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# Will..... WINTER BARLEY



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# WILL WINTER BARLEY

by

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Will winter barley is a high-yielding, stiff-strawed variety that is winterhardy and tolerant to greenbugs (*Schizaphis graminum* (Rondani)) and corn leaf aphids (*Rhopalosiphum maidis* (Fitch)). Corn leaf aphids are frequently mistaken for greenbugs. Its yield capacity and winterhardiness level exceeded both Rogers and Harbine during the testing period. These characteristics should make barley production more stable throughout Oklahoma.

Will was developed in the small grain breeding program conducted cooperatively by the Oklahoma Agricultural Experiment Station and U.S.D.A. and was released in 1963.

## The Breeding Of Will

Will (C.I. 11652)<sup>2</sup> resulted from a cross between Rogers (C.I. 9174) and Kearney (C.I. 7580) made at Oklahoma State University in 1952. The origin and description of Rogers is given by Schlehuber et al. (1). Kearney, developed by the Nebraska Agricultural Experiment Station, is a very winterhardy, greenbug tolerant variety that exhibits weak straw, low yields, and poor test weights in Oklahoma. A description and history of Kearney is presented by Wiebe and Reid (2). Both Kearney and Rogers originated as selections from Composite Cross III C.I. 5530 described by Johnston and Schlehuber (3).

Will was developed by the bulk hybrid method of breeding. The F<sub>2</sub> and F<sub>3</sub> populations were grown at Woodward during years when winter-killing eliminated a majority of segregates with the winterhardiness level of Rogers. Kearney and the bulk F<sub>3</sub> population had 75 percent winter survival; whereas Rogers had only 10 percent survival. From 1956 to

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<sup>2</sup>C. I. numbers are Cereal Accession Numbers of the Crops Research Division, ARS, USDA.

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1958 the population was grown at Stillwater, first as a bulk hybrid and later as head rows and progeny blocks. Initial selections were based on powdery mildew and greenbug tolerance as well as agronomic appearance. In 1960, two selections (C.I. 10879 and C.I. 10880) were entered in the Oklahoma Experiment Station Variety Test. In 1961, they were included in the Oklahoma State-Wide Small Grain Tests, the Uniform Winter Barley Winterhardiness Nursery and the Uniform Barley Yield Nursery (Semi-hardy Varieties). In 1962, due to their good winterhardiness, they were also entered in the Uniform Winter Barley Nursery (Hardy Varieties). Since then they have been grown continuously in all the aforementioned tests.

Breeder's seed was produced by head selection directly from the 1960 nursery plots and subsequently increased as progeny head rows. The performance and appearance of C.I. 10879 and C.I. 10880 were so similar in both Oklahoma and Regional Tests that the two strains were composited. This foundation seed was released to Certified Seed Growers for fall seeding in 1963.

## Description

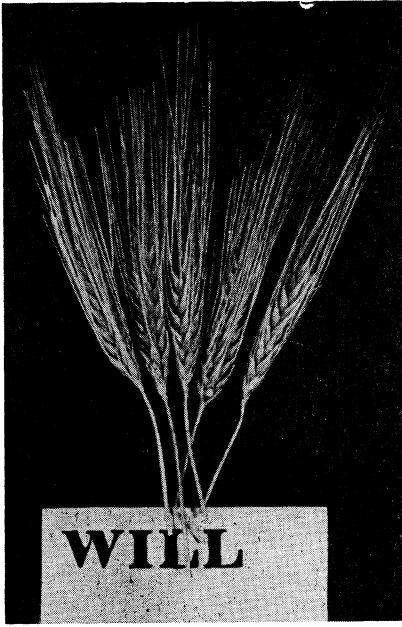
Will is a six-rowed, rough-awned, mid-tall winter barley variety that matures midseason to late.

When seeded in the fall, early plant growth is prostrate to semi-prostrate with long, narrow, drooping leaves. Basal leaf sheaths are non-hairy and auricles are green in immature plants.

