

The Production and Use of Seed Grain.

Jas. Murray, B.S.A., District Representative of the Seed Division for Manitoba and Saskatchewan writes as follows:—

"In grain, that which is called seed, is the ripened product of the plant, that which the plant lives to produce, and by means of which life is carried on from year to year. A seed consists essentially of two parts, the embryo and the endosperm. The embryo is a plantlet which develops under proper conditions into a plant similar to the one which produced it. The endosperm, the starchy part, consists of a store of food to nourish the embryo when growth starts. Under the proper conditions of heat, air, and moisture, the seed swells, the root bursts forth and strikes downward to gain support, and a tiny leaf also makes an appearance. While the embryo continues to grow, the amount of starch stored up gradually decreases as it is consumed by the young plant. It thus continues to feed until able to draw its nourishment from the soil. It will thus be seen that the strong early growth of the plant is dependent upon the supply of food material in the seed—but with this we shall deal more fully later.

The seed also is the means by which the qualities or characteristics possessed by the parent plant or its ancestors are transmitted to the plant which it produces. Plants transmit their characters from generation to generation, just as surely as do animals. A bearded variety will produce a bearded character in the progeny, an early ripening variety produces year after year plants that ripen early; a stiff strawed variety has this quality year after year. Heavy

VARIETIES.

Red Fife wheat has always been and still continues the standard variety of wheat for western conditions. It is a good yielder, produces a stiff strong straw that is not subject to rust, and produces a flour of the highest quality. This variety has greatly aided in giving Canadian hard wheat its enviable reputation on the markets of the world, and at present there is no variety that can be recommended above it for ordinary conditions. Under conditions where Red Fife will not mature before danger of frost, it is advisable to try some of the earlier ripening varieties originated by the experimental farms, and which have proved their adaptability to those conditions. Among those which have given good results in various districts may be mentioned Preston, Huron, Stanley and Percy. These varieties all compare favorably with Red Fife in yield per acre, and also produce a good yield and quality of flour. In some localities the practice of growing earlier ripening varieties is becoming very common regardless of whether they are of good milling quality. This will prove detrimental to the reputation of our wheat just in proportion to the extent to which it is followed.

MIXED VARIETIES.

Uniformity in colour, size, and shape of kernels is one of the first essentials in a high grade of wheat. Different varieties of wheat present a marked difference in the appearance of the kernels, and when several varieties are mixed together the resultant lacks uniformity. Usually also in a crop mixed in this way some varieties are ripe before others and we therefore find a much greater variety in appearance on this account. The early ripening varieties,

SIZE OF SEED.

Various experiments have been conducted to determine the relative value of different sizes of seed. At the Indian Head Experimental Farm, Superintendent Angus Mackay, as the average of two years, reports a yield of 49 bushels and 40 lbs. from well cleaned wheat, and only 44 bushels and 30 lbs. from small wheat of the same variety, a difference in favor of the well cleaned seed of over 5 bushels per acre. From well cleaned oats the average yield of two years was 101 bushels and 16 lbs., and from small oats 96 bushels and 11 lbs., a difference of 5 bushels in favor of the large seed. In a similar experiment at Guelph, Ont., Professor Zavitz obtained a difference in yield of 8 bushels per acre between heavy and light oats and of 5 bushels per acre in comparing the yields from heavy wheat with that from shrunken wheat. The results of Professor Zavitz are the average of the year's careful experimenting. These differences of a few bushels per acre may seem small until we consider what they amount to on a large farm, or on the total crop producing area of the North-west. An increase in yield of only one bushel per acre amounts in one year to upwards of 4,000,000 bushels of wheat in Manitoba and Saskatchewan, with a value approximating \$3,000,000. SEVERAL TIMES THIS INCREASE COULD BE DERIVED SIMPLY BY THE SOWING OF SEED THAT HAD ALL THE SMALL AND SHRUNKEN GRAINS CLEANED OUT. THE SAME PROCESS OF CLEANING ALSO INSURES COMPARATIVE FREEDOM FROM WEED SEEDS.

The extent to which large plump grain will yield heavier than small grain of the same kind, will depend largely upon the season and the condition of the soil. With a favorable season for early growth, and a well prepared seed bed there will be a smaller difference in yields than where the conditions are less favorable for a thrifty well nourished growth. This, which has been found repeatedly and persistently to be the case, is due simply to the fact that the plant from the large plump seed being stronger and possessed of more vigour, is better able to withstand adverse conditions than the more weakly plant from the small or shrunken seed.

RIPE AND IMMATURE SEED.

