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Lodging and Other Characteristics of Seventy Corn Hybrids

Carl Andrew Ross
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I am submitting herewith a thesis written by Carl Andrew Ross entitled "Lodging and Other Characteristics of Seventy Corn Hybrids." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Plant Sciences.

Charles R. Graves, Major Professor

We have read this thesis and recommend its acceptance:

Vernon H. Reich, Lawrence N Skold

Accepted for the Council:

Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

To the Graduate Council:

I am submitting herewith a thesis written by Carl Andrew Ross entitled "Lodging and Other Characteristics of Seventy Corn Hybrids." I recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Plant and Soil Science.

Charles R. Graves
Charles R. Graves, Major Professor

We have read this thesis and
recommend its acceptance:

Vernon H. Reich

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LODGING AND OTHER CHARACTERISTICS
OF SEVENTY CORN HYBRIDS

A Thesis
Presented for the
Master of Science
Degree
The University of Tennessee, Knoxville

Carl Andrew Ross

August 1976

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ABSTRACT

In 1975, a lodging study was conducted on forty medium season and thirty full season corn hybrids at Knoxville and Crossville, Tennessee. Lodging and yields were determined at Knoxville and Crossville. Senescence over time, ear height, and number of days to silking and tasseling were determined at Knoxville.

Senescence, ear height and yield had little or no influence on lodging. Among all the factors evaluated, ear height, senescence, and number of days to silking and tasseling affected yields most in the medium season test. Ear height and number of days to silking and tasseling had the greatest effect on yields in the full season test.

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CHAPTER I

INTRODUCTION

The University of Tennessee Agricultural Experiment Station conducts corn hybrid performance tests at several locations across Tennessee. These results are published in a "prepublication report" soon after harvest every year and later in an Experiment Station bulletin. In order to make this information available to the general public well in advance of the planting season, the corn tests are harvested as soon after maturity as possible.

One of the important characteristics of these hybrids evaluated is lodging or the failure of the corn stalk to stand erect at harvest. However, at these early harvest dates, often very little lodging has occurred and the standing ability of these hybrids in case of delayed harvest has not been measured. In 1975 a study was conducted to evaluate the lodging of 40 medium and 30 full season corn hybrids at two locations in Tennessee starting soon after maturity and continuing every two weeks through the first week in December. In addition to lodging; yields, ear heights, silking and tasseling dates, and stalk senescence over time were also determined in an attempt to show relationships among these characteristics.

CHAPTER II

LITERATURE REVIEW

Holbert and Kohler (12) in an investigation of anchorage and extent of corn root systems found a high correlation between pulling resistance of stalks and percentage of erect plants.

In a corn population study, Crews and Fleming (5) found a tendency for lodging to increase as population increased, but these findings were inconsistent and thus nonsignificant. Graves et al. (9) however, found several corn hybrids with higher lodging rates at increased population densities. Krantz and Chandler (16) also found increased lodging with high plant populations in a fertilizer rate study on corn.

Zuber and Grogan (22) introduced crushing strength and rind thickness as a means of relating stalk strength and lodging resistance. They found correlations of -0.81 and -0.82 between percent lodging and rind thickness and crushing strength respectively. A study of inheritance of crushing strength and rind thickness by Loesch et al. (18) indicated a high correlation between crushing strength and rind thickness. Thompson (19) and Arnold and Josephson (2) found that selection for plants with increased rind thickness and crushing strength resulted in increased lodging resistance.

In studies on the effects of fertilization on yield and lodging in corn, Krantz and Chandler (16) and Fisher and Smith (7) found a general increase in lodging with high nitrogen rates and a decrease with increased

potassium rates. Wittels and Seatz (21) in a potassium rate study found that applications of 20 and 40 pounds per acre of potassium resulted in a marked decrease in stalk breakage. In a similar study on the effects of potassium levels on yield, lodging, and chemical composition of corn, Boswell (4) found a significant increase in lodging in tests with no potassium applied as compared to tests receiving potassium. Potassium was found to decrease lodging by increasing brace roots in a study of the effects of potassium on morphology and lodging of corn by Liebhardt and Murdock (17).

Effects of potassium on premature stalk drying and lodging were investigated by Josephson (13). He found that added potassium reduced the number of dead and broken stalks. Also, hybrids with green stalks at harvest time were more resistant to lodging than hybrids with dead stalks. A similar investigation by Arnold et al. (3) showed that the percentage of senescent corn stalks and lodging decreased when potassium was applied.

The effects of fertilizers on stalk rot in corn were investigated by Foley and Wernham (8). Plants with high N:K ratios were found to have increased internal rot, stalk breakage, and premature drying while a low N:K ratio decreased internal rot and stalk breakage.

Durrell (6) developed an instrument for measuring stalk breaking strength for an investigation of the action of fungus as a cause of lodging in corn. He found that rot infected nodes of corn plants were weaker and the plants lodged more than plants with healthy nodes. Kohler (15), in a study of corn rots in Illinois, suggested that any

factor which causes plants to die prematurely will increase stalk breakage. He also stated that after a plant dies, stalk rot is probably the cause of most lodging. In a study of seventy corn hybrids under corn virus conditions, Hilty et al. (11) found that stalk disintegration was negatively correlated with percent erect plants.

A study by Hall (10) on the relationships of several characteristics of corn revealed little or no relationships among lodging, ear heights, and ear weights, even though plants designated as strong for lodging resistance had lower ears.

Selections for lower ear height by Vera and Crane (20) and its effects on yield, percent moisture, and lodging indicated no significant reduction in lodging as ear height was lowered. Acosta and Crane (1), in selections for lower ear height, found no relationship between percent lodging and lower ear height because of varied lodging responses from the two populations studied. In contrast, a study by Josephson and Kincer (14) on selections for low ear placement revealed that lodging was reduced as ear height was lowered.

CHAPTER III

METHODS AND PROCEDURE

Forty medium and thirty full season corn hybrids were evaluated for lodging resistance and other characteristics at Crossville and Knoxville, Tennessee in 1975.

A randomized complete block design was used with four replications. Each plot consisted of two rows 40 inches apart and 11 feet long. Plots were overplanted by hand with 19 seeds per row and subsequently thinned to 14 plants per row for a total of 28 plants per plot.

The Knoxville tests were planted on April 28 on Sequatchie loam with 2-5 percent slopes and the Crossville tests were planted on May 5 on Hartsells loam with 2-5 percent slopes.

At Knoxville 1,000 pounds of 6-12-12 per acre were broadcast before planting and 90 pounds of nitrogen as ammonium nitrate were used as a side dressing when plants were 12 inches high. The tests at Crossville received 250 pounds of urea per acre before planting. Approximately 100 pounds of 7-28-28 per acre were applied in the row just prior to planting. Atrazine (AAtrex) was applied at two pounds active material per acre at both locations for weed control.

The characteristics measured on these seventy hybrids were yields, silking, tasseling, senescence, lodging, and ear heights.

Since the primary objective of this study was to characterize these corn hybrids for lodging over a period of time, data were obtained at

two week intervals, from the first week in September through the first week in December. Senescence was recorded at the same time lodging data were obtained. Plants were considered dead when they had lost all green color at the second or third internods above ground level.

Ear heights were recorded for plants in one row of each plot for both tests at Knoxville. Measurements were made at the node on which the ear was attached. The top ear was measured on plants with two ears. Lodging dates for individual plants were recorded at two week intervals.