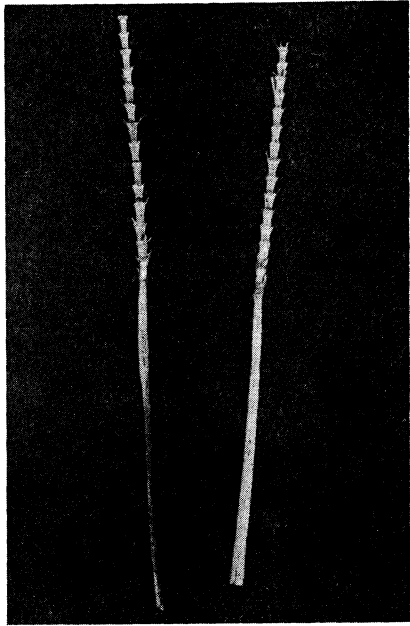
The exposed nodes are green when immature and may be covered with a whitish bloom while the plant is green. Stems are yellow at maturity and quite strong. Will has less straw breakage than Kearney, the parent variety, and is more similar to Rogers in this respect.

Spikes (Figure 1) are lax to dense, parallel, mid-long and inclined with occasional nodding heads when ripe. Collars are usually closed. The rachis internodes tend to be shorter and thicker than those of Rogers (Figure 2), and seem to be the best method of identifying these two varieties without subjecting them to special tests. The lemma awns are long with barbs the entire length of the awn. Glumes are approximately one half the length of the lemma and glume awns are about the same length as the glumes.

Kernels are white to light blue, midlong, with few lemma teeth on the lateral and marginal nerves. Rachilla hairs are short.



**Figure 1.** Typical spikes of Will are lax to dense, parallel, and midlong. Awns are barbed.



**Figure 2.** Rachis internodes of Will (right) are shorter and thicker than those of Rogers (left). Rachis edges are hairy.

## Greenbug Tolerance

Differences in tolerance of barley varieties to greenbugs was noted by Atkins and Dahms in 1945 (4). Since all tolerant strains were low yielding, weak-strawed types, it was necessary to transfer the greenbug tolerance into adapted varieties by hybridization. Will is the first variety of winter barley developed with this objective in mind.

Although the exact nature of greenbug tolerance is unknown, varieties such as Will can withstand heavy greenbug feeding. Part of this tolerance is due to the fact that greenbugs are attracted less to these varieties and cannot produce young in large numbers on them.

An experiment, conducted under field conditions at Stillwater in the 1963-64 crop year, assessed the performance of six strains of winter barley under greenbug infested and controlled conditions. One-half of

the experimental plots of each strain was uniformly infested with greenbugs on three different occasions during the growing season. The other half was sprayed periodically to control both natural and artificial infestations of greenbugs (Tables 1 and 2). The severity of the infestation is shown by Rogers grown in the infested plots (Figure 3).

Greenbug infestation on Will and other tolerant varieties was approximately half that on Rogers throughout the growing season. Low yields on Rogers were caused primarily by the destruction of the majority of the plants by greenbugs. In addition to reduced head numbers, Rogers also had fewer seeds per head and lower seed weight than the control. Greenbugs also lowered the test weight, caused later heading and shorter plants than the control.

Will was harmed by greenbugs much less than Rogers for all characteristics studied. Yield was reduced only 0.4 bushel, despite some reduction in the average number of heads. This reduction in head number

**Table 1. Agronomic data for six strains and varieties of winter barley grown in greenbug infested and control nursery plots at Stillwater, Oklahoma in 1963-64.<sup>1</sup>**

| Variety<br>or<br>Strain | C. I.<br>or<br>Sel. No. | Greenbugs<br>No. <sup>2</sup> | Test Weight<br>(Lbs./Bu.) |                | Date Headed    |                | Height (Inch)  |                |
|-------------------------|-------------------------|-------------------------------|---------------------------|----------------|----------------|----------------|----------------|----------------|
|                         |                         |                               | C <sup>3</sup>            | I <sup>3</sup> | C <sup>3</sup> | I <sup>3</sup> | C <sup>3</sup> | I <sup>3</sup> |
| Average                 |                         |                               |                           |                |                |                |                |                |
| Will (T) <sup>4</sup>   | 11652                   | 24                            | 48.6                      | 47.8           | 4-30           | 5-1            | 26             | 27             |
| Omugi (T)               | 5144                    | 31                            | 45.9                      | 44.9           | 4-28           | 4-28           | 29             | 28             |
| Rogers X<br>Kearney (T) | 11874                   | 26                            | 49.0                      | 51.2           | 4-30           | 5-2            | 27             | 27             |
| Rogers X<br>Omugi (T)   | 11664                   | 25                            | 50.6                      | 49.5           | 5-3            | 5-4            | 25             | 25             |
| Kyong No. 2 (T)         | 9225                    | 28                            | 46.4                      | 47.9           | 4-24           | 4-27           | 26             | 25             |
| Rogers (S)              | 9174                    | 53                            | 49.6                      | 44.6           | 5-2            | 5-3            | 26             | 23             |
| Average:                |                         |                               |                           |                |                |                |                |                |
| All Varieties           |                         | 31.2                          | 48.4                      | 47.6           | 4-30           | 5-1            | 26.5           | 25.5           |
| Excluding Rogers        |                         | 26.8                          | 48.1                      | 48.3           | 4-29           | 4-30           | 26.6           | 26.4           |

