Combining Unevenly Ripened Wheat

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Montana dry land spring wheat farmers face a serious problem in the spring wheat harvest of 1928. This problem grows out of the condition of the 1928 growing season, and the widespread use of the combine harvester-thresher. The problem is one of avoiding a loss of from 10 to 15 per cent of the yield of grain, or a greater loss in the heating of unripened grain in storage. The situation, briefly, may be summed up in these three paragraphs:

1.—Unusually dry weather during April and May caused uneven germination of grain, which means that the same grain will ripen unevenly.

2.—The increased use of the combine harvester-thresher, or “combine”, which cannot be successfully used where grain ripens unevenly unless special attachments and equipment are used.

3.—The fact that so many farmers do not realize the danger of unevenly ripened wheat, and have made no preparations to meet the situation. (Special equipment must be ordered far ahead of the harvest season if its delivery is to be made certain.)

Weather and the Combine

During April and May there was dry and hot weather. Some of the grain germinated with moisture held over in the soil, but there were patches in almost every field that were too dry to germinate the wheat. This last wheat started its growth with the rains of early June. Thus each field has spots of grain that will ripen ahead of the rest of the field. It is believed that about 10 per cent to 15 per cent of the dry land grain germinated late and that the unripened grain at the usual harvest time will be about that proportion of the total field.

The combined harvester-thresher has come into wide use in this state and straight combining has been found to be most economical if the grain has ripened evenly. Unevenly ripened grain can cause much trouble with this combine method, however, for 10 per cent or more of immature (or green) grain will cause heating in the bin.

A considerable part of the grain this year did not stool as much as usual and Russian Thistles have grown up with the wheat. It is probable these thistles will reach high enough that the combine will cut off the green tips. These tips are heavy and will go through the combine with the grain, thus adding moisture in the binned grain and causing heating.

The Farmer’s Risks

When the larger part of the field is ripened, the wheat farmer wants to harvest as early as possible to escape the risk of hail and heavy storms. If he does not wait for the late grain to ripen in the field, he takes the risk of spoiled grain in the bin.
A Solution for the Combine Farmer

The Montana Experiment Station urges combine operators to use the combine this harvest season under one of the following conditions:

1. Cut the grain with a windrower, laying it in wide swaths where it can all ripen evenly and be picked up later by the combine; or

2. Cut and stack the grain with a header barge, threshing later with the combine beside the stacks. The grain will dry and ripen evenly in the header barge stacks.

Fig. 1. Commercial windrowi ng machine delivering 16-foot windrow in center of the cut.

Fig. 2. Rear view of combine harvester-thresher header platform used for windrowing. Thresher equipment has been removed and the header has been mounted on special truck at one end. Note side delivery with straws at right-angles to the windrow.
Combine Still Most Economical

Nothing in the situation this harvest season should cause combine operators to desert that method of harvest, nor cause other prospective buyers of combines to change their plans. The combine harvester with special windrowing and pick-up equipment will still be the economical method of harvest and will in many cases reduce costs enough to pay for the combine. But it is essential that combine operators either adopt windrowing
methods, or use the header barge for stacking grain that is to be threshed by the combine.

Not too much emphasis can be put on the warning that farmers who expect to purchase windrowing attachments from combine manufacturers should place their orders at once. Manufacturers will be unable to meet a demand that comes upon them heavily at the late harvest time.

**Purchasing New Equipment**

Hundreds of farmers have given up their binders and other equipment that was on the farm before the combine was purchased. These farmers will undoubtedly find it best and most economical to purchase the special windrow and pick-up equipment designed and built by the combine manufacturers.

![Fig. 5. Combine harvester-thresher threshing grain from the windrow using a commercial pick-up attachment which delivers the grain to the platform of the combine.](image-url)
Home Made Equipment

Where the binders are still on the farm, home made windrowing equipment may be used. The windrowing system used on the Campbell farms in southern Montana can be adapted to the general combine farm. Farmers living within reasonable distance of the Campbell farms can see the home

Fig. 6. End view of home-made windrow attachment on binder delivering grain in the windrow. (Campbell Farm.)

Fig. 7. Four 10-foot binders connected with binder-tractor hitches delivering grain in the windrow. (Campbell Farm.)
made windrow machines in operation. Complete sets of photos of the Campbell windrow machine are being supplied to each country agricultural agent in the state. By careful study of these photographs the farmer with some ingenuity can make his own windrow equipment before harvest time, if he starts his plans at once.

Fig. 8. Rear view of binders shown in Fig. 7.

Fig. 9. General view of flax windrows made by equipment shown in Fig's. 7 and 8. The grain in each windrow is from 40-foot swaths. (Campbell Farm.)
Fig. 10. Rear view of hay loader picking up windrows and delivering the grain to the combine for threshing. (Campbell Farm.)

