OKLAHOMA
AGRICULTURAL AND MECHANICAL COLLEGE
AGRICULTURAL EXPERIMENT STATION
STILLWATER, OKLAHOMA

Summary of Results

of

EXPERIMENTS

Conducted in

FIELD CROPS AND SOILS

at the

PANHANDLE AGRICULTURAL COLLEGE

Goodwell, Oklahoma

1926

Bulletin No. 160. January, 1927.

FOREWORD

The expermental work in field crops and soils carried on at the Agricultural College at Goodwell is under the direction of Mr. H. H. Finnell, in cooperation with the Oklahoma Agricultural Experiment Station. This work has been going for three years. The purpose of this report as given by Mr. Finnell is to set forth the scope of the work and to give some of the results obtained in 1926. It does not purport to give a summary of the results obtained up to this time. I think a careful reading of this report will show that the experiments have been well planned and that in time they will give information that will be of immense value to the panhandle counties of this state.

C. T. DOWELL,
Director, Oklahoma Agricultural Experiment Station.

SUMMARY REPORT FOR 1925-26

AGRONOMY

THE PANHANDLE STATION

Goodwell, Oklahoma

The following report is submitted for the purpose of giving the general scope of experiments being conducted at this station, the progress of each, and the more marked trends of results so far obtained.

The Panhandle station has at its disposal 700 acres of land which is being used for the following purposes:

80 acres plots and field experiments,

4 acres orchard,

160 acres livestock farm rotation,

30 acres farm lots and buildings,

426 acres native pasture.

The total number of plots in cultivation during 1926 from which records of results were secured was 864. There are 14 projects on schedule and 13 of these are active at this time. Most of the projects as outlined cover investigations of several phases of work under some one general head. Not more than two numbered projects are confined to special problems. The material reported is therefore arranged by problems rather than by projects, with project references given in each case.

The agronomic work of projects 1, 2, 3, 4, 5, 6, 7, 9, and 14 is being conducted by H. H. Finnell; projects 10, 11, and 12 by A. D. McKinley. Garden, orchard, and livestock work are omitted from this report.

The Oklahoma Experiment Station has contributed to the work of the Panhandle Station, one-third the salary of associate agronomist, a portion of his travel expenses, the publication of bulletins, and the suply of various crop materials, seeds, inoculants, fertilizers, etc. The Panhandle A. and M. College supplies lands, buildings, equipment for farm and laboratories, livestock, salaries, wages, and general maintenance expenses.

This connection has proved particularly helpful to the Panhandle Station and we trust satisfactory to the State Station. Every effort has been made to make this work of service to the territory it represents by cooperaion with the County Agent Service, the Oklahoma Crop Improvement Association, the 4-H Club work, the various departments of the State Board of Agriculture, and teachers of Vocational Agriculture.

H. H. FINNELL.

Weather Data, 1926, Goodwell, Oklahoma.

Month	Precipitation			Temperature		Days Sky was			Average Daily	
	Mean	Maximum	Minimum	Total	Greatest in 24 Hours	Clear	Part Cldy.	Cloudy	Evaporation, Inches	Wind, Miles
January	33.7	67	8	.11	.11	20	8	3	.025	183.0
February	42.2	78	16	.15	.15	23	3	2	.104	159.2
March	41.8	77	6	1.47	.50	18	4	9	.132	197.0
April	48.8	81	17	2.32	.77	18	7	5	.092	191.0
May	64.5	91	36	4.09	.70	20	9	2	.202	168.7
June	74.4	102	48	5.03	1.46	25	4	1	.268	153.2
July	77.1	98	54	.47	.28	25	4	2	.284	175.9
August	78 6	104	54	.99	.65	26	5	0	.299	139.0
September	71.5	103	33	1.81	1.41	14	11	5	.222	214.0
October	60.4	94	24	.04	.03	20	8	3	.215	183.7
November	43.3	77	8	.23	.11	19	9	2	.110	208.6
December	33.8	71	—3	.58	.30	15	9	7	.039	165.4
Totals				17.29		243	81	41	60.841	65,050
Means	55.8									

WINTER WHEAT IMPROVEMENT

(Project 1)

From the Ferguson-Shifflett selections of 1921 two strains have shown consistent high yielding power and one of these in particular has proved to be resistant to smut (Tilletia tritici). Inoculated seed untreated produced on Turkey 102 an average of .04 percent smutted heads while four other relatively high yielding strains ranged from .216 to 5.72 percent smut. The highly susceptible strain, Turkey 110, suffered a loss calculated to be 1.3 bushels of grain per acre from smut alone, aside from the reduced grade of wheat.