We have little definite information regarding the relative merits of ripe grain and immature grain for seeding purposes. In experimenting with winter wheat Zavitz found that 'seed taken from wheat which was allowed to become very ripe before it was cut produced a greater yield of grain and straw, and a heavier weight of grain per measured bushel than that produced from wheat which was cut from any one of four earlier stages of maturity, according to the average results of fourteen separate tests.' What other figures and facts at hand go to show is that for seeding purposes all classes of grain should be allowed to get thoroughly ripe before being cut. The impression that grain cut before maturing has a tendency to produce an earlier ripening strain has nothing to support it in fact. To get a strain that will ripen earlier, the more rational way would be to select every year that which matures first. Perfectly ripened seed gives a stronger early growth than immature seed.

FROZEN GRAIN FOR SEED.

There is frequently a temptation to sow grain that has been affected by frost. The value of such grain for seed depends entirely upon the degree of the injury. Not infrequently the frost will rattle the bran of wheat of good quality when in stock; as a rule the vitality suffers no injury and the seeding value is not affected. When, however, a frost occurs before the grain has reached maturity the vitality is often seriously impaired, and care is necessary to prevent a disappointing stand. The oat germ is more delicate than that of wheat, and is more likely to be injured by frost. When there is any likelihood that oats have been exposed to frost before being thoroughly ripe, they should be carefully tested before being sown, to determine their value. Wheat shrunken by being frozen when immature should never be sown when good seed can be secured. Such seed has all the disadvantages of small seed, and in addition has a weakened germ that will give a plant lacking strength and vigour. The extent to which this will affect the yield of the resulting crop will depend to a certain extent upon the weather conditions.

SEED FROM A RUSTED CROP.

While we have had only one serious visitation of rust in the wheat growing sections of the west, in all probability it will not be the last. In view of this and the serious effects of rust on grain crops a few words on rusted seed may not be out of place.

It is now pretty generally understood that rust, (*Puccinia Graminis*), is a fungus disease that develops and lives inside the plant, extracting nourishment from it, checking its normal development. The reddish or black streaks or spots seen on the leaves or stems consist of numberless spores by which the disease reproduces itself. The seeds produced by plants badly affected by rust are shrivelled to a greater or less extent; frequently they are less than half the normal weight. Contrary to what might be expected, such shrivelled seed seldom fails to germinate. But we have already shown that to germinate life is only the beginning of the seed's functions, and this being the case it is quite apparent why seed from a rusted crop does not give satisfactory results. Seed from a plant badly affected by rust is analogous to immature, shrunken seed—it is light in weight, the germ is often weak, and the amount of starch stored up to feed the germ is small.



A BUSY DAY AT WETASKIWIN, ALTA., FLOUR MILL.

yielding plants and varieties in turn produce heavy yielders.

WHY GOOD SEED IS REQUIRED.

To intelligently consider the requisite qualities in good seed, and see clearly how essential it is that improvement be effected, we must understand the uses of the product. It is a matter of general knowledge that our highest grades of spring wheat can be used to produce a flour of unusual strength, but its value is due not so much to this fact, as to its usefulness for mixing wheats of a poorer quality in order to raise the standard of the resultant flour. 'The English miller does not want No. 1 hard for making a purely No. 1 hard wheat flour, but to mix with other sorts to make a standard flour of his own, and so long as No. 1 Canadian wheat is of the very highest milling value, it will command a premium above its real single milling value.'—*The Miller*, London, Eng.

To maintain the present high standard of our milling wheats is therefore essential to continued success, and we should aim to produce twenty-five years from now at least as good a quality of wheat as we are growing to-day. To succeed in this we must adopt and continue those practices that make for improved quality and increased yield in our crops. We cannot progress without this. Careless methods of cultivation and sowing, invariably result in an increase of weeds, depleted soil fertility and the mixing of varieties. Hence we see deterioration in the quality of crop instead of improvement.

(which often are bearded) in such a mixture continue to increase in proportion year after year, on account of shelling more readily and appearing as volunteer wheat the following season. Further, bearded soft strawed varieties of wheat are much more subject to the attacks of rust, and, becoming affected early, spread the disease rapidly to other plants surrounding them. The importance cannot, therefore, be too strongly urged of having, not only the best obtainable variety, but also of having it pure.

WEEDS.

In addition to the harm done by mixtures of this sort, weed seeds are every year the cause of incalculable direct loss. Weeds have been largely introduced through the medium of seed grain, and their rapid distribution through the farming areas is also largely through this medium. When they once get a foothold in a country such as this, where on the majority of farms no regular rotation is followed it becomes difficult to eradicate them. In many of the newer parts immunity from many of the worst weeds is still enjoyed, but not half appreciated. In such cases the utmost care should be taken to prevent their introduction. As an aid in accomplishing this it is important to know the weed seeds. The Wild Oat is one of the worst weeds that the Manitoba farmer has to combat at present, and it has been most commonly introduced through seed grain. It is only necessary to know what the seed looks like to prevent its introduction from such a source, and with many of our other weeds the same is true. It is therefore highly important to be able to identify the seeds of our common weeds.