Silking and tasseling were expressed as the number of days from planting to silking and tasseling. Plots were considered silked when 50 percent of the plants had silks 1-1.5 inches long and tasseled when 50 percent had all anthers exposed.

Plots were harvested by hand the first week in December. Yields were adjusted to 15.5 percent moisture.

Analyses of variance were applied to the data from individual experiments at each location and to the combined experiments between locations where applicable. All analyses were performed on an IBM 360/65 computer utilizing the Statistical Analysis System. Treatment means were subjected to the New Duncan's Multiple Range Test. All tests for significance were conducted at the .05 level of probability. Regression analyses were used for determining correlations.

CHAPTER IV

RESULTS AND DISCUSSION

The lodging performances over time of forty medium season and thirty full season corn hybrids at Knoxville and Crossville, Tennessee are shown in Tables 1, 2, 3, and 4. In general, both the medium and full season hybrids lodged more during the last two-week interval than during previous intervals at both locations. Lodging rates were significantly different among the medium season and among the full season hybrids at this time period at both locations (Tables 5, 6, 7 and 8). There was a location X hybrid interaction for both the medium and full season tests.

Very little lodging occurred at the early dates (Tables 1, 2, 3 and 4) so most of the discussion will be concerned with lodging at the last time period in December. At Knoxville on December 9, the medium season hybrids FFR 808C, DeKalb XL72B, and Golden Harvest H-2655 had lodged the least and Golden Harvest H-2750, P.A.G. SX39, and McNair S338 had lodged the most (Table 5). At Crossville using the last lodging date of December 11, Golden Harvest H-2666, Golden Harvest H-2655, and T.E. 6968 had lodged the least and T-4020, McNair X210, and Golden Harvest H-2750 had lodged the most (Table 6). The mean percentages of lodged plants for the medium season hybrids at the last lodging time period were 29.2 at Knoxville and 25.1 at Crossville. The tests at Knoxville lodged very little at the early time periods because the weather was dry with little

Table 1. Percentage of Lodged Plants (Means of Four Replications) at Each of Eight Sampling Dates for Forty Medium Season Corn Hybrids at Knoxville, Tennessee, 1975

Hybrid	Sampling Dates							
	9/2	9/16	10/1	10/14	10/28	11/11	11/25	12/9
	Percent Lodged Plants							
Asgrow RX114	2.7	10.8	13.7	13.7	19.1	21.9	29.1	38.1
DeKalb XL72B	0.0	1.9	1.9	3.7	4.7	5.6	6.5	8.3
DeKalb XL75	0.0	0.9	1.7	1.7	3.6	3.6	3.6	11.9
DeKalb XL80	0.9	2.7	9.0	9.9	14.5	15.3	15.3	23.4
DeKalb XL80A	0.9	1.9	3.6	3.6	5.7	7.6	7.6	14.4
DeKalb XL94	0.0	2.8	8.7	11.7	19.6	20.5	23.7	37.2
DeKalb XL390A	0.0	3.5	8.2	10.1	22.2	24.0	28.6	43.3
Excel RA116	0.0	0.0	1.9	1.9	1.9	4.7	9.3	45.2
FFR 808C	0.0	1.8	5.0	6.8	11.0	11.0	11.9	16.2
FFR 890C	0.9	3.6	12.7	13.6	15.4	16.3	17.2	18.9
Funk C-4747W	0.0	2.8	8.2	9.2	16.5	17.4	24.6	45.6
Funk G-4810	0.9	1.8	2.6	3.5	5.3	5.3	5.3	14.1
Funk G-4864	0.9	2.8	3.7	4.6	8.3	10.1	12.9	31.4
Golden Harvest H-2655	0.0	0.0	1.9	1.9	3.7	3.7	4.7	6.5
Golden Harvest H-2666	0.9	0.9	12.5	13.4	17.0	17.0	21.4	28.6
Golden Harvest H-2750	2.1	7.9	11.6	14.3	30.1	32.0	34.8	52.7
McCurdy 72-44A	0.9	2.8	8.6	17.0	18.8	19.9	23.8	43.4
McCurdy MSX70	4.7	5.7	8.3	9.2	11.9	15.5	27.1	33.5
McCurdy MSX88	0.0	0.9	8.0	9.8	11.6	11.6	23.2	46.4
McNair S338	1.8	9.9	22.5	22.5	28.8	34.2	40.5	49.4
McNair X170	0.9	2.7	3.6	3.6	7.2	8.1	9.9	14.4
McNair X194	0.0	2.8	8.7	11.7	19.6	20.5	23.7	37.2
McNair X210	0.9	4.9	12.7	14.3	30.0	33.5	35.3	39.9
McNair X233	0.9	1.8	2.7	5.3	16.9	18.6	24.8	39.8
Northup, King PX76	0.0	3.6	7.2	7.2	11.7	12.6	13.5	26.2
Northup, King PX91	1.0	2.0	2.0	2.0	14.7	16.5	17.4	18.3
P.A.G. 494	0.0	0.9	2.9	2.9	7.7	8.6	11.6	20.5
P.A.G. 644W	0.9	1.8	3.6	6.5	11.0	11.9	18.3	28.3
P.A.G. SX17	0.0	0.0	0.9	0.9	2.6	2.6	12.4	48.4
P.A.G. SX39	2.6	3.4	15.7	16.6	28.5	28.5	32.0	52.6

Table 1 (continued)

Hybrid	Sampling Dates							
	9/2	9/16	10/1	10/14	10/28	11/11	11/25	12/9
	Percent Lodged Plants							
Pioneer brand 3145	0.0	0.0	0.0	2.3	4.1	5.1	6.9	15.1
Pioneer brand 3147	0.0	4.4	7.0	7.9	10.6	11.6	14.2	25.6
Pioneer brand 3177	0.0	0.9	4.4	6.2	15.0	15.0	26.4	38.0
Pioneer brand 3368	0.9	1.8	5.6	5.6	7.3	8.4	10.2	18.4
Pioneer brand 3368A	0.0	1.7	10.3	11.2	15.5	15.5	16.4	34.8
Pioneer brand 3369A	0.0	0.0	4.4	6.3	9.9	10.8	11.8	20.8
Princeton SC850	0.0	1.8	9.9	11.6	18.8	19.7	22.4	26.9
T-4020	2.7	7.2	10.8	11.7	29.7	29.7	33.3	43.2
T-4021	1.8	3.6	4.5	8.2	10.0	10.0	10.9	20.9
T.E. 6968	0.9	1.8	4.5	4.5	7.2	9.9	9.9	23.6

Table 2. Percentage of Lodged Plants (Means of Four Replications) at Each of Eight Sampling Dates for Forty Medium Season Corn Hybrids at Crossville, Tennessee, 1975.