<sup>1</sup>Tests were arranged in a split-plot design with three replications, planted on November 1, 1963, at the rate of 1.5 bushels per acre.

<sup>2</sup>Varieties were infested with greenbugs on November 9 and November 27 in 1963 and on January 16, 1964. The data represent the average number of greenbugs per linear foot that were on the varieties throughout the test.

<sup>3</sup>C = Control; I = Infested

<sup>4</sup>T = Tolerant; S = Susceptible

**Table 2. Yield, number of heads, number of seeds per head and kernel weight for six strains of winter barley grown in greenbug infested and control nursery plots at Stillwater, Oklahoma in 1963-64.**

| Variety<br>or<br>Strain   | YIELD          |                | YIELD COMPONENTS |                |                |                |                  |                |
|---------------------------|----------------|----------------|------------------|----------------|----------------|----------------|------------------|----------------|
|                           | (Bu/A)         |                | Heads Per Plot   |                | Seeds Per Head |                | Seed Weight (Mg) |                |
|                           | C <sup>1</sup> | I <sup>1</sup> | C <sup>1</sup>   | I <sup>1</sup> | C <sup>1</sup> | I <sup>1</sup> | C <sup>1</sup>   | I <sup>1</sup> |
|                           | Average        |                |                  |                |                |                |                  |                |
| Will                      | 69.0           | 68.6           | 480              | 391            | 40.62          | 44.95          | 32.41            | 33.44          |
| Omugi                     | 65.2           | 70.6           | 454              | 444            | 48.19          | 51.04          | 30.23            | 30.24          |
| Rogers X Kearney          | 69.9           | 65.7           | 466              | 456            | 39.58          | 37.79          | 34.87            | 34.49          |
| Rogers X Omugi            | 62.2           | 60.2           | 620              | 601            | 26.03          | 24.33          | 34.83            | 35.21          |
| Kyong No. 2               | 66.4           | 54.5           | 517              | 376            | 44.19          | 44.28          | 31.08            | 32.37          |
| Rogers                    | 72.5           | 9.8            | 469              | 65             | 38.84          | 34.13          | 32.87            | 31.94          |
| Average:                  |                |                |                  |                |                |                |                  |                |
| All Varieties             | 67.5           | 54.9           | 501              | 389            | 39.58          | 39.42          | 32.72            | 32.95          |
| Excluding Rogers          | 66.5           | 63.9           | 507              | 453            | 39.72          | 40.50          | 32.68            | 33.15          |
| Percent of Control:       |                |                |                  |                |                |                |                  |                |
| All Varieties             |                | 81.3           |                  | 77.6           |                | 99.6           |                  | 100.7          |
| Excluding Rogers          |                | 96.1           |                  | 89.3           |                | 102.0          |                  | 101.4          |
| L.S.D. (.05) <sup>2</sup> | 13.2           | 13.2           | 126              | 126            | 3.3            | 3.3            | 2.03             | 2.03           |
| L.S.D. (.05) <sup>3</sup> |                | 18.7           |                  | 171            |                | 4.86           |                  | 1.94           |

<sup>1</sup>C = Control; I = Infested

<sup>2</sup>For comparing differences among varieties within Control or Infested Treatments.

<sup>3</sup>For comparing variety differences between Control and Infested Treatments.

was almost completely compensated for by increases in seeds per head and in seed weight. The other greenbug-tolerant strains performed similar to Will, although there were some differences.

Figure 4 illustrates the yield stability of tolerant varieties under heavy greenbug infestations. Although yields were reduced in five of the six strains, only Rogers showed a significant yield decrease.

