

KANSAS STATE AGRICULTURAL COLLEGE
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PREPARING LAND FOR WINTER WHEAT

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PREPARING LAND FOR WINTER WHEAT

With a soil of average fertility, the preparation of the seed-bed by the proper tillage and cultivation methods very largely determines the yield of the crop. Three general methods of tillage for preparing the land for wheat are practiced in this State; namely, plowing, listing, and disking. There may be variations of these three methods, as early plowing, late plowing, shallow plowing, deep plowing, single listing, double listing, little cultivation after plowing, frequent cultivation after plowing, etc. Local conditions may determine which method is the best. That certain methods are superior to others may be readily shown by comparative trials.

AN EXPERIMENT.

Tests of several methods of preparing the seed-bed for wheat have been carried on at the Experiment Station at Manhattan for the past two seasons and show the following results:

METHODS OF PREPARING SEED-BED FOR WHEAT.

METHOD OF PREPARATION.	Yield per acre. bu.			Cost per acre for prep. 1908-'09.	Cost per bu. 1908-'09 Cents.	Value of crop 1908-'09 at \$1. per bu.	Net profit.
	1907-'08.	1908-'09.	Av. 2 yrs.				
Disked July 15, and at frequent intervals until seeding. Not plowed.....	14.95	28.24	21.59	6.88	24.3	28.24	21.36
Double disked July 15. Plowed September 15 seven inches deep.....	20.11	30.56	25.33	5.53	18.1	30.56	25.03
Plowed September 15 seven inches deep..	19.59	27.98	23.78	4.66	16.7	27.98	23.32
Plowed September 15 three inches deep..	21.19	30.76	25.97	4.66	15.1	30.76	26.10
Plowed July 15 seven inches deep.....	28.84	35.02	31.93	5.59	15.8	35.02	29.43
Plowed August 15 seven inches deep.....	34.74	40.12	37.43	4.53	11.3	40.12	35.59
Plowed August 15 seven inches deep. Not worked until September 15.....	30.53	38.12	34.32	4.03	10.6	38.12	34.09
Listed July 15 seven inches deep and ridges harrowed down.....	20.02	32.17	26.09	4.40	13.6	32.17	27.77
Listed July 15, ridges split August 15, harrowed down.....	23.67	31.33	27.50	4.65	14.8	31.33	26.88

THE RESULTS EXPLAINED.

The field upon which this experiment was conducted is upland soil, previously seeded to alfalfa. The alfalfa was broken in the fall of 1904, planted to corn in 1905, and sown to wheat in 1906. The experiment was started in 1907 on this wheat stubble. Nine different methods of preparing a seed-bed have been tried, as indicated in the table.

Plowing. — Plowing was done on July 15, August 15, and September 15. It will be seen from the table that the early plowing on July 15 did not give the highest yield or the largest net profit. This was due to the lodging of the wheat on this plot. Being an old alfalfa field, organic matter rich in nitrogen was abundant in this soil. The early and continuous preparation probably produced nitrates in such large amounts that a rank growth of weak straw resulted, and the wheat lodged. With a soil lower in fertility or in a section further west, where less moisture was available, this condition would not usually occur.

The highest yields were obtained from the August 15 plowing. Upon these plots the grain did not lodge. The plot plowed August 15 and cultivated after plowing received two harrowings before September 15. Otherwise it was worked in exactly the same manner as the other August 15 plowed plot, which was not surface cultivated until September 15. These two harrowings in 1907 increased the yield 4 bushels per acre, and in 1908 two bushels per acre, or an additional expense of 50 cents resulted in a profit of \$3.00 in 1907 and \$1.50 in 1908.

The late plowing, September 15, has each year given the lowest yield of any of the plowed plots, although every effort was taken to prepare a good seed-bed by surface cultivation immediately before seeding. In 1908 the late plowed plots were harrowed three times, disked once and acme-harrowed once after plowing before seeding. The wheat was seeded on all plots October 9. Thus the seeding was not done for nearly a month after plowing; yet the large amount of work put on these late plowed plots was not enough to prepare a sufficiently firm seed-bed. The plot plowed shallow gave a slightly increased yield over the deep plowed plots where each were plowed as late as September 15. The shallow plowed plot could be better firmed down. Double-disking ground early in the season to be plowed late gave a slightly increased yield. This was due to the fact that the disk ing kept the ground in better shape for plowing, and it firmed down more readily than the undisked ground.

Listing.—Listing has not proved especially successful as a method for preparing a seed-bed for wheat, giving a less yield than early or medium early plowing. Listing has not proved a cheap method at this Station during the past two years, due to the heavy summer rains that have made frequent harrowing and disk ing necessary in order to keep down the weeds.

Disking.—The same condition has made it very expensive to prepare a seed-bed for wheat by disk ing without plowing. It required eleven diskings in 1908 to prevent the growth of weeds and prepare a good seed-bed by this method. Disking has also resulted in a low yield, producing the least amount of wheat and the lowest net profit of any method employed in this experiment.

CONCLUSIONS DRAWN.

The soil conditions and environment suitable for the successful growth of a wheat crop are well established and fairly well understood. With good seed, a few simple factors largely determine the stand and the yield of the crop and the quality of the grain produced.

In order to secure the ideal condition for seed germination and plant growth, a seed-bed for planting wheat and other small seeds should not be mellow to too great a depth, but rather the soil should be mellow and well pulverized only about as deep as the seed is planted. Below that depth the soil should be firm and well settled, making a good connection with the subsoil, so that the soil water stored in the subsoil may be drawn up into the surface soil.

The firm soil below the seed, well connected with the subsoil,

supplies the moisture to the seed, while the mellow soil above the seed allows sufficient circulation of air to supply oxygen and favors the warming of the soil, gathering the heat of the sunshine during the day and acting as a blanket to conserve the soil heat, maintaining a more uniform temperature of the soil during the night.

The mellow soil above the seed conserves the soil moisture, acting as a mulch to keep the water from reaching the surface, where it would be rapidly lost by evaporation, and the same condition favors the growth of the young shoot upward into the air and sunshine.

The too-mellow, deep seed-bed is almost wholly dependent upon rains for sufficient moisture to germinate the seed and start the young plants. In such a seed-bed, drouth is very apt to injure the crop because of the rapid drying out of the loose soil to the depth of the plowing. In the loose seed-bed the crop is not very apt to "burn out" in summer, but it is also more apt to "freeze out" in winter than a crop grown in the "ideal" seed-bed described above.

Approved:

ED. H. WEBSTER,

Director.

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