Hybrid	Sampling Dates							
	9/4	9/18	10/3	10/16	10/30	11/13	11/27	12/11
	Percent Lodged Plants							
Asgrow RX114	0.0	0.0	6.4	10.1	14.7	14.7	14.7	14.7
DeKalb XL72B	0.0	0.0	6.3	7.2	9.9	10.8	10.8	10.8
DeKalb XL75	0.0	0.0	7.0	8.7	11.6	13.5	13.5	15.3
DeKalb XL80	0.0	0.0	19.7	23.5	26.2	30.0	31.7	36.4
DeKalb XL80A	0.0	0.0	15.1	16.0	17.9	18.8	18.8	20.8
DeKalb XL94	0.0	0.0	7.4	7.4	13.9	19.4	27.6	29.5
DeKalb XL390A	0.0	0.9	11.0	14.6	18.5	23.0	26.6	28.4
Excel RA116	0.0	0.9	8.1	9.0	11.7	11.7	12.6	13.5
FFR 808C	0.0	1.0	4.7	5.6	7.4	7.4	10.3	10.3
FFR 890C	0.0	0.0	6.4	6.4	10.9	13.7	20.9	23.6
Funk G-4747W	0.0	0.0	18.1	20.0	24.6	24.6	31.9	34.7
Funk G-4810	0.0	0.9	6.3	6.3	7.2	9.0	11.8	12.7
Funk G-4864	0.0	0.0	13.9	13.9	15.9	16.8	19.7	23.7
Golden Harvest H-2655	0.0	0.0	3.5	3.5	4.4	7.0	8.8	8.8
Golden Harvest H-2666	0.0	0.0	0.0	0.0	2.9	3.8	7.5	9.4
Golden Harvest H-2750	0.0	0.0	28.2	31.9	35.6	36.5	42.7	48.2
McCurdy 72-44A	0.0	0.9	5.4	5.4	8.2	9.1	10.9	10.9
McCurdy MSX70	0.0	0.0	4.7	6.6	8.4	10.2	12.0	12.9
McCurdy MSX88	0.0	0.0	20.7	23.5	28.2	31.0	38.4	40.3
McNair S338	0.0	1.9	26.1	27.9	36.4	37.3	38.2	41.0
McNair X170	0.0	0.0	7.9	7.9	12.7	12.7	14.7	16.5
McNair X194	0.0	1.0	10.8	12.7	17.5	17.5	23.2	31.8
McNair X210	0.0	1.0	21.9	29.6	34.4	39.1	49.1	50.1
McNair X233	0.0	0.0	34.7	37.6	39.6	40.5	41.5	43.4
Northup, King PX76	0.0	0.0	14.9	18.5	22.2	22.2	23.2	23.2
Northup, King PX91	0.0	0.9	15.4	19.0	20.9	20.9	22.7	23.6
P.A.G. 494	0.0	0.0	7.1	7.1	12.1	12.1	13.2	14.1
P.A.G. 644W	0.0	0.0	22.8	28.2	30.0	34.5	39.1	45.5
P.A.G. SX17	0.0	0.0	7.8	8.8	13.6	15.5	20.3	28.8
P.A.G. SX39	0.0	1.9	1.9	1.9	20.7	21.6	28.2	33.0

Table 2 (continued)

Hybrid	Sampling Dates							
	9/4	9/18	10/3	10/16	10/30	11/13	11/27	12/11
	Percent Lodged Plants							
Pioneer brand 3145	0.0	0.0	10.0	11.8	14.6	15.5	23.6	26.2
Pioneer brand 3147	0.0	0.0	23.0	23.9	26.6	28.4	32.7	35.3
Pioneer brand 3177	0.0	0.9	7.5	13.1	14.9	18.4	24.5	28.9
Pioneer brand 3368	0.0	0.0	5.3	5.3	6.2	7.1	10.6	12.3
Pioneer brand 3368A	0.0	0.0	8.9	10.7	11.6	13.4	17.0	17.9
Pioneer brand 3369A	0.0	0.0	7.3	7.3	9.1	10.0	13.6	15.4
Princeton SX850	0.0	0.0	6.4	8.3	12.9	14.7	20.1	22.8
T-4020	0.0	0.0	32.1	36.7	42.2	44.0	47.7	51.4
T-4021	0.0	0.0	17.0	20.5	20.5	21.4	26.8	31.3
T.E. 6968	0.9	0.9	3.5	4.2	5.3	5.3	6.2	6.2

Table 3. Percentage of Lodged Plants (Means of Four Replications) at Each of Eight Sampling Dates for Thirty Full Season Corn Hybrids at Knoxville, Tennessee, 1975

Hybrid	Sampling Dates							
	9/2	9/16	10/1	10/14	10/28	11/11	11/25	12/9
	Percent Lodged Plants							
Asgrow RX125W	1.8	8.9	14.3	17.0	22.3	23.2	25.9	29.5
Asgrow RX132	0.0	0.0	9.1	10.0	11.7	12.6	13.5	22.7
Coker 56	0.0	3.2	4.6	4.6	10.7	11.5	18.2	26.3
DeKalb XL394	0.0	1.8	1.8	2.6	7.1	7.1	10.6	21.3
Funk G-4762	0.0	0.9	3.6	4.5	6.3	9.0	11.7	18.3
Golden Harvest H-2660W	0.9	4.6	7.4	7.4	9.1	12.0	13.8	34.7
Golden Harvest H-2775	0.0	1.8	10.7	12.5	25.9	27.7	33.0	48.2
Golden Harvest XC-4728	3.6	6.3	18.0	18.0	33.6	33.6	34.6	60.0
McCurdy 67-14	0.0	3.7	3.7	5.5	7.3	10.0	10.9	17.2
McCurdy 72-22	4.4	4.4	5.3	7.1	8.0	9.0	10.8	22.8
McCurdy 73-56	1.8	1.8	3.6	4.5	8.0	8.0	10.7	36.6
McCurdy 73-90	0.0	6.3	14.4	16.1	31.4	32.3	35.9	48.4
NcNair X300	0.0	0.9	4.5	4.5	14.3	17.0	17.9	44.9
Pennington 9P-3A	0.0	0.0	0.0	0.0	0.9	0.9	3.6	11.6
Pioneer brand 511A	0.0	1.8	7.0	7.9	20.5	22.3	26.0	40.3
Pioneer brand 3080	0.9	1.7	3.6	3.6	3.6	3.6	4.5	19.6
Pioneer brand 3145	0.0	0.9	0.9	1.8	1.8	2.7	3.6	10.7
Pioneer brand 3147	0.9	1.7	2.6	2.6	4.5	5.4	8.0	10.8
Princeton SP935	0.9	2.7	4.4	4.4	7.9	10.5	10.5	26.3
Princeton SX805	0.9	2.7	2.7	3.6	4.5	5.4	6.3	23.0
Princeton SX910	0.0	1.8	3.6	3.6	9.1	10.0	11.8	37.9
Stull SP2825	3.6	4.5	15.3	16.3	27.0	33.4	37.2	59.8
T-0107	0.8	2.6	6.2	7.0	15.6	17.3	22.6	27.9
T-2008	0.0	0.0	0.9	2.9	7.8	9.8	10.9	29.7
T-3015L	6.4	10.9	18.2	19.1	25.4	25.4	28.1	52.8
T-4030L	5.5	6.4	12.7	13.6	20.9	20.9	20.9	54.9
T-4108L	0.9	2.8	10.3	11.2	14.9	14.9	19.5	42.6
T.E. 6980	0.0	2.5	4.4	5.3	6.2	7.5	11.9	16.6
Tenn. 505	0.0	2.7	7.1	12.4	20.3	21.2	23.9	58.4
Tenn. 606	5.4	6.3	12.7	14.4	28.1	32.4	35.4	48.8

Table 4. Percentage of Lodged Plants (Means of Four Replications) at Each of Five Sampling Dates for Thirty Full Season Corn Hybrids at Crossville, Tennessee, 1975