## Yield

### Variety Tests

Will was compared for yield with other adapted varieties in the Variety Test trials at Stillwater, Woodward, Cherokee and Goodwell for four years and at Granite for two years (Table 3). Goodwell data are



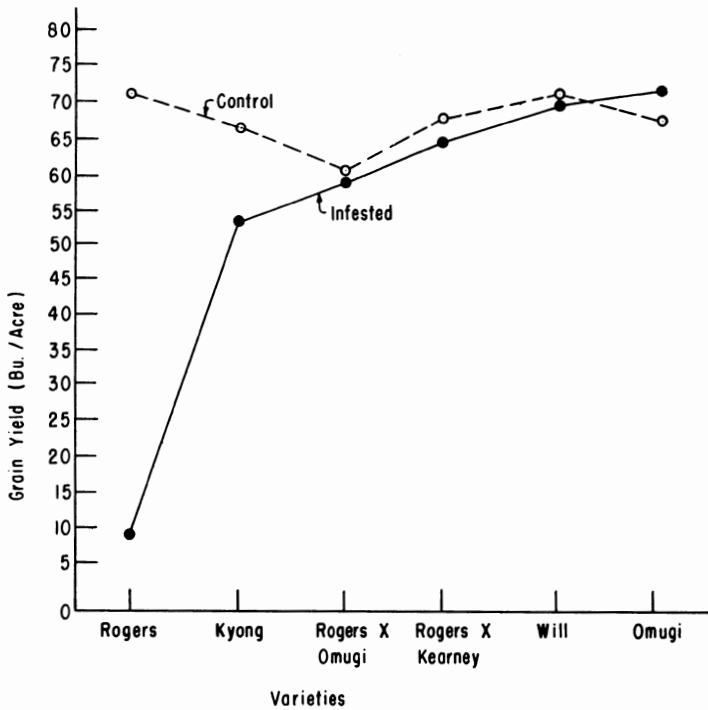


**Figure 3. Response of experimental plots of Will and Rogers winter barley to greenbug infestation at Stillwater. Photographed on May 20, 1964.**

not reported for 1960 due to severe winterkilling and for 1962 when the nursery was destroyed by hail.

Will consistently outyielded Rogers and Harbine in nursery trials, with the greatest advantage occurring in 1960 and 1963 when it produced respective yields of 26 and 35 percent more than Rogers. Part of this yield advantage undoubtedly resulted from its superior winterhardiness when low temperatures caused killing and stunting in Rogers and Harbine. However, under growing conditions characterized by a mild winter and no winterkilling of any of the three varieties, as in 1961, Will outyielded Rogers by 10 percent and Harbine by 25 percent.

No heavy infestations of greenbugs occurred in these yields trials, but if they had it seems logical to assume that the yield advantage of Will would have been considerably greater.



**Figure 4. Yield of six varieties of winter barley grown under controlled and greenbug infested conditions at Stillwater, Oklahoma, in 1964.**

### State-Wide Tests

Will also exhibited high-yielding ability in the State-Wide Tests conducted on various farms and experiment stations throughout Oklahoma during the past three years (Table 3).

Will's yield advantage will probably be more fully realized in the western half of Oklahoma, where winterkilling is more severe, than in the eastern half, although Will has performed quite satisfactorily in the Eastern area (Table 3). The State-Wide Tests conducted for 26 station-years, show that Will has practically the same relative yield advantage over Rogers and Harbine as it does in the Variety Tests. Its performance in both the State-Wide and Variety Test indicates its adaptability to all sections of Oklahoma.

**Table 3. Grain Yields of Will, Rogers, and Harbine, 1960-1963.**

| Variety | Experiment Station Variety Test <sup>1</sup> |      |                       |      |                       |      |                                    |      |                      |      |                 |                |
|---------|--|------|-----------------------|------|-----------------------|------|------------------------------------|------|----------------------|------|-----------------|----------------|
|         | Stillwater<br>1960-1963                      |      | Woodward<br>1960-1963 |      | Cherokee<br>1960-1963 |      | Goodwell <sup>2</sup><br>1960-1963 |      | Granite<br>1962-1963 |      | 17 Sta. - Years |                |
|         | Av.  | Rank | Av.                   | Rank | Av.                   | Rank | Av.                                | Rank | Av.                  | Rank | Av.             | % of<br>Rogers |
| Will    | 64.8   | 1    | 46.1                  | 1    | 57.6                  | 1    | 65.2                               | 1    | 21.6                 | 1    | 51.1            | 122            |
| Rogers  | 53.0   | 2    | 34.8                  | 2    | 52.6                  | 2    | 58.4                               | 2    | 15.8                 | 2    | 41.7            | 100            |
| Harbine | 46.0   | 3    | 28.3                  | 3    | 47.1                  | 3    | 33.8                               | 3    | 15.4                 | 3    | 34.3            | 82             |