The strains 101 and 102 show some promise as competitors of Kanred in this locality and several hundred selections have been returned to nursery this year for pure lining.

Nursery work has been started also with Malakof, Turkey, Blackhull, and Nebraska 60, high yielding varieties from the variety tests.

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SPRING BARLEY IMPROVEMENT

(Project 1)

Work on this subject has been confined to an attempt to develop a variety that would serve as a small grain catch feed crop for late sowing and quick maturity. Variety tests of spring grains show the standard varieties of oats and six-rowed barleys unsuited to grain production in this region, so two varieties of two-rowed barley, the French Chevalier and Blackhull, have been hybridized and a number of selections made including both white and black as well as gray lines. A semblance of uniformity was secured for the first time in most lines this year and highest yields were made by 103, 106, 107, gray selections, 113 a black selection, and 105 a white selection. Those chosen as possible better varieties yielded from 28 to 38 bushels per acre while the poorer selections fell as low as 20 bushels per acre. Additional selections will be necessary to establish pure lines and nursery plantings will be made next year. Highest yielding strains planted March 16, were headed out May 23, and matured July 6.

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CORN IMPROVEMENT

(Project 1)

Tests of open field selections of two varieties of corn have been made for two years and the highest yielding strains brought together in variety test in 1926 with White Austrian Flint making 14.0 bushels per acre with 1887 pounds stover and the blue and white Flour Corn 12.2 bushels per acre with 2100 pounds stover.

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MILO IMPROVEMENT

(Project 1)

Mass selections purelined have revealed no outstanding families of yellow milo. Crossing with a number of well established hybrids was begun this year, about 75 hand crosses having been apparently successful. The varieties used in this connection are Yellow Straightneck, Compton Hybrid, J. K. M. Hybrid, Darso, and Dwarf Yellow Milo.

DESERT STRAINS OF THE BISHOP CROSS

(Project 1)

Since this material was only approaching the point of stable uni when selections were first made, considerable success was had in is the superior families. Several hundred inferior selections have been c ed and we now have five strains purelined with whose performance satisfied, both as to production and uniformity. This variety has sho ability to make quick maturity when planted late as July 10, compari with the earlier milos in this respect, yet when planted early it star tween Dawn Kafir and Dwarf Yellow Milo in time required to mature yields have been higher for three years than the best varieties of Dawn and Sunrise. We are therefore holding a supply of elite seed o for distribution.

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VARIETIES OF WINTER WHEAT

(Project 6)

All varieties yielded higher this year than in 1924 on lands of preparation and the rank of varieties was substantially the same. On mer fallowed land Malakof stands ahead followed by Turkey, Kanre Blackhull. Minturki, Minhardy, and Kharkov fall into a group yielding lower than the best varieties. On stubble lands Blackhull and Minturk given yields which may indicate their ability to compete with the group under adverse conditions. Hyde's selection was grown the firs this year standing fourth on both fallowed and cropped soils. Highes this year was 42.8 bushels per acre by Malakof, lowest was 22.2 by Min

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VARIETIES OF WINTER RYE

(Project 6)

A variety similar to the Wisconsin but of unknown origin has highest yields for two seasons. It is called Southwest. The Wis variety is second and Abruzzes a poor third. The loss of rye grain from thrashing before harvest has proved considerable each year. Since the are much below that of the inferior kinds of wheat and the extensive rye would greatly endanger its mixture in the wheat fields, the crop app ly has no place in the cropping system of the Panhandle. Thickly wheat is recommended in its place where a winter manure or pasture is demanded.

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VARIETIES OF WINTER BARLEY

(Project 6)

Oklahoma and Michigan winter barleys seem to be about equally ed climatically, the Oklahoma giving higher yields on stubble land so and the Michigan the higher on fallowed sowings. Wisconsin barley out a poor third and the Tennessee beardless far the lowest in proc capacity.

Winter barley has demonstrated its ability to come through th winters alongside the wheat and to make profitable yields any seasor wheat is successful.

VARIETIES OF SPRING WHEAT

(Project 6)

The spring wheats have made very low yields not exceeding 20 bushels on the most favorable seasons. The Marquis variety seems to be best adapted among those tested. It is followed in rank by the Durum and Early Java. Spring wheats cannot be recommended on the strength of the past three years results.