Hybrid	Sampling Dates				
	10/9	10/23	11/6	11/20	12/4
	Percent Lodged Plants				
Asgrow RX125W	39.0	40.0	49.3	49.3	54.7
Asgrow RX132	54.3	64.8	69.2	72.9	80.0
Coker 56	16.4	16.4	19.1	25.1	45.0
DeKalb XL394	22.9	27.1	28.8	31.3	41.4
Funk G-4762	21.5	23.3	29.6	47.0	66.2
Golden Harvest H-2660W	47.5	48.5	54.9	72.3	85.3
Golden Harvest H-2775	20.2	24.8	28.5	32.2	51.4
Golden Harvest XC-4728	35.9	36.8	40.3	53.0	72.0
McCurdy 67-14	67.4	68.3	76.5	81.9	90.0
McCurdy 72-22	38.8	47.7	53.1	55.8	72.6
McCurdy 72-56	18.0	19.7	20.6	35.1	57.5
McCurdy 73-90	29.1	31.3	35.4	40.9	60.2
McNair X300	39.9	40.8	43.4	45.3	55.0
Pennington 9P-3A	36.4	39.0	42.7	44.6	63.8
Pioneer brand 511A	54.5	57.1	60.6	67.5	74.6
Pioneer brand 3080	29.6	34.9	43.7	46.5	58.2
Pioneer brand 3145	9.7	12.3	13.2	13.2	21.4
Pioneer brand 3147	29.9	33.5	34.4	42.5	54.2
Princeton SP935	41.1	47.3	52.4	54.2	61.9
Princeton SX805	9.9	9.9	10.8	11.7	22.2
Princeton SX910	39.0	40.0	49.3	49.3	54.7
Stull SP2825	42.5	48.8	50.5	63.6	87.9
T-0107	53.1	58.4	62.9	70.1	83.9
T-2008	29.7	35.0	45.9	47.7	64.5
T-3015L	54.9	55.8	62.1	72.0	83.9
T-4030L	15.7	19.2	21.0	28.1	48.5
T-4108L	42.9	46.3	57.4	63.5	83.1
T.E. 6980	9.8	9.8	11.7	18.2	48.2
Tenn. 505	55.4	57.2	60.0	65.6	85.4
Tenn. 606	44.6	49.9	51.6	64.7	85.9

Table 5. Percentage of Lodged Plants (Means of Four Replications) on December 9 for Forty Medium Season Corn Hybrids at Knoxville, Tennessee, 1975

Hybrid	Lodged Plants %
Golden Harvest H-2750	52.7 a*
P.A.G. SX39	52.6 a
McNair S338	49.4 ab
P.A.G. SX17	48.4 ab
McCurdy MSX88	46.4 ab
Funk G-4747W	45.6 abc
Excel RA116	45.2 abcd
McCurdy 72-44A	43.4 abcd
DeKalb XL390A	43.3 abcde
T-4020	43.2 abcde
McNair X210	39.9 abcde
McNair X233	39.8 abcdef
Asgrow RX114	38.1 abcdef
Pioneer brand 3177	38.0 abcdefg
McNair X194	37.2 abcdefgh
DeKalb XL94	37.2 abcdefgh
Pioneer brand 3368A	34.8 abcdefghi
McCurdy MSX70	33.5 bcdefghij
Funk G-4864	31.4 bcdefghijk
Golden Harvest H-2666	28.6 cdefghijkl
P.A.G. 644W	28.3 cdefghijkl
Pioneer brand 3145	28.2 defghijklm
Princeton SX850	26.9 efghijklm
Northup, King PX76	26.2 efghijklm
Pioneer brand 3147	25.6 fghijklmn
T.E. 6968	23.6 ghijklmno
FFR 890C	23.6 ghijklmno
Northup, King PX91	23.6 ghijklmno
DeKalb XL80	23.4 ghijklmno
T-4021	20.9 hijklmno

Table 5 (continued)

Hybrid	Lodged Plants %
Pioneer brand 3369A	20.8 ijklmno
DeKalb XL80A	20.8 ijklmno
McNair X170	14.4 ijklmno
P.A.G. 494	14.1 jklmno
Funk G-4810	14.1 jklmno
Pioneer brand 3368	12.3 klmno
DeKalb XL75	11.9 klmno
FFR 808C	10.3 lmno
DeKalb XL72B	8.3 mno
Golden Harvest H-2655	6.5 o
C.V. %	37.5

*Values followed by the same letter are not significantly different at the .05 level of probability.

Table 6. Percentage of Lodged Plants (Means of Four Replications) on December 11 for Forty Medium Season Corn Hybrids at Crossville, Tennessee, 1975

Hybrid	Lodged Plants %
T-4020	51.4 a*
McNair X210	50.1 a
Golden Harvest H-2750	48.2 ab
P.A.G. 644W	45.5 abc
McNair X233	43.4 abcd
McNair S338	41.0 abcde
McCurdy MSX88	40.3 abcde
DeKalb XL80	36.4 abcdef
Pioneer brand 3147	35.3 abcdefg
Funk G-4747W	34.7 abcdefg
P.A.G. SX39	33.0 abcdefgh
McNair X194	31.8 abcdefghi
T-4021	31.3 abcdefghijk
DeKalb XL94	29.5 bcdefghijk
Pioneer brand 3177	28.9 bcdefghijk
P.A.G. SX17	28.8 bcdefghijk
DeKalb XL390A	28.4 bcdefghijk
Pioneer brand 3145	26.2 cdefghijkl
Funk G-4864	23.7 defghijkl
FFR 890C	23.6 defghijkl
Northup, King PX91	23.6 defghijkl
Northup, King PX76	23.2 defghijkl
Princeton SX850	22.8 defghijkl
DeKalb XL80A	20.8 efghijkl
Pioneer brand 3368A	17.9 fghijkl
McNair X170	16.5 fghijkl
Pioneer brand 3369A	15.4 fghijkl
DeKalb XL75	15.3 fghijkl
Asgrow RX114	14.7 ghijkl
P.A.G. 494	14.2 ghijkl

Table 6 (continued)

Hybrid	Lodged Plants %
Excel RA116	13.5 hijkl
McCurdy MSX70	12.9 hijkl
Funk G-4810	12.7 hijkl
Pioneer brand 3368	12.3 hijkl
McCurdy 72-44A	10.9 ijk1
DeKalb XL72B	10.8 ijk1
FFR 808C	10.3 jk1
Golden Harvest H-2666	9.4 k1
Golden Harvest H-2655	8.8 k1
T.E. 6968	6.2 l
C.V. %	48.3

*Values followed by the same letter are not significantly different at the .05 level of probability.

Table 7. Percentage of Lodged Plants (Means of Four Replications) on December 9 for Thirty Full Season Corn Hybrids at Knoxville, Tennessee, 1975

Hybrid	Lodged Plants %
Stull SP2825	59.8 a*
Tenn. 505	58.4 ab
T-4030L	54.9 abc
T-3015L	52.8 abc
Golden Harvest XC-4728	51.0 abc
Tenn. 606	48.8 abcd
McCurdy 73-90	48.4 abcd
Golden Harvest H-2775	48.2 abcd
McNair X300	44.9 abcde
T-4108L	42.6 abcdef
Pioneer brand 511A	40.3 abcdefg
Princeton SX910	37.9 bcdefgh
McCurdy 73-56	36.6 cdefgh
Golden Harvest H-2660W	34.7 cdefgh
T-2008	29.7 defghi
Asgrow RX125W	29.5 defghi
T-0107	27.9 defghi
Coker 56	26.3 efghi
Princeton SP935	26.3 efghi
Princeton SX805	23.0 fghi
McCurdy 72-22	22.8 fghi
Asgrow RX132	22.7 fghi
DeKalb XL394	21.3 fghi
Pioneer brand 3080	19.6 ghi
Funk G-4762	18.3 hi
McCurdy 67-14	17.2 hi
T.E. 6980	16.6 hi
Pennington 9P-3A	11.6 i
Pioneer brand 3147	10.8 i
Pioneer brand 3145	10.7 i
C.V. %	38.0

*Values followed by the same letter are not significantly different at the .05 level of probability.