|         | Oklahoma State-Wide Tests |      |                  |      |                  |      |                 |        |
|---------|---------------------------|------|------------------|------|------------------|------|-----------------|--------|
|         | Northwest                 |      | Southwest        |      | Eastern          |      | 26 Sta. - Years |        |
|         | 1961-1963                 |      | 1961-1963        |      | 1962-1963        |      | % of            |        |
|         | Av. <sup>3</sup>          | Rank | Av. <sup>3</sup> | Rank | Av. <sup>4</sup> | Rank | Av.             | Rogers |
| Will    | 44.4                      | 1    | 58.3             | 1    | 59.9             | 1    | 53.3            | 124    |
| Rogers  | 34.3                      | 2    | 45.3             | 2    | 54.1             | 2    | 43.1            | 100    |
| Harbine | 28.0                      | 3    | 40.3             | 3    | 47.5             | 3    | 37.2            | 86     |

<sup>1</sup>Only C.I. 10879 data were used for Will in 1963.

<sup>2</sup>All entries were winterkilled in 1960 but are included as zero yields in the Goodwell average. No data are included for 1962 since the entire test was destroyed by hail.

<sup>3</sup>10 Station-years.

<sup>4</sup>6 Station-years.

## Winterhardiness

Will averaged approximately 30 percent more winter survival than Rogers in both the Oklahoma State-Wide and Experiment Station Variety Tests (Tables 4 and 5).

Table 6 compares Will with some of the most winterhardy commercial varieties grown in the United States. Considering the 45 station-year average which represents winter kill results from 18 Northern states and Canada, Will is superior to Dayton and almost equal to B475. However, the adverse winter of 1963 demonstrated that its winterhardiness level is considerably below that of Kearney, Chase, and Reno. Despite a winterhardiness disadvantage, Will yielded 34 percent more than Kearney for the 45-station-year average.

Figure 5 shows the relationship between winter survival and yield of Will, Rogers, and Harbine grown in Variety Tests at five locations in Oklahoma during the 4-year period 1960-1963. Despite large annual fluctuations in yield, Will outyielded Rogers and Harbine even in years with no winterkilling. This feature of Will should help to stabilize barley production in Oklahoma.

**Table 4. Percent winter survival of Will, Rogers, and Harbine in Experiment Station Variety Tests in Oklahoma, 1960-1963.**

| Variety           | C.I. No. | Location   |      |      |      |     |          |      |      |      |     |          |      |      |      |     |
|-------------------|----------|------------|------|------|------|-----|----------|------|------|------|-----|----------|------|------|------|-----|
|                   |          | Stillwater |      |      |      |     | Woodward |      |      |      |     | Cherokee |      |      |      |     |
|                   |          | 1960       | 1961 | 1962 | 1963 | Av. | 1960     | 1961 | 1962 | 1963 | Av. | 1960     | 1961 | 1962 | 1963 | Av. |
| Will <sup>1</sup> | 11652    | 100        | 100  | 99   | 91   | 98  | 99       | 100  | 99   | 25   | 81  | 83       | 100  | 99   | 93   | 94  |
| Rogers            | 9174     | 75         | 100  | 99   | 41   | 79  | 75       | 100  | 97   | 2    | 69  | 41       | 100  | 98   | 28   | 67  |
| Harbine           | 7524     | 59         | 100  | 99   | 30   | 72  | 73       | 100  | 86   | 1    | 65  | 21       | 100  | 97   | 39   | 64  |

| Variety           | C.I. No. | Location |      |      |      |     |         |      |     |    |     | 18-Sta. Years |             |
|-------------------|----------|----------|------|------|------|-----|---------|------|-----|----|-----|---------------|-------------|
|                   |          | Goodwell |      |      |      |     | Granite |      |     |    |     | Av.           | % of Rogers |
|                   |          | 1960     | 1961 | 1962 | 1963 | Av. | 1962    | 1963 | Av. |    |     |               |             |
| Will <sup>1</sup> | 11652    | 0        | 100  | 79   | 98   | 69  | 100     | 100  | 100 | 87 | 128 |               |             |
| Rogers            | 9174     | 0        | 100  | 29   | 50   | 45  | 100     | 85   | 93  | 68 | 100 |               |             |
| Harbine           | 7524     | 0        | 100  | 24   | 64   | 47  | 100     | 86   | 93  | 66 | 97  |               |             |

<sup>1</sup>Actually the average of C.I. 10879 and C.I. 10880 which were later composited under the variety designation Will.