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VARIETIES OF SPRING RYE

(Project 6)

Only two varieties of spring rye have been grown, the Mammoth White and the Abruzzes, the first mentioned giving the greater yield; but both are much below the spring wheats.

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VARIETIES OF SPRING OATS

(Project 6)

Grain has been harvested from the oat plots twice during the past three years and the behavior of varieties has been rather irregular with no particular one standing out from the others in grain yield. Fulghrum, Kanota, Iowa 103, Texas Red, and Early May form a group of the better yielding varieties. Other varieties grown in these tests are Iowa 105, Iogren, Ferguson, Silvermine, Black Orr, Nichol's 100 Bushel, Extra Early. On the whole the yields of oats have not compared favorably with those of the two-rowed barleys.

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VARIETIES OF SPRING BARLEY

(Project 6)

French Chevalier and Blackhull are outstanding in grain yield above the six-rowed varieties of the Common, Oderbrucker, and the White Hulless. During the season of 1926 the hybrids mentioned under Barley Improvement were grown in variety test with the other and have outyielded the pure lines in five instances. The advantage of this type of barley for spring sowing on the high plains is due mainly to its quick vegetative growth enabling it to enter upon the fruiting stage practically as soon as do the winter grains.

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VARIETIES OF GRAIN SORGHUMS

(Project 4)

All varieties have been grown in 3½' and 7' rows each year and yields of grain and stover recorded. All stover yields are adjusted to 10 percent moisture, samples being taken for moisture determination at time of weighing.

For grain yield the milos stand unquestioned at the top, there being little choice between the yellow and white as to yielding capacity; but dwarf varieties have been more satisfactory than the standard.

The next in rank for grain production are Desert Bishop, Darso, Dawn Kafir, and Sunrise Kafir. Reeds, Red, Hegari, Shrock, etc., range very low in the grain class though the Reed and Red kafirs make fair yields of fodder. Hegari has proved very erratic in its performance as has Feterita and other minor varieties.

The reaction to spacing has followed, generally speaking, the lines of maturity dates. At times when regular spacing was best for the milo wide spacing has often made the greater grain yield for the late maturing varieties, particularly Yellow Straightneck and Red Kafir. The Desert Bishop probably combines consistent grain yield with high stover yield better than any of the other varieties where grain and stover are both wanted.

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DATES OF PLANTING GRAIN SORGHUMS

(Project 4)

A digest of three years' results on dates of planting show some varieties to be very exacting in this respect and others more elastic. Red kafir probably requires the earliest planting for grain production which should be from May 15 to 31. Other kafirs have yielded most when planted about the 1st of June. The milos, especially the dwarf varieties, make greater grain yields when planted from the 10th to 20th of June. Two varieties which have shown an unusual degree of elasticity of planting dates are Darso and Desert Bishop. Such varieties as Feterita and Hegari are apparently more affected by the peculiarities of the seasonal conditions during growth than they are by a fixed planting date.

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VARIETIES OF FORAGE SORGHUMS

(Project 4)

African Millet or Sourless Cane with Orange and Sumac are the heavier forage producers followed by a large group among which there is little difference when averages are taken, Standard Blackhull Kafir, Red Kafir, Reeds Kafir, Pink Kafir, Sunrise Kafir, Darso, Desert Bishop, Black Amber, Dawn Kafir, Red Amber and Ashburn.

The Milos and Feterita, Compton's and the J. K. M. Hybrids have made lowest forage yields.

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VARIETIES OF BROOMCORN

(Project 4)

Common Dwarf, Scarbrough, and Dwarf Acme have averaged highest marketable brush yields in the order named. Black Jap and Evergreen have not proved as reliable as the dwarf varieties.

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GRASSES AND CLOVERS

(Project 7)

In cooperation with the Agronomy Department at Stillwater plantings have been made as in other parts of Oklahoma of a variety of grasses and clovers intended for hay or pasture improvements. Slender wheat, Orchard, and Smooth Brome grasses maintained stands through the summer but were unproductive. Tall oat grass, Red Top, Meadow Fescue, Hard Fescue, Bermuda, Lespedza, Alsike and Subterranean clover failed to produce a stand or died out in summer. Oklahoma, Grimm, Utah and Cossack alfalfas, Red clover, white and yellow sweet clovers, maintained stands very well but were unproductive their first season. Of 1924 sowings of these crops there remain at the present time only the Common, Grimm, and Cossack alfalfas, a very scattered stand of Red clover and also scattered reseedings of the sweet clovers.

