Hard Red Spring and Durum Wheats

GUIDELINES for SWATHING

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Swathing at the proper stage of grain maturity is important to obtain maximum yields of hard red spring and durum wheat.

Very little research has been done to determine the effect of swathing time on different hard red spring or durum wheat varieties or comparing hard red spring and durum wheat. Molberg (1) found that Selkirk hard red spring wheat could be swathed without loss in yield when the kernel moisture was between 25 and 38 per cent. Dodds (2) obtained similar results in two different years using Rescue and Chinook.

The purpose of these trials was to (a) establish field criteria which can be used to determine proper swathing time, (b) determine if there are swathing time differences among hard red spring wheat varieties or between hard red spring wheat and durum, and (c) if there are differences from year to year.

MATERIALS AND METHODS

Three hard red spring varieties, Crim, Manitou, and Justin, and one durum variety, Leeds, were selected to study the effect of swathing at different stages of maturity. Crim is an early maturing, bearded variety from Minnesota (3); Manitou is a medium early maturing, non-bearded variety from Canada (4); Justin is a medium late maturing, non-bearded variety from North Dakota (5); and Leeds is a recent release of the U.S.D.A. and the North Dakota Agricultural Experiment Station (6).

The trials were conducted from 1966 through 1968. The hard red spring varieties were sown at 60 pounds per acre while the durum was sown at 75 pounds per acre with a disc seeder having 12 inch row spacing. The trial was designed as a split plot replicated four times. The plots were sown on summerfallow which had been fertilized by broadcasting 100 pounds per acre of 11-48-0 prior to seeding. The plots were sprayed for weed control.

All varieties were swathed at intervals, beginning when the wheat had finished filling and ending when it was fully ripe. Six, eight and nine cuttings were made in 1966, 1967 and 1968, respectively. At each swathing stage samples were threshed, the grain weighed and then oven dried at 67°C for 24 hours to nearly zero per cent moisture. The samples were then reweighed to determine the kernel moisture content at cutting time. At each cutting date straw color, head color, kernel color, kernel hardness, and kernel maturity were estimated. Straw and head color were classified on the basis of the estimated amount of yellow or green straw present. Kernel color was noted as either green, yellow, or "ripe"; kernel maturity was classified as late milk, early, medium, or hard dough; and kernel hardness was evaluated as to whether it could be crushed between the fingers or had to be cut with a sharp object.

After the plots had been threshed, yield, test weight, grain color, kernel weight and wheat protein were determined.

In 1966 the germination percentage of the grain from the various treatments was determined in a standard germination test.

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RESULTS

Yield and Test Weight:

The yield and test weight results for all wheats tested as affected by stage of swathing were similar in each of the three years. This would be expected, as grain passes through definite stages in the ripening process which are not altered much by seasonal conditions.

Yields of hard red spring and durum wheat were not reduced significantly when grain was swathed between 25 and 35 per cent kernel moisture content. (Figure 1). When the grain was swathed with a kernel moisture of 40 per cent or above, the yields were reduced. The reduction became progressively larger as grain was swathed at higher kernel moisture content. When the swathing was delayed until the kernel moisture content was below 25 per cent, there was a slight yield reduction in Crim, Justin and Leeds. This reduction did not occur every year. The yield reduction occurred most often in Crim and was probably due to shattering. Manitou, which is quite shatter resistant, did not show this slight yield reduction in any of the three years. The hard red spring and durum wheat appeared to react the same to stage of swathing.

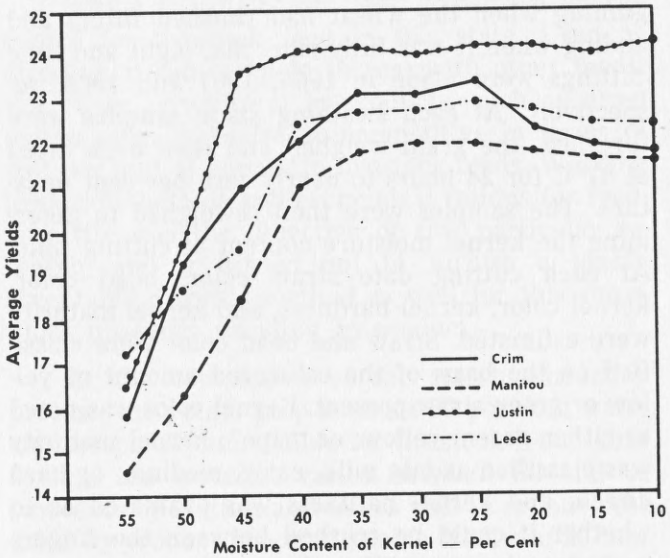

Figure 1. Average yields of Crim, Manitou, and Justin Hard Red Spring Wheat and Leeds Durum swathed at different stages of kernel moisture content from 1966-1968.

Test weights of the hard red spring and durum wheat changed little when swathed at a kernel moisture of 35 per cent or below. When the grain was swathed at higher kernel moisture contents, test weights were reduced.

The combined three-year average test weights of hard red spring and durum wheat at the different kernel moisture contents are given in Figure 2.