Table 8. Percentage of Lodged Plants (Means of Four Replications) on December 4 for Thirty Full Season Corn Hybrids at Crossville, Tennessee, 1975

Hybrid	Lodged Plants %
McCurdy 67-14	90.0 a*
Stull SP2825	87.9 ab
Tenn. 606	85.9 abc
Tenn. 505	85.4 abc
Golden Harvest H-2660W	85.3 abc
T-0107	83.9 abc
T-3015L	83.9 abc
T-4108L	83.1 abc
Asgrow RX132	79.9 abcd
Pioneer brand 511A	74.6 abcde
McCurdy 72-22	72.6 abcde
Golden Harvest XC-4728	72.0 abcde
Funk G-4762	66.2 abcde
T-2008	64.5 abcde
Pennington 9P-3A	63.8 abcde
Princeton SP935	61.9 abcde
Princeton SX910	60.6 abcde
McCurdy 73-90	60.2 abcde
Pioneer brand 3080	58.2 abcde
McCurdy 73-56	57.5 abcde
NcNair X300	55.0 bcdef
Asgrow RX125W	54.7 bcdef
Pioneer brand 3147	54.2 bcdef
Golden Harvest H-2775	51.4 cedfg
T-4030L	48.5 defg
T.E. 6980	48.2 defg
Coker 56	45.0 efg
DeKalb XL394	41.4 efg
Princeton SX805	22.2 fg
Pioneer brand 3145	21.4 g
C.V. %	31.3

*Values followed by the same letter are not significantly different at the .05 level of probability.

wind. However, at Crossville a rain storm caused considerable lodging in the full season test but little lodging in the medium season test.

At Knoxville on December 9, the full season hybrids Pioneer brand 3145, Pioneer brand 3147, and Pennington 9P-3A had lodged the least and Stull SP2825, Tenn. 505, and T-4030L had lodged the most (Table 7). At Crossville using the last time period, Pioneer brand 3145, Princeton SX805, and DeKalb XL394 had lodged the least and McCurdy 67-14, Stull SP2825, and Tenn. 606 had lodged the most (Table 8). The mean percentages of lodged plants for the full season hybrids at the last lodging period was 33.1 at Knoxville and 64.0 at Crossville.

In this study senescence, ear height, and yield were measured to determine if there was an association between these variables and lodging. Senescence was measured concurrently with lodging. A high positive correlation between senescence and lodging was expected. However, linear regression analyses of the medium and full season hybrids at Knoxville revealed a low but significant influence of senescence on lodging (Table 9).

The lack of senescence and lodging association can be illustrated by the following examples. On October 28, the medium season hybrid DeKalb XL75 had 3.6 percent lodged plants and 100 percent dead plants (Tables 1 and 10), whereas, Pioneer brand 3368A had 15.9 percent lodged plants and only 49.1 percent dead plants.

The same lack of association between senescence and lodging was found in the full season test at Knoxville as shown in Tables 3 and 11. Although there was little or no association between senescence and

Table 9. Linear Regression of Lodging on Senescence at Each of Eight Sampling Dates for Forty Medium Season and Thirty Full Season Corn Hybrids at Knoxville, Tennessee, 1975

Date	Intercept	Slope	R-Square	Probability >F
Medium Season				
9/02	0.344	0.031	0.051	0.0040
9/16	1.644	0.033	0.033	0.0220
10/01	3.695	0.081	0.076	0.0004
10/14	4.694	0.061	0.039	0.0121
10/28	8.948	0.062	0.020	0.0728
11/11	4.970	0.116	0.045	0.0069
11/25	29.600	0.485	0.068	0.0009
12/09	-175.902	2.055	0.024	0.0496
Full Season				
9/02	0.383	0.094	0.107	0.0003
9/16	0.457	0.174	0.230	0.0001
10/01	0.905	0.287	0.345	0.0001
10/14	2.162	0.190	0.221	0.0001
10/28	4.402	0.227	0.156	0.0001
11/11	0.682	0.267	0.214	0.0001
11/25	7.895	0.110	0.011	0.2605
12/09	0.385	0.054	0.000	0.8723

Table 10. Percentage of Senescent Plants (Means of Four Replications) at Each of Eight Sampling Dates for Forty Medium Season Corn Hybrids at Knoxville, Tennessee, 1975

Hybrid	Sampling Dates							
	9/2	9/16	10/1	10/14	10/28	11/11	11/25	12/9
	Percent Senescent Plants							
Asgrow RX114	32.8	50.9	60.8	88.0	100.0	100.0	100.0	100.0
DeKalb XL72B	3.7	16.5	28.4	55.9	84.2	98.2	100.0	100.0
DeKalb XL75	6.3	28.2	64.4	100.0	100.0	100.0	100.0	100.0
DeKalb XL80	9.9	22.5	29.7	44.0	53.0	62.0	97.2	100.0
DeKalb XL80A	10.4	19.7	26.4	35.8	64.5	55.3	94.4	100.0
DeKalb XL94	7.3	18.1	25.3	33.7	40.9	50.7	86.7	98.0
DeKalb XL390A	22.0	43.8	51.2	59.5	68.6	78.4	98.2	100.0
Excel RA116	11.0	55.9	96.4	100.0	100.0	100.0	100.0	100.0
FFR 808C	21.8	38.5	47.9	66.0	84.2	92.3	100.0	100.0
FFR 890C	10.8	14.5	21.7	37.0	51.4	64.9	97.3	100.0
Funk G-4747W	14.6	32.9	41.9	51.0	66.6	80.1	100.0	100.0
Funk G-4810	4.3	6.1	8.7	12.3	22.0	30.0	71.5	98.4
Funk G-4864	4.7	9.3	13.9	23.3	33.4	42.4	79.9	97.2
Golden Harvest H-2655	14.8	21.3	26.0	43.4	68.8	93.6	100.0	100.0
Golden Harvest H-2666	26.8	39.3	48.2	64.3	82.1	91.0	100.0	100.0
Golden Harvest H-2750	20.7	32.1	35.9	52.5	68.8	84.8	100.0	100.0
McCurdy 72-44A	12.1	15.0	28.5	40.3	64.6	84.9	98.0	100.0
McCurdy MSX70	33.0	55.0	74.7	100.0	100.0	100.0	100.0	100.0
McCurdy M X88	52.7	74.1	84.8	100.0	100.0	100.0	100.0	100.0
McNair S338	21.6	39.4	47.6	60.1	71.9	88.2	100.0	100.0
McNair X170	15.3	20.7	27.0	46.8	65.8	91.9	100.0	100.0
McNair X194	25.6	66.2	88.4	97.0	100.0	100.0	100.0	100.0
McNair X210	14.6	21.8	35.5	45.0	65.0	95.8	100.0	100.0
McNair X233	7.9	18.5	34.4	44.2	62.8	86.0	100.0	100.0
Northup, King PX76	22.4	30.6	40.5	60.4	82.0	98.1	99.0	100.0
Northup, King PX91	6.6	9.3	19.4	74.5	95.5	100.0	100.0	100.0
P.A.G. 494	25.4	35.0	44.8	64.0	75.9	87.2	98.1	100.0
P.A.G. 644W	16.5	30.2	36.6	48.4	70.0	91.0	100.0	100.0
P.A.G. SX17	6.2	17.0	21.3	42.6	61.0	87.6	100.0	100.0
P.A.G. SX39	3.6	15.1	26.7	40.1	62.6	80.7	97.3	100.0