VARIETIES OF COTTON

(Project 7)

All stands of cotton were lost in the dry season of 1925. The yields of 1924 and 1926, however, indicate the rather definite superiority of certain varieties under Panhandle conditions. Oklahoma 44, Trice, Acala, Half and Half, Burnett, King, and Lightning Express have stood high in yields and percentage of picked cotton for the two years of this test. Other varieties tested are Lone Star, Burdette Express, Rowden, Ferguson Triumph 406, Improved Mebane, Rivercrest, Excelsior, New Boykin, Bennett, Webb, Kasch, Cook's Improved, Mebane, and Cleveland Big Boll. Burnett, Oklahoma 44, and Burdette Trice made highest yields in 1924. High three in 1926 were Acala 14, Half and Half, and Oklahoma 44, with Burdette Trice in fifth place. Yields ranged from 370 pounds seed cotton per acre to 166, highest and lowest varieties being Acala 14 and Cleveland Big Boll respectively.

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COTTON SPACING

(Project 7)

Ten spacings were used this year with Oklahoma 44 cotton, varying from 8" to 34". The 8" spacing made the highest yield, 430 pounds seed cotton per acre and the 34" spacing the lowest yield which was 214 pounds per acre. Earliness of fruiting as indicated by the proportion of total yield coming in on the first picking was definitely affected by spacing. Spacings less than 24" had fewer pounds of bollies than first picking while all those wider than 24" had more bollies than first picking. The relationships both as to yield and proportions of white cotton produced were fairly consistent and strongly in favor of close spacing.

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VARIETIES OF CORN

(Project 7)

Silvermine, Pride of Saline, Surecropper, Boone County White, Ried's Yellow Dent, Ferguson Yellow Dent, Midland Yellow Dent, Dent Squaw, Chisholm, St. Charles White of the dent varieties were planted with wide spacing on summer fallowed land this year and all failed to mature any grain. White Australian Flint, and Squaw Flour corn yielded 14.0 and 12.2 bushels respectively in the same series of plots. Early dent varieties are sometimes succesful but never as dependable as the small varieties. These results do not hold, however, on the sandy types of soil, for we find many areas where the dent corns are much preferred by farmers of long experience.

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VARIETIES OF COWPEAS

(Project 7)

Cowpeas were harvested for hay in 1925 and 1926, 13 varieties being used. In all cases they were harvested about the time half the pods were ripe, but when drouth so injured the crop as to start leaves to falling the crop was promptly cut. In 1925 weather conditions were such that the total yield was not noticeably affected by the time of maturity, but this year the early maturing kinds were all in the low yielding group. Blackeye, Early Buff, Early Red, and Whippoorwill were the more productive varieties in 1925 with yields

ranging from 1450 to 1550 pounds standard hay (10% moisture) per acre. Other varieties yielded as low as 528 pounds per acre.

In 1926 the high yielding group included Early Red, Red Ripper, Brabham, Potomac, Blue Goose, Whippoorwill, and Blackeye. Holstein, Groit, and Early Buff ceased growth before frost and made very low yields. Other varieties tested but which made a mediocre showing were Iron, New Era, and Black.

VARIETIES OF SOYBEANS

(Project 7)

Plantings of soybeans were destroyed by rabbits in 1924 and 1925, but the test plots were fenced and readings secured on forage production for 1926. The Laredo was the outstanding variety this year making 1720 pounds standard hay per acre which was one-fourth ton more than any variety of cowpeas produced in the same series of plots. The Virginia about equalled the best cowpea variety with Mammoth, Wilson and Biloxi in the second group. Morse was low in yield making only 663 pounds hay per acre. The Biloxi did not mature seed. Wilson pods popped more freely than any of the other varieties.

MUNG BEANS

(Project 7)

Erect and Dwarf mung beans were grown in test with cowpeas and soybeans. The Dwarf variety matured September 9th, yielding 1420 pounds cured hay per acre. The Erect variety stood until October 16, yielding 935 pounds per acre.

LEGUME INOCULATION

(Project 9)

Wilson soybeans were grown in inoculation test with the following results: "Nodule-Bacter" inoculation 829, soil inoculation 740, no inoculation 691 pounds standard hay per acre. These were grown on soil which had never produced a crop of soybeans with check plot between the two inoculated plots, plot length being 10 times the series width.

RATES OF SOWING WHEAT

(Project 6)

Rates of from 16 to 40 pounds of hard red winter wheat were used with 3 pound intervals. The yield increased with the amount of seed used up to 23 pounds per acre. All rates from 23 to 36 pounds seed yielded nearly the same, that is, betweeen 1617 and 1683 pounds per acre of grain. The 40 pound rate shows a drop to 1423 pounds of grain per acre. Lowest yield was 1038 from the 16 pound rate. All sowings were made October 31, on sorghums stubble land.

