

components of the cross. This produces self-fertilized grains. The second generation is a crop of plants which seems to obey no law—which "sports" and varies in all directions; an example of which is shown in Fig. 1\*, all of which were produced from a single wheat grain the third year of growth after crossing. Some of the progeny show increased and some diminished energy; some show advance and improvement; others, deterioration. The grains are again produced by self-fertilization. From this generation the breeder selects the best single plant for further growth. The *third generation* is yielded by grain taken from the best plants of the second generation. The crop is still sportive and variable as regards some of the progeny; but in some the reaction and disturbance may be subsiding. The grains are produced by self-fertilization. The best and most promising plant is again selected for further growth. The fourth, fifth, sixth, and successive generations are reared and selected till disturbance completely subsides, and till fixity of character is attained: a new cross-breed is the result. Any variations which still appear after the third generation are usually reversions.

Fig. 2 shows parent barleys and an evolved type. The parents here figured are Edel, to the left, and Chevalier, to the right of the plate. Other parents used in the evolution were: Manschurian, Golden Melon, Jewel, and Italian. The evolved type shows the following characters: ear elongated like Chevalier; six-rowed, as in Manschurian and Edel; beards partially dropping off at maturity, as in Jewel; grain large and of good quality, as in the two-rowed parents.

From this course of events it is evident that a commercial breeder can have almost as many new varieties as he chooses.

\* The illustrations given are from a paper from which we quote, prepared by Prof. A. N. McAlpine, botanist to the Highland and Agricultural Society.

#### Winter Wheat--Varieties and Methods of Cultivation--Practical Reports.

The winter wheat plots on the Experimental Farm at Guelph, when visited by the writer, just before cutting, presented a most creditable appearance as a rule, though a few of them had not altogether survived the rigors of winter and spring. Early seeding gave by far the best results. This was particularly true of spring wheats. Among the latter Herrison's Bearded stands away ahead of all the others. It is a good milling wheat, has yielded about 30 bushels per acre, and weighs from 63 to 64 lbs. to the measured bushel.

Winter wheats, as a rule, were shorter in the straw than last year on the College Farm, but stood up and filled well, and were very free from rust. We noticed that the old Treadwell was a failure; but the Scott variety was fairly good. American Bronze has done fairly well, and the Surprise was good, as it usually is. Early Red Clawson was very good also, but its weak point is the straw being very liable to go down. Michigan Amber, an old sort, though noticed here for the first time this year, looked very well, as did Jones' Square Head, which stood the winter well. Early White Leader was scarcely as luxuriant on the Farm as we have noticed it elsewhere. Dawson's Golden Chaff was particularly fine, ranking at the top of the whole range of over 100 varieties that have been tested. We find from the records of the Experimental Union all over Ontario that it has given the largest yield of all the varieties tested in 1893 and 1894. It was also one of the least affected by rust, was one of the first to mature, produced the largest quantity of grain from 100 lbs. of straw, and its average yield over the Province was about 35 bushels. On the Experimental Farm plots it has averaged over 51 bushels per acre for three years.

In one very careful set of experiments the advantage of carefully selecting large and perfect grains for seed was very apparent.

On Mr. O'Brien's farm, near London, we noticed a promising 20-acre field of Amber Dye Mediterranean, a plump-headed, bearded wheat, of which he thinks highly. He had also Early Red Clawson and Golden Cross, but the latter was not so good as the others. We found a fine field of Dawson's Golden Chaff on the farm of Mr. E. M. Zavitz, Lobo, and another in the same locality, where it has been tested three years. In driving towards Delaware from Poplar Hill we saw an excellent field of Manchester, which is still a favorite with many. A few fields of Golden Cross or Volunteer were also observed. Mr. R. Gibson, of Delaware, was growing both Early White Leader and Dawson's Golden Chaff, the latter having rather stiffer straw, the former being a trifle longer both in straw and head. In our travels we have not seen larger or finer crops of wheat than on the Gibson farm. One of our staff found the Early White Leader doing well on Shore Bros' farm at White Oak, and noted that about Paris the Dawson Golden Chaff is very popular. In fact, it was there that Mr. Robt. Dawson, from whom it was named, found the first head of it in a field of Seneca Clawson wheat in 1881.