Table 10 (continued)

Hybrid	Sampling Dates							
	9/2	9/16	10/1	10/14	10/28	11/11	11/25	12/9
	Percent Senescent Plants							
Pioneer brand 3145	0.0	1.0	5.5	14.3	37.0	71.7	98.2	100.0
Pioneer brand 3147	2.6	11.5	15.9	25.7	37.3	50.7	91.1	100.0
Pioneer brand 3177	1.8	10.6	23.9	45.2	69.0	77.8	100.0	100.0
Pioneer brand 3368	7.7	22.8	33.4	41.6	54.5	71.5	97.3	100.0
Pioneer brand 3368A	7.0	20.0	28.7	37.6	49.0	60.4	92.8	100.0
Pioneer brand 3369A	13.7	20.0	33.6	49.1	68.2	75.4	100.0	100.0
Princeton SX850	22.4	35.0	42.2	51.2	66.8	72.9	94.5	100.0
T-4020	14.4	19.9	26.1	38.8	60.4	74.7	96.4	100.0
T-4021	2.7	6.4	12.8	30.9	77.2	95.4	100.0	100.0
T.E. 6968	18.9	25.2	33.4	55.0	79.4	95.5	100.0	100.0

Table 11. Percentage of Senescent Plants (Means of Four Replications) at Each of Eight Sampling Dates for Thirty Full Season Corn Hybrids at Knoxville, Tennessee, 1975

Hybrid	Sampling Dates							
	9/2	9/16	10/1	10/14	10/28	11/11	11/25	12/9
	Percent Senescent Plants							
Asgrow RX125W	24.1	27.7	36.6	51.8	56.3	63.4	96.4	100.0
Asgrow RX132	17.4	24.5	35.5	44.5	49.0	60.0	92.5	100.0
Coker 56	4.9	12.5	16.0	23.5	25.8	30.2	69.0	93.8
DeKalb XL394	0.9	3.5	6.2	12.3	23.8	33.5	92.0	100.0
Funk G-4762	2.7	6.4	9.1	15.4	31.2	45.8	93.5	100.0
Golden Harvest H-2660W	4.7	13.7	20.2	28.5	38.5	45.8	91.8	100.0
Golden Harvest H-2775	5.4	13.4	17.9	28.6	37.5	51.8	99.1	100.0
Golden Harvest XC-4728	37.2	49.1	53.6	69.0	86.4	94.6	100.0	100.0
McCurdy 67-14	5.5	10.9	14.5	19.9	29.8	45.0	100.0	100.0
McCurdy 72-22	3.7	4.6	9.9	14.7	23.6	42.8	85.4	100.0
McCurdy 73-56	0.0	3.6	4.5	11.6	16.1	25.0	89.3	100.0
McCurdy 73-90	18.9	27.0	36.0	46.0	52.3	64.9	78.3	97.3
McNair X300	8.0	13.5	16.2	28.9	51.0	63.7	99.0	100.0
Pennington 9P-3A	0.9	3.6	5.6	8.0	16.1	24.1	76.8	92.9
Pioneer brand 511A	21.4	25.8	28.4	34.8	45.6	55.4	83.0	100.0
Pioneer brand 3080	4.5	8.0	11.6	22.3	37.5	50.0	91.0	100.0
Pioneer brand 3145	3.6	3.6	6.3	15.2	23.2	38.4	87.5	100.0
Pioneer brand 3147	4.4	10.8	10.8	20.7	27.0	38.7	81.0	96.3
Princeton SP935	7.9	14.2	20.4	27.5	47.8	60.4	97.4	100.0
Princeton SX805	6.2	9.8	9.8	14.2	24.8	31.9	83.2	97.3
Princeton SX910	3.6	14.4	22.6	33.3	42.4	58.5	91.8	100.0
Stull SP2825	15.4	20.8	24.5	31.7	45.6	52.8	86.4	99.1
T-0107	14.0	25.4	34.2	46.2	58.4	61.9	86.0	100.0
T-2008	3.6	6.3	10.0	21.3	36.3	63.2	97.2	100.0
T-3015L	26.4	35.6	43.8	57.3	61.2	80.2	96.4	100.0
T-4030L	11.0	19.2	28.1	40.7	53.3	73.2	94.6	100.0
T-4108L	3.7	15.8	18.5	23.2	25.9	36.0	62.0	81.5
T.E. 6980	14.1	18.7	51.0	87.2	99.0	99.0	100.0	100.0
Tenn. 505	2.7	13.3	23.9	31.9	41.7	50.4	84.1	94.7
Tenn. 606	10.9	19.1	23.6	32.6	46.2	56.0	89.3	97.4

lodging, there were significant differences among the medium season and among the full season hybrids on October 28 for dead plants (Tables 12 and 13) and on December 9 for lodged plants (Tables 5 and 7).

Ear height (Tables 14 and 15) was also expected to be positively correlated with lodging, but linear regression analyses of the medium and full season hybrids at Knoxville revealed no significant influence of ear height on percent lodging (Table 16). Examples of this lack of association are apparent. The medium season hybrid Golden Harvest H-2750 had 52.7 percent lodged plants and an average ear height of 50.2 inches (Table 1, p. 8 and Table 14). In contrast, Funk G-4810 had 14.1 percent lodged plants and an average ear height of 54.4 inches. The full season hybrid Golden Harvest H-2775 had 48.2 percent lodged plants and an average ear height of 53.2 inches (Table 3, p. 12 and Table 15). In contrast, McCurdy 72-22 had 22.8 percent lodged plants and an average ear height of 64.8 inches.

Significant differences in ear height were found among the medium season and among the full season hybrids at Knoxville. The medium season hybrids averaged 50.2 inches and ranged from 40.5 inches for FFR 890C to 59.6 inches for Funk G-4747W. The full season hybrids averaged 56.6 inches and ranged from 43.1 inches for T.E. 6980 to 66.2 inches for T-3015L.