FALL PREPARATION AND SPACING OF MILO

(Project 3)

This experiment was laid out on the basis of a large number of moisture tests made in the summer of 1923 and observations throughout the Panhandle of the outcome of milo yields that year. Moisture samplings have been made at seasonal intervals since that time and the planting time reading was found to be highly significant. The table gives a summary of the results.

Plot Number, Preparation and Spacing of Rows	1924		1925		1926	
	Moisture* at Planting Time	Yield Grain Per A.	Moisture at Planting Time	Yield Grain Per A.	Moisture at Planting Time	Yield Grain Per A.
2319 Fall listed 3½'	14.40	1570	9.20	61	14.55	1083
2320 Fall listed 7'	14.44	1045	10.31	510	15.09	768
2321 None 3½'	15.51	975	9.56	482	14.80	912
2322 None 7'	16 62	795	11.70	867	15.37	732

*The moisture at planting time is expressed as the total inches of water contained in the 6 foot soil section.

The prediction at planting time of the most favorable spacing for grain yield has proved correct in each case. While the moisture on hand in the fall does not have a positive correlation with spacing and yield considerations there appears the possibility that the advisability of fall listing may depend on having moist topsoil conditions at the time of the operation.

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MILO IN ROTATIONS

(Project 5)

Seven of the rotations contain milo as a grain producing crop and the two preparations giving consistent high yields are summer fallowing and the bean or cowpea crop. Low yields have followed a wheat crop or weeds the previous year. The problem of suitable spacing is interrelated with the effects of the previous crop and the manner of preparation, as it affects the grain yields of milo.

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WHEAT IN ROTATION

(Project 5)

Yields of wheat in 1926 were highest on land which had been fallowed for one year or following crops which came off early to permit September sowing, such as corn and cowpeas. Wheat following milo or wheat made low yields. When deep listing or plowing entered into the rotation practice it was most successful when done one year or more before wheat sowing time, so far as wheat yields were concerned. The highest yield, 2280 pounds grain per acre, came from a plot fall listed, worked down during spring weed control and clean cultivated until sowing time. The next two high yielding plots received the same treatment, excepting the third one which made a light yield of corn fodder previous to wheat. Lowest yield was made on a plot which had been in wheat two years.

ROTATION AND FERTILITY EXPERIMENTS

(Project 5)

Fifteen rotations, consisting of 11 three-year plans, 3 four-year plans, and 1 five-year plan have been running for three years, all plots in the three year rotations having completed one cycle of crops with 1926. Studies of crop sequences, times and kinds of preparations, spacing methods, summer fallowing and residue returns are integral parts of the rotation plans. Each plan represents a type of cropping or facility of sequence suitable to some well recognized type of market crop or livestock farming. The land used has been in cultivation about twenty years. It is a body of very uniform silty clay loam soil having been heavily cropped as one field until the laying out of this experiment. The organic matter ranged from 65 to 75 percent of the original as indicated by analyses of adjoining native sod at the time the rotations began.

The adavntages of various operating expedients, and preparation methods and sequences favorable to grain production have been pointed out under the heads of Milo and Wheat in rotations, but the primary object of the study is to determine the long term productivity of various rotations, the level of fertility maintained and their adaptability to the climatic features of this region.

The use of crop residues to the best advantage is one of the problems being given special attention.

Animal manures, manure crops, and commercial supplements are also being studied as parts of the rotation practices.

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ORGANIC MATTER MAINTENANCE NUDER COTINUOUS WHEAT

(Project 14)

Twenty-eight plots devoted to this work were summer fallowed during 1925 and given uniform treatment through the harvest of 1926. The wheat was harvested by plots and the various amounts of residue and manure by different times and methods of culture were applied.

This experiment constitutes part of "A Study of Some Factors that Affect the Quality of Wheat" being carried on by the Oklahoma Station at Stillwater, and this land has been set aside for this purpose as long as its use may be required.

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MOISTURE STUDIES

(Project 3)

Thirty-four plots are given to the study of tightland moisture problems, the purpose of which is to determine the moisture requirements of type crops, their relative efficiency, the effects of previous cropping, time of preparation, kind of preparation, and summer fallowing on the reception of water into the soil and a complete moisture log to a depth of eight feet on 22 plots and to six feet on 12 plots by seasonal and crop period intervals, from October, 1923.