On the subject of varieties, methods of cultivation, etc., we have received the replies given below

#### Our Inquiries re Fall Wheat.

1st. Has the crop done well this season, and if not, why?

2nd. On what soils, following what other crop, with what manuring, early or late sowing, and with what method of soil preparation, has it done best?

3rd. What varieties have you or your neighbors grown most generally with best results?

4th. What new sorts have been tried? What were their characteristics, their good and weak points?

KENT.

W. A. McGeachy.—In this section winter wheat was a poor crop this season. It will not average half a crop. The ice during the winter smothered it completely in spots. A week's heavy frost in late spring, followed by a severe drought, damaged it badly, and what was left was badly infested with weevil. It was best on clay. Our best crop was on clay and clay loam. It was a meadow which we ploughed up immediately after the hay was harvested. Barnyard manure was spread upon it, and this was worked over until about September 15th, when we drilled in the wheat. The varieties most grown around here are American Bronze and Manchester.

We tried the varieties sent out by the Experimental Farm in the fall of 1893, but they failed to pan out right and so we discarded them.

ELGIN.

Chas. C. Ford.—Wheat is fair, on the whole, but the ice remaining on it during winter destroyed it in some places, and the frost in May killed considerable, yet the crop in general is fair.

On gravelly and clay soils it has done best, with summer-fallowing the previous season and manured pretty freely when fallow was ploughed in May or early in June.

With regard to period of sowing, early sowing proved best.

The old reliable Manchester variety is the best; as it is a kind that has done so well in the past, it is more or less generally sown. Red Clawson and Scott prove very good also.

In regard to new varieties, there has not been many tried. Early White Leader and Golden Cross are very good, but usually too weak in the straw. Surprise has been tried with poor results, as it is too coarse in the straw.

LAMBTON, E. R.

Ellis F. Augustine.—Although wheat came through the winter in splendid condition, prospects are only for fifty per cent. of full crop. Main cause of failure: late spring frosts followed by long-continued drouth.

It has done best on loamy soils following barley, or upon summer-fallow, or turned clover sod. Manuring shows best results when applied to previous crop, or where wheat follows clover, when used to stimulate the clover as a renovating crop. The most promising prospects are from medium early sowing upon a fine but compact seed-bed, with seed sown in drills.

Democrat continues to give best general satisfaction, while Manchester is also much esteemed. Volunteer or Golden Cross has not come up to expectations.

MIDDLESEX, S. R.

G. W. Ferguson.—The winter wheat in this vicinity this season is generally light, not at all up to the average; of course there are exceptions—some on high, rich, loamy soil is fairly good; that on low land has suffered from the frost, and in all places from the dry weather.

As regards culture: it is becoming common now to plant beans instead of summer-fallowing, which is much better than sowing peas, as was so often done formerly, since it leaves the ground perfectly clean, while the pea field was a nursery for weeds. The wheat, too, seems to succeed about as well by this method as by summer-fallowing, and the bean crop pays for the cultivation.

I have not learned of any new varieties being grown in this neighborhood. Red Clawson, Democrat, Manchester, Golden Cross, etc., are the varieties mostly grown.

MIDDLESEX, S. R.

Richard Gibson, "Belvoir Stock Farm."—1. Not done well, through ice forming in winter and smothering it badly in places. Also rust has been bad in places.

2. After peas and clover, early sowing, early ploughing, so as to get a firm bottom, and surface frequently worked.

3. Manchester, Golden Cross, and Democrat.

4. White Leader. Dawson's Golden Chaff, and a local variety called Victor. I like the Leader for my soil: it grows a good quality of grain—straw bright and strong enough to carry the head. This is now my third year, and shall put in one-half of what I grow. Dawson's Golden Chaff will be the other half. This is first season that I have grown it, and I like it.

MIDDLESEX, N. R.

J. W. Johnson.—With regard to winter wheat-growing in this locality, with some it has been a success and with others a failure. Some fields were injured more by the late frosts than others, particularly low land that was not well-drained. The late frosts, no doubt, has been the principal cause of the shortage this year, as I believe a majority of the farmers put the crop in in good condition.

There are various ways of preparing the land for winter wheat, and the system to adopt would depend on the nature and condition of the soil. Two of the best pieces in this locality were grown

on oat stubble. The soil a clay loam, ploughed as soon as the oats were taken off, then harrowed and rolled, it received then a dressing of well-rotted stable manure, at the rate of fifteen loads to the acre, ploughed again lightly about the first of Sept.; the seed was drilled in on the tenth.