Fig. 11. Side view of equipment shown in Fig. 10.
Windrowing Experiments

Rather extensive experiments with the windrowing machine have been carried on by the Montana Experiment Station at the Brockton tractor farm. While windrowing will not be generally used where grain is evenly ripened, it has been quite successful on fields where the grain had ripened unevenly, or where grain was quite weedy. Weeds tend to hold the windrows in a fluffy mass, making them easy to pick up for the combine. After drying in the windrows, the weeds are easy to clean out of the wheat, while green weeds in straight combining often present a serious problem. Bearded grain also is easier to pick up from the windrows. Farmers in northern Montana who have used the windrow method have reported that there is very little loss of grain even where the windrows are left for weeks through heavy storms.

Experiments show that hay loaders can be pulled behind the combine and the windrow can be picked up and dropped on the combine platform.

The Header Barge

The header attached to the stacker barge, pulled by a tractor, cuts the grain and elevates it into the stacker barge, which moulds a small stack of grain. This stack may be dumped from the barge in a convenient position for threshing later with the combine. A new and improved type of header barge has been built and tested by the agricultural engineering department of the Montana Experiment Station. Sets of photographs of this barge are in the hands of county agricultural agents. Wheat growers by studying these photographs and charts will be able to build their own header barges for the 1928 harvest if they start action at once.

Fig. 12. Header and stacker barge being drawn by tractor. Two-man outfit for heading and stacking grain.
Fig. 13. Side view of same equipment shown in Fig. 12.

Fig. 14. Header barge stacks.

**Drying “Rained-on” Windrows**

Several Montana farmers who have been practicing windrowig have successfully dried out the windrows after heavy heating rains by turning them with a side delivery rake, which not only places the windrows on top of standing stubble but also aerates the headed grain. (See quotation from Edward B. Mondale, Lewistown, on page 14.)

**The Combine and Short Straw**

A large part of the grain this year will have comparatively short straw and will entail heavy waste if cut with the binder, which cannot make satisfactory bundles out of short straw. Wheat farmers on large acreages will probably find it economy to purchase a combine and windrowing equipment this year to escape the loss of binding short straw wheat.
It is pointed out that in many cases two operators can purchase a combine together, use supplemental headers in short grain and thus get their harvest done at a cost low enough to justify the purchase of the combine.

Fig. 15. Front view of combine and supplemental header. The header delivers the headed grain to the platform of the combine. In this way a 34-foot swath is combined in one operation—adapted to light yielding grain.

Fig. 16. Rear view of equipment shown in Fig. 15.

Labor Problems

The increasing use of the combine in Montana's wheat areas has reduced the amount of itinerant harvest labor available. Farmers who desert the combine for the binder system this year will probably have greater trouble in getting satisfactory labor.
Summary

1. Wheat growers on large acreages should stick to the combine method of harvesting, but should use either the windrow method or the header barge method to insure against loss in the 1928 harvest season.

2. Preparations for use of the windrow attachment or the header barge must be started at once if the equipment is to be ready by harvest time.

3. County agricultural agents are prepared to give help in the construction of the home made windrow equipment or the header barge.

4. Where there are no old binders on the farm, it is better to purchase new windrow equipment from the manufacturers.

Windrowing Experiences

Following are excerpts from letters giving experiences of Montana farmers who have used the windrowing method of harvesting grain with the combine harvester-thresher.

Thomas D. Campbell, manager of the Campbell Farming Corporation, Hardin, Montana, says: "Every person who uses a combine soon learns that there are several objections to its use in spite of the fact that it is the most economical way of threshing grain. In order to combine a crop successfully, the grain must be absolutely ripe, uniformly matured and free from weeds. In order to have this maturity it has been necessary to wait a week or ten days longer than when the grain could be shocked. This delay always invites a serious weather hazard in a country where there is hail, and most large wheat growing sections are subject to hail. The green spots in a ripe field will cause the grain to heat in storage and green weeds are even worse. In fact, one of the big obstacles to the use of the combine is the moisture which comes from green weeds and immature wheat.

"In order to overcome these objections we have worked out a system of windrow harvesting whereby the grain can be cut and put in windrows a day or so earlier than it can be shocked. Uneven ripe spots will mature in the windrow and weeds will dry in a short time so that they can be threshed and separated. These windrows are made by taking several old binders, removing the binder head and equipping them with extension carriers as shown in illustrations (Figs. 6, 7, and 8) so that the successive cuts will be deposited in one continuous windrow. This method eliminates the necessity of a man on each binder, eliminates the cost of twine, the cost of shocking, and the great expense of collecting shocks from the field and delivering them to a stationary threshing machine. The binders usually are old machines which have been junked or if new a great saving can be made in the cost of the binder head. Very little power is required to pull them and there are practically no stops as there is nothing to get out of order. The extension carriers are made of light material and are supported from the binder except in cases of extreme length when they are supported on castor wheels. Any of the commercial hitches for hauling two or more binders behind a tractor can be used. We make the extension carriers of the same width as the platform canvas so that old platform canvas can be used. The most desirable arrangement for the average farm is three 8-foot binders, making a 24-foot windrow and a 16-foot combine. Three such binders pulled by a three-plow tractor will average 75 to 80 acres per day with two men.