A positive significant correlation between yield (Tables 17 and 18) and percent lodged plants (Table 1, p. 8 and Table 3, p. 12) on December 9 was expected. However, in linear regression analyses no significant regression was obtained for the medium season hybrids and an R-square of

Table 12. Percentage of Senescent Plants (Means of Four Replications) on October 28 for Forty Medium Season Corn Hybrids at Knoxville, Tennessee, 1975

Hybrid	Senescent Plants %
McCurdy MSX88	100.0 a*
DeKalb XL75	100.0 a
Excel RA116	100.0 a
McCurdy MSX70	100.0 a
Asgrow RX114	100.0 a
McNair X194	100.0 a
Northup, King PX91	95.5 ab
DeKalb XL72B	84.2 abc
FFR 808C	84.2 abc
Golden Harvest H-2666	82.1 abc
Northup, King PX76	82.0 abc
T.E. 6968	79.4 abc
T-4021	77.2 abcd
P.A.G. 494	75.9 bcde
McNair S338	71.9 cdef
P.A.G. 644W	70.0 cdef
Pioneer brand 3177	69.0 cdef
Golden Harvest H-2655	68.8 cdef
Golden Harvest H-2750	68.8 cdef
DeKalb XL390A	68.6 cdef
Pioneer brand 3369A	68.2 cdef
Princeton SX850	66.8 cdef
Funk G-4747W	66.6 cdef
McNair X170	65.8 cdef
McNair X210	65.0 cdef
McCurdy 72-44A	64.6 cdef
DeKalb XL80A	64.5 cdef
McNair X-233	62.8 cdefg
P.A.G. SX39	62.6 cdefg
P.A.G. SX17	61.0 cdefg

Table 12 (continued)

Hybrid	Senescent Plants %
T-4020	60.4 cdefg
Pioneer brand 3368	53.3 defgh
DeKalb XL80	53.0 efgh
FFR 890C	51.4 fgh
Pioneer brand 3368A	49.0 fgh
DeKalb XL94	40.9 ghi
Pioneer brand 3147	37.3 hi
Pioneer brand 3145	37.0 hi
Funk G-4864	33.4 hi
Funk G-4810	22.0 i
C.V. %	19.9

*Values followed by the same letter are not significantly different at the .05 level of probability.

Table 13. Percentage of Senescent Plants (Means of Four Replications) on October 28 for Thirty Full Season Corn Hybrids at Knoxville, Tennessee, 1975

Hybrid	Senescent Plants %
T.E. 6980	99.0 a*
Golden Harvest XC-4728	86.4 a
T-3015L	61.2 b
T-0107	58.4 bc
Asgrow RX125W	56.3 bcd
T-4030L	53.3 bcde
McNair X300	51.0 bcde
Asgrow RX132	49.0 bcdef
Princeton SP395	47.8 bcdef
Tenn. 606	46.2 bcdefg
Pioneer brand 511A	45.6 bcdefg
Stull SP2825	45.6 bcdefg
McCurdy 7390	44.9 bcdefg
Princeton SX910	42.4 bcdefgh
Tenn. 505	41.7 cdefgh
Golden Harvest H-2660W	38.5 defgh
Pioneer brand 3080	37.5 defgh
Golden Harvest H-2775	37.5 defgh
T-2008	36.3 edgh
Funk G-4762	31.2 fghi
McCurdy 6714	29.8 fghi
Pioneer brand 3147	27.1 ghi
T-4108L	25.9 hi
Coker 56	25.8 hi
Princeton SX805	24.8 hi
DeKalb XL394	23.8 hi
McCurdy 72-22	23.6 hi
Pioneer brand 3145	23.2 hi
McCurdy 73-56	16.1 i
Pennington 9P-3A	16.1 i
C.V. %	27.3

*Values followed by the same letter are not significantly different at the .05 level of probability.

Table 14. Ear Height (Means of Four Replications) of Forty Medium Season Corn Hybrids at Knoxville, Tennessee, 1975

Hybrid	Ear Height Inches
Funk G-4747W	59.6 a*
McNair X233	59.4 a
T-4021	58.9 a
P.A.G. 644W	58.7 a
DeKalb XL94	55.5 b
Pioneer brand 3145	55.4 b
Funk G-4864	54.8 b
Funk G-4810	54.4 bc
McCurdy 72-44A	54.2 bcd
Pioneer brand 3147	53.0 bcde
DeKalb XL75	53.0 bcde
DeKalb XL80A	52.6 bcdef
T-4020	52.6 bcdef
DeKalb XL390A	52.3 bcdefg
Northup, King PX91	51.2 cdefgh
Pioneer brand 3177	50.8 defgh
P.A.G. SX17	50.7 efgh
McCurdy MSX88	50.5 efgh
Asgrow RX114	50.3 efgh
Golden Harvest H-2750	50.2 efgh
P.A.G. SX39	50.0 efghi
T.E. 6968	49.6 efghi
Pioneer brand 3368A	49.6 efghi
McNair S338	49.5 fghijk
Pioneer brand 3368	49.4 fghijkl
Excel RA116	49.0 ghijklm
Princeton SX850	47.9 hijklm
DeKalb XL80	47.9 hijklm
McCurdy MSX70	47.7 hijklm
DeKalb XL72B	46.6 ijklm

Table 14 (continued)

Hybrid	Ear Height Inches
Pioneer brand 3369A	46.6 ijklm
McNair X170	46.1 jklm
Golden Harvest H-2666	46.1 klm
Northup, King PX76	45.8 lm
McNair X210	45.4 m
McNair X194	45.3 m
P.A.G. 494	42.3 n
FFR 808C	42.1 n
Golden Harvest H-2655	41.6 n
FFR 890C	40.5 n
C.V. %	4.1

*Values followed by the same letter are not significantly different at the .05 level of probability.

Table 15. Ear Height (Mean of Four Replications) of Thirty Full Season Corn Hybrids at Knoxville, Tennessee, 1975

Hybrid	Ear Height Inches
T-3015L	66.2 a*
McCurdy 72-22	64.8 ab
T-4030L	64.4 ab
Golden Harvest XC-4728	64.2 ab
McCurdy 73-90	61.9 abc
DeKalb XL394	61.4 bc
Stull SP2825	61.3 bcd
T-2008	60.7 bcde
Princeton SX910	60.5 bcde
Pioneer brand 511A	59.5 cdef
Tenn. 505	59.3 cdef
Tenn. 606	59.1 cdef
Princeton SP935	58.5 cdef
T-0107	58.3 cdef
Golden Harvest H-2660W	57.5 cedfg
T-4108L	56.8 defg
Pioneer brand 3145	56.2 efg
Pioneer brand 3080	55.5 fg
Asgrow RX125W	55.5 fg
Asgrow RX132	54.9 fg
Pioneer brand 3147	53.6 gh
Coker 56	53.6 gh
McCurdy 67-14	53.2 gh
McCurdy 73-56	53.1 gh
Pennington 9P-3A	53.1 gh
Funk G-4762	49.5 hi
Golden Harvest H-2775	47.2 ij
McNair X300	45.9 ij
Princeton SX805	45.6 ij
T.E. 6980	43.1 j
C.V. %	4.9

*Values followed by the same letter are not significantly different at the .05 level of probability.

Table 16. Linear Regression of Lodging on Ear Height at Each of Three Sampling Dates for Forty Medium Season and Thirty Full Season Corn Hybrids at Knoxville, Tennessee, 1975

Date	Intercept	Slope	R-Square	Probability >F
Medium Season				
9/16	30.493	-0.345	0.065	0.1123
10/28	23.474	-0.077	0.002	0.7690
12/09	8.782	0.420	0.047	0.1798
Full Season				
9/16	-8.263	0.363	0.091	0.1057
10/28	-8.914	0.481	0.097	0.0934
12/09	-5.791	0.691	0.134	0.0469

Table 17. Grain Yield (Means of Four Replications) of Forty Medium Season Corn Hybrids at Knoxville, Tennessee, 1975