One piece was sown with Red Clawson, the other Democrat. Although these two pieces have made a good record, it must be remembered the land was well underdrained and in good condition; previous to the oat crop, being clover sod with the second crop ploughed down. Winter wheat can be grown with good success after corn, where the land has been well-manured and well-cultivated, and the corn crop taken off time enough for the wheat seeding, which should not be later than the 15th of Sept. The Democrat has given as good satisfaction as any variety that has ever been introduced into this locality, although the Red Clawson has improved rather than retrograded, but perhaps the season has been somewhat favorable to it, as it is inclined to grow heavy straw in a damp season.

HURON, S. R.

A. P. Ketchen.—Fall wheat promises, on the whole, to be rather a light crop, being unusually short in the straw, caused in part by the severe frost in spring, and in part by the extreme drouth which followed. The sample, however, promises to be good.

The best fields are clay loam, with a tendency to heavier clay. Summer-fallow gives the best crop, though I cannot say the most profitable. The best system of culture seems to be that which pulverizes the soil thoroughly to a good depth, yet leaves it firm and compact. Personally, I like to have the land so firm when sowing that it will carry the horses nicely.

On good soils Manchester gives about the best yields, though on poorer lands Democrat is still the favorite. Red Clawson is a very good wheat, but has a tendency to rust.

I know of no new varieties worthy of mention. Jones' Winter Fife, Canadian Velvet Chaff, Harvest Queen, and some others were tried here; but have fallen into disrepute.

BRUCE, E. R.

James Tolton, Walkerton.—Wheat came out of the winter and in the early spring looking exceedingly well; in fact, the prospects were never finer, but the May frosts damaging it in many cases 50 per cent.; after the frosts the long-continued drouth has injured it very materially, and the last ten days or two weeks many fields have rusted considerably, so at present appearance about a half crop is about all that may be looked for. Many fields will be cut by July 18th. Best fields I have seen are on clay loam, following a pea crop over sod that was clean and in good heart, and the few summer-fallows are also fair. Early sowing on properly-prepared fields and (if not rich) well-manured are the conditions necessary for a crop.

Garfield is the best I have seen; other varieties sown are American Bronze, Early Red Clawson, Democrat, and a little Jones' Early Fife, but I noticed this variety has rusted worse than Garfield.

No new varieties other than those named have been sown in our neighborhood.

BRANT, N. R.

R. S. Stephenson.—Fall wheat has been badly winter-killed here and also much injured by the late frost. The most promising fields suffered most.

All soils suffered from winter-killing. The American Bronze seems to have given the best satisfaction in this vicinity, and seems well-adapted to the lighter soils. Red Clawson is a favorite with some, and White Clawson is also largely sown.

Among the new varieties, Genesee Giant is a promising wheat, but the straw seems rather brittle.

PERTH, S. R.

John Burns, Kirkton.—Generally speaking, the crop has done fairly well. The only places where it does not come up to a fair average is on bare fallow, or on undrained clay lands. The soil best adapted to fall wheat growing here is a limestone clay, or loamy clay, with porous subsoil or good artificial drainage, if the subsoil is retentive. No other way seems to give as good results as a pasture sod ploughed deeply and the manure worked in on the surface either with the gangplow or merely cultivated in with the seed when sowing. As a rule it is considered here that the first week in September is the best time to sow, and it is noticeable that September sowing, as a rule, gives better satisfaction than earlier.

Among varieties, Democrat has had the leading place, although a good many have been growing Golden Cross and early Red Clawson; but Democrat, I think, has proven itself to be the most reliable among those named, and certainly the most generally grown. In the newer varieties we have Dawson's Golden Chaff and American Bronze, both of which appear to give promise of being excellent varieties. In my own field the Bronze is, I think, the better of the two, having a longer straw, perfectly free from rust so far, and all together giving promise of the heaviest yield I have had for years. The Golden Chaff is growing in the same field and is considerably shorter in the straw and does not appear to carry as heavy a head as the Bronze. I consider the Bronze the most vigorous fall-grower I have ever had. It will, I think, be two or three days later in ripening than Golden Chaff, and consequently there is more danger of its suffering from rust than other sorts. All together, I judge both of these varieties to be