**Table 5. Percent winter survival of Will, Rogers, and Harbine in State-Wide Tests, 1962-1963.**

| Variety | C.I. No. | Northern      |                        | Southern      |                        | Eastern       |                        | 23 Station Years |             |
|---------|----------|---------------|------------------------|---------------|------------------------|---------------|------------------------|------------------|-------------|
|         |          | 1962-1963 Av. | % of Rogers 9 Sta.-Yr. | 1962-1963 Av. | % of Rogers 8 Sta.-Yr. | 1962-1963 Av. | % of Rogers 6 Sta.-Yr. | Av.              | % of Rogers |
| Will    | 11652    | 78            | 167                    | 93            | 123                    | 98            | 106                    | 89               | 129         |
| Rogers  | 9174     | 47            | 100                    | 76            | 100                    | 93            | 100                    | 69               | 100         |
| Harbine | 7524     | 45            | 96                     | 73            | 95                     | 91            | 98                     | 66               | 97          |

Locations were included where no differential winterkilling occurred.

**Table 6. Percent winter survival comparisons of Will and other winter barley varieties in the Uniform Regional Winter Barley Nursery (Hardy Varieties), 1962-1963.<sup>1</sup>**

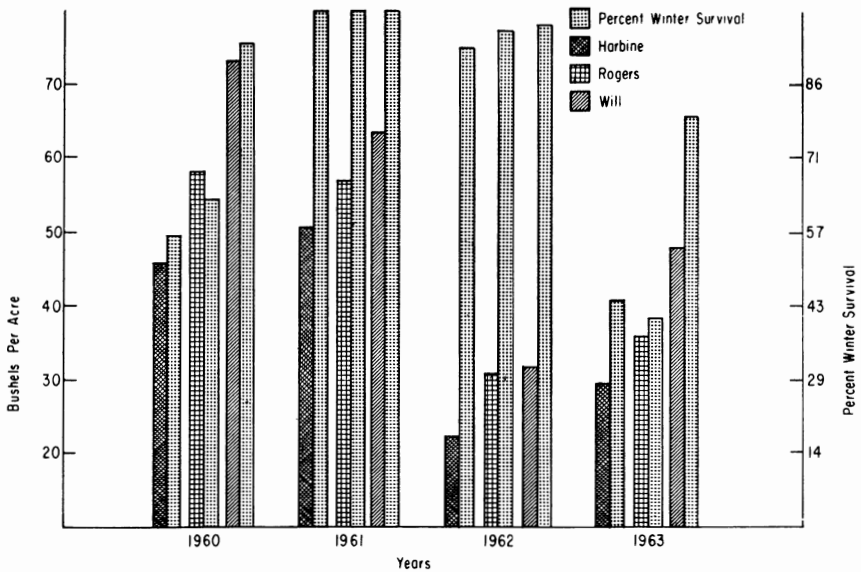
| Variety           | C.I. No. | 1962             |      | 1963             |      | 46 Sta. - Years<br>Av. |
|-------------------|----------|------------------|------|------------------|------|------------------------|
|                   |          | Av. <sup>2</sup> | Rank | Av. <sup>3</sup> | Rank |                        |
| Kearney           | 7580     | 81.6             | 1    | 74.2             | 1    | 78                     |
| Chase             | 9581     | 76.9             | 2    | 72.0             | 3    | 74                     |
| Reno              | 6561     | 72.3             | 3    | 72.1             | 2    | 72                     |
| Mo. B-475         | 9168     | 68.1             | 5    | 62.0             | 4    | 65                     |
| Will <sup>4</sup> | 11652    | 70.7             | 4    | 54.6             | 5    | 63                     |
| Dayton            | 9517     | 56.6             | 6    | 47.7             | 6    | 52                     |

<sup>1</sup>Reid, D. A. (Compiler) Winter Barley Nursery (hardy varieties) 1963. U.S. Dept. Agri., ARS, Crops Res. Div. CR-71-63, 24pp (Processed).

