

The TILLAGE of STUBBLE LAND

Professor John Bracken, Department of Field Husbandry, University of Saskatchewan, Gives Results of Exhaustive Tests.

Most Pressing Problem in Production in Saskatchewan is control of crops on stubble fields.—Nine-tenths of poor crops in the province are on stubble land.—Lack of moisture principal cause of low yields.—Methods of cultivating stubble land which have given best results.

It has been estimated that nine out of every ten poor crops in Saskatchewan are grown on fields that have produced one or more crops of wheat, oats, barley or flax after having been "broken" or "stubble" fields.

Such fields are commonly spoken of as "stubble" fields. The surplus moisture stored in fallowed land in semi arid regions is an insurance against failure of the next season's crop as a result of drought. The same is true in less degree of prairie or sod soil that has been well "broken" and left unworked till the following year. On land that has produced one or more crops, however, the soil moisture is largely exhausted and the next succeeding crop is almost wholly dependent upon the amount that falls after harvest time. Because of the fact that equal opportunity to control the factors necessary for growth is not given it is probably true that we shall never on the average get as good returns from the "stubble" crop as from that sown on fallow or "broken" or after "hoed" crops. Nevertheless much can be done to increase the productive power of such land.

The control of the yield of crops on our stubble fields is without doubt the most pressing problem in production now facing the Saskatchewan grain grower; and in view of the fact that over two-thirds of our present cropped area is stubble it would seem that this portion of our farms should receive very much greater consideration than it has ever been given before.

Causes of Low Yields
The causes of low yields on stubble fields are usually few in number. The most important ones are—

1. The low moisture content of the soil.
2. The presence of grass, shrubs and weeds.
3. A poor seed bed.
4. Insufficient "available" plant food.
5. The stubble itself.
6. Unavailable subsoil moisture.

The first is the most general but any one or all of the others may be contributing factors. Some of these, unfortunately, cannot be controlled absolutely, but all can be materially influenced by man and most are entirely within his control.

Each is affected by certain specific tillage operations. If the largest net advantage is to be derived, hence no fixed procedure can with profit be followed on all fields.

The actual causes of low yield on a given field must first be determined and then the cultural treatment that is likely to control those particular causes must be given.

The Control of Soil Moisture
The low moisture content of the soil is the principal cause of low yields on stubble land. "A dry season," "too little rain," "hot winds" are generally given as causes of partial failure. In the drier parts of the province the control of soil moisture is the most serious question to be faced in the handling of stubble fields.

So far as this portion of the general problem of managing stubble fields is concerned only two things can be done: (1) endeavor to keep the moisture already in the soil from escaping, and (2) try to get more in.

The moisture in stubble land escapes in only two ways—By evaporating directly into the air and by being pumped out by weeds or other volunteer plants growing on the land. Evaporation can be effectively lessened by creating and maintaining a soil mulch—a loose layer of dry soil on the surface of the field—through which moisture escapes very slowly.

The loss of moisture through the growth of weeds can be controlled by killing the weeds when they are small.

Getting additional moisture into stubble fields is a more difficult problem than keeping in what may already be there. Our autumn, winter and spring seasons are dry. In the seven months from August to March inclusive only about one-third of the year's precipitation falls, and a large portion of this is in the form of snow and therefore not easily controlled. It must be apparent to all that a receptive surface soil, that is, one loose on top as a result of surface cultivation or plowing, is likely to absorb more of the fall and spring showers and melted snow than an untilled field, particularly one that is covered with a heavy mat of undulating or rolling land.

To prevent the "run off" plowing would seem preferable to surface cultivation or no cultivation and fall plowing would prove better than spring plowing. But "the stubble holds snow" and "fall plowing dries out." If in plowing to store moisture in the soil we lose some that is already there, then what is the net result?

Weeds
Weed seeds on the surface of stubble fields are a menace not only to the crop immediately following, but to the farm as a business concern. If they are left to take their own course, they seldom germinate until spring and then the plants generally mature and drop their seeds either before or at harvest time. Incidentally they use up tons of moisture, lessen the yield of the crop and increase the cost of cutting, stooking, threshing and marketing it.

Most of these are annuals that die when subjected to the low temperature of winter. Obviously, they ought to be encouraged by some form of cultivation to germinate in the fall. In any case, fall cultivation induces a greater spring germination and enables us to kill the young plants by subsequent cultivation.

Seed For Sale

Barley tested 99 per cent. in six days. Oats tested 91 per cent. in seven days.

Also good seed potatoes. For samples and prices call at our office next to Land Titles.

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SASKATOON

It is regrettable that in dry autumns the seeds of annual weeds can be started only with difficulty; but biennial weeds can be completely controlled by thorough surface cultivation with the disc, or shallow plowing either in fall or spring.

The perennial plants, among which the native quack, sweet grass and prairie rose are the most common, are serious pests in many stubble fields. They spread not only by seeds but by underground creeping rootstocks. These weeds cannot be controlled by burning or discing or other surface cultivation. Plowing, preferably in dry seasons when the roots can be exposed to the hot sun and drying wind, is the only remedy for these legacies of poor breaking. Other plants of a similar nature are brome grass, Canada thistle and sow thistle.

The "Seedbed"
A good seed bed is one that provides the conditions necessary for germination—heat, air and moisture—in optimum amounts, at the right depth, at the time the seed is sown. Too often the surface of our stubble fields is too hard to get the seed into, or too dry to cause germination, or covered with stubble through which the drill cannot satisfactorily force the seed. The surface soil can be made more mellow by surface cultivation or by plowing, the moisture content in the soil more or less controlled by the same means, and the stubble, if too long, can either be burned or plowed deeply or left without any cultivation.

