September 1 to as late as January 1, but the ideal time is from October 1 to 15. Spring seeding is not recommended unless it is sown early enough to become well established before the onset of hot weather.

Depending on the use to which the grass is to be put, row spacing may vary from seven inches to three feet. The wider the row spacing, the greater the forage and seed yield. Beyond the two-foot row spacing, additional care is required to control the weeds that may invade the stand between the rows. The 14-inch row spacing seems to be the most satisfactory. Much wider spacings than this makes the grass coarse and less desirable for pasture purposes, and if cultivated for seed, seems to promote erosion.

Uniform stands of grass can be established by seeding a cereal nurse crop in alternate rows with grass. The grain yield of the nurse crops is approximately 90% of normal while at the same time satisfactory grass stands are established. The nurse crop can be cut for hay or left to mature for grain. The nurse crop utilizes the soil moisture which would otherwise be used up by the weeds, thereby providing a satisfactory weed control measure. The ordinary grain drill can be adjusted to seed the two crops in alternate rows by having removable partitions placed in the grain box. The rate of seeding for both the crops can be made at the same setting but for any desired variation, reducers made of heavy wire can be used very effectively. Recommended rate of grass and nurse crop seeding is eight pounds and forty pounds respectively. If rye is used as a nurse crop, the rate should be cut down to 20 pounds per acre. Spring tension should be lessened on the furrow openers of the drill sowing grass so that the seed will not be buried too deeply in the soil.

Trees and Shrubs for Dry-Land Planting: Several species of trees and shrubs are included in the station forestry project for farm home landscaping and wind-break purposes. Some trees on the station are 25 years old while others are 17 years old. Trees are a valuable asset to any farm, both in improving rural living conditions and in increasing the value of the property.

Initial observational tests of woody species are carried on at the Soil Conservation Nursery at Pullman. Secondary tests are carried on cooperatively at Experiment stations at Prosser and Lind, Washington and at Moro, Oregon. The present testing program at Lind was started in 1928 by the Dry Land Experiment Station and the Department of Forestry and Range Management, Washington State College.

A standard dryland windbreak planting consists of a minimum of five rows and when properly established, gives excellent protection from the wind.

Standard Species, Arrangement, and Spacing of trees and Shrubs for Windbreak Plantings in the 8-10 inch rainfall area.

Row No.	Species	Growth Habit	Spacing in row	Minimum distance from next row*
1	Caragana	Erect Shrub	3 ft.	18 ft.
2	Tamarix	Intermediate Shrub	6 ft.	18 ft.
3&4	Black Locust	Deciduous tree	12 ft.	18 ft.
5	Ponderosa pine	Evergreen tree	12 ft.	27 ft.

*Rows may be spaced wider apart if cultivation equipment requires it.

Results to date indicate that bladdersenna and southernwood are equal to caragana in the erect shrub group except that neither are quite as winter hardy. Since Russian olive contains an unidentified disease, tamarix appears to be the most promising intermediate shrub. American plum may replace the tamarix, but further testing is needed on this shrub. Black locust is still the most promising deciduous tree. Other deciduous trees being tested include green ash and Oregon white oak. Rocky Mountain juniper appears promising as a replacement for Ponderosa pine in the evergreen group. Both Douglas fir and Blue spruce also appear well adapted. Continuous clean cultivation is essential throughout the life of a dryland tree planting. Interplanting of crops utilizes moisture needed by the trees and shrubs and this practice is not recommended.