<sup>2</sup>24 Station-Years

<sup>3</sup>21 Station-Years

<sup>4</sup>Average of C.I. 10879 and C.I. 10880.



**Figure 5. Relationship between annual yield and winter survival of Harbine, Rogers, and Will grown in Oklahoma Agricultural Experiment Station Variety Tests, 1960-1963.**

## Other Characteristics

### Maturity

Will matured two to five days earlier than Rogers at all the variety test locations except Granite (Table 7). Its earlier maturity appears due primarily to less stunting from low temperatures. Both Will and Rogers headed on almost identical dates during the mild winter of 1961, whereas low temperatures in 1960 and 1963 caused differences of seven or more days. Triumph winter wheat averaged heading approximately two days earlier during the four-year period. However, in mild winters, Will can be expected to head one to two days earlier than Triumph.

### Height and Lodging

Will and Rogers are mid-tall to tall varieties while Harbine is a mid-tall variety averaging approximately one-inch shorter during the four-year test period (Table 7). All three varieties exhibited equally good lodging resistance compared with the older varieties, Ward and Tenkow. Broken stem lodging was observed on Will and Rogers at Stillwater in 1961 and at Stillwater and Cherokee in 1962. This type of lodging is believed to be caused by a combination of high winds and moisture stress during the heading period and appears to be associated with varieties that produce an abundance of tillers.

### Test Weight

Test weights of both Will and Harbine are lower than that of Rogers (Table 7). However, this defect is not deemed serious since Harbine was considered a high test weight variety in comparison to Ward and was readily accepted by growers until the higher yielding Rogers was released in 1957.

Rogers seems to have slightly plumper kernels than Will. Test weight differences therefore may be partly attributed to this extra plumpness.

## Disease Resistance

### Powdery Mildew

Will exhibited high resistance to powdery mildew caused by *Erysiphe graminis* DC., which occurs naturally in Oklahoma and other states. Rogers is the only other widely-grown variety in Oklahoma that has equally high resistance.

**Table 7. Average heading date, height and test weights of Will, Rogers, and Harbine grown in Oklahoma Experiment Station Tests, 1960-1963.**