Importance of "Available" Plant Food
All of the plant food in a soil cannot be drawn upon by the growing crop. Since plants "drink" their food it is clear that only that portion of the fertilizing content of a soil that makes it available to the growing crop can be used by them. It is wise, therefore, to have a surplus of available plant food in a soil at all times.

On one piece of untilled grassy stubble the average yield of wheat in 1914 was 5 bus. per acre (a part of it produced at the rate of only 2 bus. per acre). Adjoining this was a similar piece of stubble that was plowed in 1913. The yield of wheat in 1914 was 13 bus. when plowed with native packed, double disced and harrowed in the fall.

On the other hand, in all cases where grassy stubble was plowed the yield increased and the grass was either totally killed or very much lessened. When the same land was plowed in 1913, in many instances it became overrun with native quack, or, in low places, with sweet grass, both of which were more numerous than in 1914.

Cereal crops cannot compete successfully for moisture and plant food with the weeds and volunteer plants. Neither burning nor surface cultivation will kill the latter and when they are present in any quantity in stubble fields plowing for the succeeding crop, in fall or spring, becomes almost a necessity.

(3) Early fall plowing to late fall
In the 1911 wheat crop early fall plowing increased the yield 1 bus. and 36 lbs. over fall plowing done three weeks later. In 1912 the increase due to the earlier work was 1 bus. 12 lbs. and in 1914 it was 3 bus. and 4 lbs. per acre.

In 1914 early double disking increased the yield of wheat 2 lbs. and 10 lbs. over double disking done 3 weeks later. It was often impossible to plow land early after harvest on account of its hard condition. But it is never impossible to disc it.

(4) Avoid working tight clay soils when possible
In the spring of 1913 some sticky clay portions of our investigation field were plowed when the soil was too wet, with the result that they were "baked" and the yield was cut down to less than half that secured on other lighter soils worked at the same time. Light soils are not likely to be hurt by working them too soon after heavy rains but medium soil are invariably seriously injured by this practice.

(5) The Desirable Harrowing Plowed Land as soon as possible after plowing
In humid regions fall plowing is generally left loose and untilled for the reason that the greater precipitation there is some hard and more or less baked. But in our semi-arid climate and unless plowed plowed land as soon as possible after the operation is performed a few tight clay types that may run together and bake if more than normal precipitation occurs.

The effect of harrowing fall plowed land within twelve hours after the plowing was done was to increase the yield of wheat 2 bus. in 1913; 1 bus. and 29 lbs. in 1914; and to decrease the yield 30 lbs. per acre in 1914.

The yield of wheat on spring plowing in 1911 was increased 50 lbs. per acre as a result of harrowing the same day the work was done. In 1913 the increase from the same practice was 3 bus. 36 lbs. and in 1914 1 bus. and 21 lbs. per acre.

Summarizing 28 tests during three years the increase from one operation of the heavy harrows or two of the light lever harrows the same day the plowing was done was 1 bus. and 57 lbs. of wheat per acre. We are firmly convinced that harrowing plowed land as soon as possible after the operation is performed is a very important and necessary operation on all Saskatchewan soils excepting a few tight clay types that may run together and bake if more than normal precipitation occurs.

(6) The Furrow Slice should be flat and firm against the narrow bottom.
In humid climates the practice of turning the furrow over flat is not considered advisable, but in semi-arid regions it is important that the furrow slice be placed firmly in contact with the sub-surface soil. This can be done by using a land packer or by thorough surface cultivation, or, if the work be done early enough, the rains accomplish the same end—and at no cost.

A summary of all our work with the "surface" land packer shows that plowing deep plowing increased the yield of wheat 2 bus. and 6 lbs. per acre, and packing shallow 40 lbs. per acre, while packing unplowed stubble land decreased the yield 3 years out of 4.

It was observed that where packing was done the crop was invariably more uniform and earlier. The practice of firming fall and spring plowed land in dry regions seems desirable although the best time for doing it is not apparent. The surface packer should generally be followed by the harrow, particularly if the soil is in good physical condition as those of us who come from a more humid area are likely to suppose. In the absence of grass and in the presence of a short stubble, soils of good physical condition often produce a large net return with cereal crops from thorough double disking as from plowing. This is particularly true in the drier parts of the province on land that is well fallowed every third year.

Summarizing all our tests at Saskatoon for three years the average yield for surface cultivated stubble is 15 bus. and 56 lbs. of wheat and from plowed stubble 18 bus. 23 lbs. 1-2 lbs. Burning before surface cultivation increased the yield over per acre, but in a year when the stubble was long the increase from burning was considerably greater than this.

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Harrowing the growing crop is a practice in which judgment must be used. A thin stand means later maturity. Harrowing invariably pulls out some of the plants thus leaving a thinner stand. This is particularly true on light loose soils or on fields carrying considerable rubbish in the form of stubble. On fields in this condition, harrowing, if done at all, must be practiced with care. A light lever harrow with the teeth tilted backward is preferred for this work.

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A Hundred Million Tins of Canned Foods Consumed in Canada Every Year

WHY? Because they are recognized the country over to be sanitary, easily prepared, wholesome and nutritious foods—because the busy housewife finds them one of the best foods that can be placed on the table. Practically every household now consumes several cases of canned goods every season. Why not then buy them by the case? They are always handy and ready for any emergency and there is absolutely no waste—and you save money buying them that way. All are Canadian-made goods.

CANNED TOMATOES—Best brands only—a steaming hot plate makes a good meal in itself, and they are ever ready for luncheon and dinner. Per tin, 11c; per dozen, \$1.25; per case of 24 tins, \$2.45.

CANNED PEAS—We would recommend the finer grades of peas—they are smaller and more tender than the