In the spring grain series fall plowing has proved advantageous to grain yield when moisture was plentiful in the fall but has been markedly depressing when the land was plowed dry, compared with that not plowed at all.

Little difference has been noted between different methods of plowing which have included subtilling and subsoiling as well as disking and turnplowing.

Data of some more than two hundred plot periods have been correlated and a few more or less definite relations regarding the use of soil water are indicated.

Definite relationships by statistical analysis have been pointed out between the following factors:

1

Total water used by crop and soil wastes, to the amount contained in 6 foot soil section at the beginning of the growing season.

2

Total yield per acre, to the daily rate of water yield from 6 foot soil section.

3

Total water wasted in fallow operations, to the depth soil was stirred during fallow period.

Significant relations were not revealed between the following factors:

1

Total water wasted in fallowing, to the amount contained in 6 foot soil section at the beginning of the fallow period.

2

Daily rate of soil water yield to crop use, to the average daily rainfall for growing season.

3

Total yield per acre, to the average daily rainfall for growing season.

4

Water accumulated in 6 foot soil section, to depth cultivated previous season.

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FERTILITY INDEX

(Project 3)

Extensive greenhouse and laboratory experiments have been run in an effort to devise a means of getting a quick reading on the fertility condition of a field plot at such times as it is impossible to determine it by an actual field yield. It has been indicated by the moisture and nitrate studies that other factors play a considerable part in the net result of cropping, and to be able to measure the composite force of the combined factors as they would affect production at various given times during the fallow season would give us valuable information on how to arrange crop sequences and time the rest intervals to best advantage.

For the past three years this study has consisted mainly of an investigation of pot culture technique and considerable information on this subject has been obtained.

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SEED TREATMENTS

(Project 9)

The field studies of treatment for protection from seedbed rotting when soils are wet or cold has been continued as reported in Bulletin 159, using numerous other varieties of sorghums with much the same results.

PLANT DISEASES

(Project 9)

Work is in progress, none of which is yet completed, investigating the conditions surrounding the infection of the small grains and sorghums by the various smuts common to this region. The effectiveness of control measures under special conditions constitute another phase of these studies. Special attention is being given the head smut of sorghums for which adequate control is yet lacking.

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SEED TESTING

(Project 1)

A simple and effective laboratory test for the detection of hybrid seeds in a sorghum seed sample is being sought. A large amount of seeds for testing have been accumulated in the past year and equipment purchased to carry out this work, but only preliminary investigations have been made so far.

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DRYFARM TERRACING

(Project 11, A. D. McKinley)

A 20-acre field which was broken from native sod in 1924 and which has beeen uniformly croppeed since that time was divided previous to the 1926 planting of milo into halves, the upper one being terraced with low broad terraces level grade on 6" steps, six terraces being required for the 10 acres. Otherwise both fields were treated alike.

The yields for 1926 were 637 pounds grain per acre on the unterraced field and 950 on the terraced field. The effect of the terraces was easily noted by eye from the time the crop was well headed out. It should be noted that only one rain occurred in this crop season which was great enough to run off, being 2.71 inches on the 25 and 26 of June and it was apparently from the effects of holding this water on the field that the above results were secured. These terraces will be maintained and the experiments continued on the other crops of the livestock rotation.

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INHERITANCE STUDIES IN MILO

(Project 1)

Both pureline fixation of characteristics and a study of open field populations are being used in an attempt to discover what part is played by heredity if any in the tendencies toward crown branching, head branching, side branching, the intervals required for response to the field conditions that bring on the second and third growth heads, since the promptness or delay in such responses have been shown to greatly affect the ultimate grain yield. Other plant characters are being studied with the end in view of making the plant a basis of selection for improvement in grain production. About 45,00 measures have been taken this year covering all the observations made. 124 pure lines have been established and considerable material is still on hand for further study. This experiment is now in its second year.

NITRATE STUDIES

(Project 3)

It has been shown that 40 to 60 pounds of nitrate nitrogen per acre 6" may accumulate in the topsoil on fallowed land and remain there several months under normal temperature and rainfall conditions of this region. The factors contributing to such accumulations and their effects upon the quality and production of subsequent crops are being studied. Climatic fluctuations, previous cropping, time of cultivations and kind of cultivations are evidently all concerned in nitrate accumulations. Whether these can best be absorbed by immediate cropping or applications of carbonaceous manures, or whether they should be allowed to accumulate at all are questions to be worked out.