"After the grain has become sufficiently matured in the windrow we take our combines, raise the cutter bar and attach an ordinary hay loader with a double cylinder to the combine and usually find that the ordinary 16-foot com-
bine has no difficulty in handling the 24-foot windrow. Two men operate the combine and engine as there is no adjustment necessary to the cutter bar. The hay loader automatically cleans the ground and there is less waste than in the shock rows. We have found that our grain matures better in the windrow, is safer from weather hazards, even wind, after 24 hours, but the great advantage is the reduced cost and the fact that the farmer's threshing is done in a day or two after he is through cutting. The grain is fed into the combine in a uniform stream from the windrow and in case it is too heavy the tractor pulling the engine can go in low speed. With this system four men will do all the cutting and threshing of 640 acres of land and the saving will pay for the entire outfit in one year. There is never more than one or two day's cutting down and in event of rain there is only a small amount to be damaged. There is no waiting for the community threshing machine and there is no damp grain from the combine. Our records for several years show that this method saves from $2.50 to $4.00 per acre from the old method of shock threshing. By using a straw spreader on the combine all of the straw is left on the field and can be used as a fertilizer. This method works equally well in all kinds of grain and is particularly effective in the threshing of flax, which has always been a problem to the farmer, especially in wet weather. It is impossible to feed flax uniformly by using the old bunch method but with a windrow the flax is fed with absolute uniformity. Extension carriers can be made for less than $10.00 each, not including the canvas. Most combine manufacturers are now making a windrowing machine which is very serviceable and can be purchased at a reasonable cost if a farmer does not care to make his own windrowing equipment.

Rain on the Windrows

Edward B. Mondale of the Mondale-Secor Implement Co., Lewistown, Montana, relates the following experience in drying windrowed wheat that has been rained upon: "Referring to the use of the side delivery rake for turning windrows of wheat will say that Anderson Bros. of Hanover, Montana windrowed 700 acres of wheat. As the season was very wet the grain settled down into the ground so firmly that it was difficult to pick up. So we used a --- side delivery hay rake with entire satisfaction. Although some of the wheat laid on the ground for seven and eight weeks through the heavy rain storms we had last fall, yet the threshed wheat did not lose its dark color."

"I do not think that the side delivery rake shatters any of the grain and I believe that if the windrow system is to be used and farmers are to protect themselves against wet falls, then they must provide side delivery hay rakes so that when the wheat lays on the ground and passes through heavy rain that it can be turned and dried out. We picked up this wheat with a --- make cylinder type hay loader and observed that it did not shatter the grain."

Follows Campbell System

G. C. Morton, manager of the F. H. Gilchrist Farm Companies, Lewistown, Montana, tells of his experience with the windrow method of harvesting with a combine as follows: "A short time ago (Sept. 27, 1927) we visited the Campbell Farm at Hardin to investigate Mr. Campbell's method of windrow harvesting."

"We spent considerable time watching his operations and, from the men in charge, we got all the information we could regarding the advantages and disadvantages of this new process. As a result we all returned home feeling quite confident that this new method would solve most of the combine problems of the central Montana farmer.

"Anderson Bros., who were operating one of the larger Gilchrist farms last year, windrowed 800 acres of wheat. Some of it was damaged by hail and contained a lot of short green heads. Some of their winter wheat died and was reseeded to spring wheat and this grain ripened very unevenly. It was impossible for ordinary methods to be used on these fields and it would have been
difficult to have harvested the crop with binders. Consequently, they decided to try out the Campbell method."

"The method worked out quite well. There were some disadvantages, of course, and the Anderson Bros. discovered some things which they will improve upon another season. We used a manufactured pick-up which did a good job except where the heads were cut short and the straw laid in the same direction in which the combine was being operated.

"Taking it as a whole, we do not believe that there is any more grain loss than by the binder method, or the common method of combining. I believe that Campbell's system of picking up windrows with the two-cylinder type of hay loader will work out very well."

"We found that the grain which was combined from the windrow retained its beautiful color and graded dark, while the same kind from a field that stood until October 8 and was combined by the ordinary method at the same time as the windrowed wheat and went through the same amount of rain, was very badly bleached and lost all of the dark grade. Also, all green kernels and pieces of green weeds have completely dried and to see the combined grain one would think it had come from a threshing machine. One difficulty we have had so far is having been held up a good deal because of showers. A slight shower will stop the operations just as quirkily as it would if the grain was standing in the field and being combined by the usual method."