| Variety                      | C.I. No. | DATE HEADED  |      |      |      |      | HEIGHT (INCHES) |              |      |      |     | TEST WEIGHT-LBS./BU. |      |              |              |      |
|------------------------------|----------|--------------|------|------|------|------|-----------------|--------------|------|------|-----|----------------------|------|--------------|--------------|------|
|                              |          | 1960         | 1961 | 1962 | 1963 | Av.  | 1960            | 1961         | 1962 | 1963 | Av. | 1960                 | 1961 | 1962         | 1963         | Av.  |
| <b>STILLWATER, 1960-1963</b> |          |              |      |      |      |      |                 |              |      |      |     |                      |      |              |              |      |
| Will                         | 11652    | 5-5          | 5-12 | 4-30 | 4-22 | 5-3  | 30              | 28           | 32   | 25   | 29  | 48.7                 | 46.8 | 43.6         | 47.8         | 46.7 |
| Rogers                       | 9174     | 5-11         | 5-12 | 5-2  | 4-29 | 5-6  | 30              | 28           | 30   | 27   | 29  | 49.0                 | 49.6 | 45.5         | 49.1         | 48.3 |
| Harbine                      | 7524     | 5-12         | 5-13 | 5-2  | 4-27 | 5-6  | 30              | 27           | 29   | 26   | 28  | 47.6                 | 47.8 | 42.4         | 47.5         | 46.3 |
| Triumph                      | 12132    | 5-4          | 4-28 | 4-26 | 4-21 | 4-27 |                 |              |      |      |     |                      |      |              |              |      |
| <b>WOODWARD, 1960-1963</b>   |          |              |      |      |      |      |                 |              |      |      |     |                      |      |              |              |      |
| Will                         | 11652    | 5-5          | 5-2  | 5-3  | 5-5  | 5-4  | 29              | 31           | 25   | 19   | 26  | 47.3                 | 42.3 | 44.8         | <sup>1</sup> | 44.8 |
| Rogers                       | 9174     | 5-10         | 5-2  | 5-2  | 5-10 | 5-6  | 30              | 29           | 25   | 19   | 26  | 49.4                 | 43.9 | 46.7         | <sup>1</sup> | 46.7 |
| Harbine                      | 7524     | 5-9          | 5-2  | 5-5  | 5-9  | 5-6  | 28              | 27           | 22   | 18   | 24  | 46.5                 | 44.7 | 42.0         | <sup>1</sup> | 44.4 |
| Triumph                      | 12132    | 5-3          | 5-2  | 4-30 | 4-24 | 4-30 |                 |              |      |      |     |                      |      |              |              |      |
| <b>CHEROKEE, 1960-1963</b>   |          |              |      |      |      |      |                 |              |      |      |     |                      |      |              |              |      |
| Will                         | 11652    | 5-11         | 4-27 | 5-2  | 4-25 | 5-1  | <sup>2</sup>    | <sup>2</sup> | 32   | 26   | 29  | 46.6                 | 46.0 | 38.9         | 45.2         | 44.2 |
| Rogers                       | 9174     | 5-21         | 4-25 | 5-4  | 4-28 | 5-5  | <sup>2</sup>    | <sup>2</sup> | 32   | 26   | 29  | 44.7                 | 48.4 | 39.5         | 48.0         | 45.2 |
| Harbine                      | 7524     | 5-19         | 4-24 | 5-6  | 4-29 | 5-5  | <sup>2</sup>    | <sup>2</sup> | 31   | 24   | 28  | 44.5                 | 47.9 | 38.0         | 45.4         | 44.0 |
| Triumph                      | 12132    | 5-6          | 5-1  | 4-29 | 4-26 | 5-1  |                 |              |      |      |     |                      |      |              |              |      |
| <b>GOODWELL, 1961-1963</b>   |          |              |      |      |      |      |                 |              |      |      |     |                      |      |              |              |      |
| Will                         | 11652    | <sup>3</sup> | 5-6  | 5-17 | 4-28 | 5-7  | <sup>3</sup>    | 36           | 29   | 29   | 31  | <sup>3</sup>         | 47.2 | <sup>4</sup> | 42.8         | 45.0 |
| Rogers                       | 9174     | <sup>3</sup> | 5-7  | 5-24 | 5-4  | 5-12 | <sup>3</sup>    | 35           | 25   | 30   | 30  | <sup>3</sup>         | 47.0 | <sup>4</sup> | 46.2         | 46.6 |
| Harbine                      | 7524     | <sup>3</sup> | 5-5  | 5-23 | 4-30 | 5-9  | <sup>3</sup>    | 33           | 22   | 29   | 28  | <sup>3</sup>         | 47.0 | <sup>4</sup> | 45.0         | 46.0 |
| Triumph                      | 12132    |              | 5-7  | 5-8  | 4-30 | 5-5  |                 |              |      |      |     |                      |      |              |              |      |
| <b>GRANITE, 1962-1963</b>    |          |              |      |      |      |      |                 |              |      |      |     |                      |      |              |              |      |
| Will                         | 11652    |              |      | 4-29 | 4-17 | 4-23 | 22              | 19           |      |      | 21  |                      |      | 44.1         | 44.4         | 44.3 |
| Rogers                       | 9174     |              |      | 4-28 | 4-18 | 4-23 | 22              | 18           |      |      | 20  |                      |      | 43.5         | 46.8         | 45.2 |
| Harbine                      | 7524     |              |      | 4-27 | 4-14 | 4-21 | 22              | 18           |      |      | 20  |                      |      | 45.5         | 43.4         | 44.5 |
| Triumph                      | 12132    |              |      | 4-23 | 4-17 | 4-20 |                 |              |      |      |     |                      |      |              |              |      |

Will Winter Barley

<sup>1</sup>Insufficient seed for test weight.  
<sup>2</sup>Height observations not recorded.  
<sup>3</sup>Experiment destroyed by low temperatures.  
<sup>4</sup>Experiment not harvested due to hail damage.

## **Loose Smut**

Will has had little natural infection with loose smut caused by *Ustilago nuda* (Jens.) Rostr. It has not shown a tendency to build up in successive years as is characteristic of some varieties of winter barley.

## **Leaf Rust**

Will is susceptible to leaf rust caused by *Puccinia hordei* Otth.; however, this disease is seldom a limiting factor to barley production in Oklahoma.

## **Literature Cited**

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