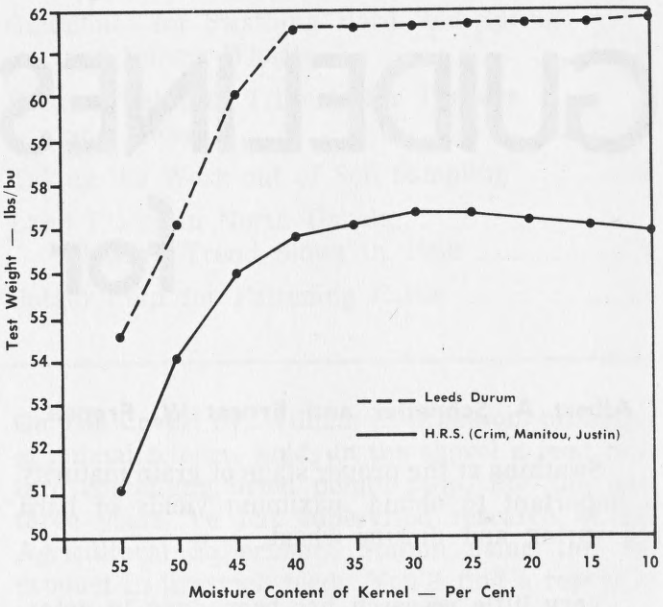

Figure 2. Combined three year (1966-1968) test weights of Crim, Manitou, and Justin Hard Red Spring Wheat and Leeds Durum when swathed at different kernel moisture contents.

Threshed Grain Color:

The threshed grain color of hard red spring and durum wheat swathed at different times did not change when the kernel moisture content was below 35 per cent. Threshed grain from wheat swathed at the 40 per cent kernel moisture stage had a slightly greenish tinge. As moisture content increased the kernels became progressively greener. There is close relationship between the estimated per cent of green kernels at swathing and the estimated per cent of green kernels which are green when swathed remain green after drying, while those that are yellow or gold dry to normal color.

Grain cut green was generally harder to thresh but threshed cleaner than grain cut at late stages of maturity.

Germination of Threshed Grain:

No significant differences in germination percentages were found between grain swathed at high or low kernel moisture percentages in either hard red spring or durum wheat.

1,000 Kernel Weight:

One-thousand kernel weight is a guide for measuring kernel development. There was little change in kernel weight when grain was swathed at 40 per cent kernel moisture content or below. When grain was swathed at higher than 40 per

cent kernel moisture content, the kernel weight decreased progressively. This decrease in kernel weight indicated the kernel had not reached maturity. There were no differences between the hard red spring wheat varieties or between hard red spring or durum wheat.

Grain Protein Content:

There was no consistent correlation between the protein content of the threshed grain and the time of swathing.

FIELD OBSERVATION FOR DETERMINING THE PROPER TIME TO SWATH

Head and Straw Color:

Neither head nor straw color was consistent from year to year with regard to the best time to swath. There was a high amount of variation between color of the head and straw color from year to year at specific kernel moisture contents.

Kernel Maturity and Color:

In the stages of development following the milk stage, the kernel becomes progressively harder and the color changes. During the early milk stage the kernel is green, but it loses its green coloring as it matures, and by the end of the milk stage has become a pale yellow. The color then gradually darkens as the kernel hardens, until it takes on the color of mature grain.

Kernel maturity, hardness, and color appear to be fairly good indicators of the proper time to swath. Apparently both hard red spring and durum wheat can be swathed in the early to medium dough stage without loss of yield, test weight, or color. At this stage the kernels are yellow without a trace of green, and can be crushed between the fingers without finding any "milk." Kernel moisture content at this stage of maturity is usually 35 to 40 per cent.

At the 25 per cent kernel moisture stage the grain is in the hard dough stage and the kernels can no longer be crushed, but must be cut with a sharp object.

The average length of time between the 40 per cent and the 25 per cent kernel moisture content stage was seven days in 1966, five days in 1967, and seven and one-half days in 1968. This stage averaged seven days for Manitou and Crim, six days for Justin, and five days for Leeds durum.

SUMMARY

Three hard red spring wheat varieties, Crim, Manitou, and Justin, and one durum wheat variety, Leeds, were swathed at different stages of kernel moisture content to determine proper stage for swathing, and to determine if there were varietal differences among hard red spring wheats or between hard red spring and durum wheat.

Yields of all varieties were highest when the grain was swathed between 35 per cent and 25 per cent kernel moisture content. Below 25 per cent kernel moisture content, there was a slight yield loss in Leeds, Crim, and Justin, believed to be due to shattering. Yields of Manitou, which is more shatter resistant, did not change significantly below the 25 per cent kernel moisture content.

The test weights of the hard red spring and durum wheats did not change significantly when cut below 35 per cent kernel moisture content.

Threshed grain color did not change below 35 per cent kernel moisture content. Grain swathed at moisture contents higher than 35 per cent had a greenish color which it retained after drying.

One-thousand kernel weight did not change significantly when grain was swathed at the 40 per cent kernel moisture content or below.

Seed germination and grain protein did not appear to be affected by swathing at different stages of kernel moisture content.

Straw and head color were inconsistent from year to year and could not be satisfactorily used to determine the proper stage of swathing.

Kernel maturity and color appear to be the most reliable and practical field indicators of the proper time to swath wheat. Wheat can be swathed in the early to medium dough stage, or when the kernels no longer have a trace of green color, without a loss in yield or test weight. Kernels at this stage of maturity and color had 35 to 40 per cent kernel moisture content.

There appeared to be little difference between hard red spring wheat varieties nor between spring and durum wheat relative to the proper time to swath. This was true each year of the study.

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