Hybrid	Yield Bu/A
Pioneer brand 3147	158.2 a*
DeKalb XL94	153.5 ab
McNair X233	152.4 abc
T-4021	146.5 abcd
P.A.G. SX17	144.2 abcde
DeKalb XL80A	142.6 abcde
Pioneer brand 3368A	141.3 abcdef
DeKalb XL80	140.8 abcdef
Funk G-4810	136.9 bcdefg
FFR 808C	136.7 bcdefg
Funk G-4747W	136.6 bcdefg
McCurdy MSX78	135.2 bcdefgh
Princeton SX850	134.7 bcdefghi
Pioneer brand 3369A	134.0 bcdefghi
P.A.G. 644W	133.5 cdefghi
Golden Harvest H-2666	130.9 defghi
McNair X170	130.4 defghij
T-4020	130.3 defghij
T.E. 6968	129.8 defghij
P.A.G. SX39	129.2 defghij
Pioneer brand 3368	128.1 defghijk
DeKalb XL72B	127.6 defghijk
McNair S338	127.4 defghijk
DeKalb XL75	126.3 efghijkl
McCurdy MSX70	125.8 efghijkl
DeKalb XL390A	125.0 efghijkl
Asgrow RX 114	125.0 efghijkl
Golden Harvest H-2750	124.4 efghijkl
McCurdy 72-44A	121.6 fghijkl
Northup, King PX76	121.2 fghijkl

Table 17 (continued)

Hybrid	Yields Bu/A
Excel RA116	120.1 ghijkl
Golden Harvest H-2655	119.7 ghijkl
Pioneer brand 3145	119.3 ghijkl
Northup, King PX91	118.6 ghijkl
FFR 890C	118.1 ghijkl
Pioneer brand 3177	115.8 hijkl
Funk G-4864	114.8 ijk1
P.A.G. 494	110.6 jk1
McNair X210	108.8 k1
McNair X194	107.3 1
C.V. %	8.9

*Values followed by the same letter are not significantly different at the .05 level of probability.

Table 18. Grain Yield (Means of Four Replications) of Thirty Full Season Corn Hybrids at Knoxville, Tennessee, 1975

Hybrid	Yield Bu/A
Golden Harvest XC-4728	169.4 a*
T-4030L	164.2 ab
Tenn. 606	159.0 abc
Princeton SX910	150.7 abcd
T-3015L	149.3 abcd
Pioneer brand 511A	149.2 abcd
Pioneer brand 3080	147.8 abcd
Pioneer brand 3147	144.2 bcde
Pennington 9P-3A	143.5 bcde
T-4108L	142.4 bcdef
McCurdy 73-90	138.3 cdefg
DeKalb XL394	136.8 cdefg
Stull SP2825	136.6 cdefg
McCurdy 67-14	136.1 cdefg
Asgrow RX125W	132.8 defg
Tenn. 505	132.7 defg
T-2008	132.3 defg
T-0107	131.6 defg
Pioneer brand 3145	129.6 defg
McNair X300	129.3 defg
Golden Harvest H-2660W	128.9 defg
McCurdy 73-56	128.8 defg
Princeton SP935	127.9 defg
Golden Harvest H-2775	127.6 defg
Princeton SX805	126.8 defg
Asgrow RX132	123.3 efg
Funk G-4762	119.5 fg
Coker 56	119.2 fg
McCurdy 72-22	115.4 g
T.E. 5980	114.4 g
C.V. %	10.1

*Values followed by the same letter are not significantly different at the .05 level of probability.

0.096 was obtained for the full season hybrids (Table 19). Examples of this lack of association are evident. The medium season hybrid Golden Harvest H-2750 had 52.7 percent lodged plants on December 9 and a yield of 124.4 bushels per acre (Table 1, p. 8 and Table 17). In contrast, DeKalb XL80A had 23.4 percent lodged plants and a yield of 142.6 bushels per acre. Similar examples were found among the full season hybrids.

Yields among hybrids were significantly different for all tests except the medium season test at Crossville (Tables 17, 18, 20 and 21). There was a location X hybrid interaction for the full season hybrids but not for the medium season hybrids.

Number of days from planting to silking and to tasseling was measured for each hybrid at Knoxville but was not correlated with lodging. These data are shown in Tables 22-25. Significant differences were found among the silking dates and among the tasseling dates in both tests.

The medium season hybrids averaged 65.4 days to silking and 65.7 days to tasseling. The dates ranged from 60.0 days to silking and 60.5 days to tasseling for Golden Harvest H-2655 to 70.8 days to silking and 70.8 days to tasseling for P.A.G. 644W.

The full season hybrids averaged 69.5 days to silking and 68.4 days to tasseling. The dates ranged from 65.3 days to silking and 63.8 days to tasseling for T.E. 6980 to 72.8 days to silking for McCurdy 72-22 and 72.0 days to tasseling for Asgrow RX132.

In general, the full season hybrids silked and tasseled a few days later than the medium season hybrids and some of the full season hybrids silked and tasseled before the medium season hybrids (Tables 23-26).

Table 19. Linear Regression of Lodging on Yield for Forty Medium Season and Thirty Full Season Corn Hybrids at Knoxville, Tennessee, 1975

Date	Intercept	Slope	R-Square	Probability >F
		Medium Season		
12/09	43.752	-0.112	0.010	0.2110
		Full Season		
12/09	-10.116	0.315	0.096	0.0006

Table 20. Grain Yield (Means for Four Replications) of Forty Medium Season Corn Hybrids at Crossville, Tennessee, 1975

Hybrid	Yield Bu/A
P.A.G. 644W	154.8 a*
Princeton SX850	153.3 a
DeKalb XL80	148.6 a
Funk G-4747W	148.2 a
Golden Harvest H-2750	146.4 a
FFR 890C	144.7 a
P.A.G. SX17	141.1 a
Golden Harvest H-2666	138.6 a
McNair S338	138.4 a
DeKalb XL94	137.9 a
McNair X233	137.5 a
McCurdy MSX70	135.5 a
McCurdy MSX88	135.5 a
DeKalb XL390A	135.4 a
Pioneer brand 3147	135.1 a
Funk G-4810	133.4 a
McNair X194	132.9 a
T-4020	132.6 a
Pioneer brand 3368	132.4 a
Pioneer brand 3368A	131.9 a
Pioneer brand 3369A	131.4 a
Golden Harvest H-2655	131.2 a
P.A.G. SX39	130.4 a
Pioneer brand 3177	129.3 a
T-4021	128.4 a
Asgrow RX114	128.3 a
T.E. 6968	126.1 a
Excel RA116	126.0 a
FFR 808C	125.3 a
McNair S210	124.0 a

Table 20 (continued)

Hybrid	Yield Bu/A
Pioneer brand 3145	123.8 a
DeKalb XL80A	122.0 a
Northup, King PX76	121.6 a
DeKalb XL72B	121.6 a
McNair X170	119.4 a
Northup, King PX91	116.0 a
Funk G-4864	115.0 a
McCurdy 72-44A	111.7 a
DeKalb XL75	110.6 a
P.A.G. 494	104.4 a
C.V. %	15.7

*Values followed by the same letter are not significantly different at the .05 level of probability.

Table 21. Grain Yield (Means of Four Replications) of Thirty Full Season Corn Hybrids at Crossville, Tennessee, 1975

Hybrid	Yield Bu/A
Golden Harvest H-2660W	146.9 a*
Pioneer brand 511A	144.5 ab
McCurdy 67-14	140.1 abc
Princeton SX910	139.9 abcd
Tenn. 606	138.6 abcde
Pioneer brand 3147	137.4 abcde
Asgrow RX125W	136.3 abcde
T-4030L	136.0 abcde
T-2008	135.9 abcde
Pennington 9P-3A	135.2 abcde
McCurdy 73-56	134.7 abcde
T-4108L	134.7 abcde
DeKalb SX394	134.3 abcde
Golden Harvest H-2775	133.4 abcde
Pioneer brand 3145	132.0 abcde
McCurdy 72-22	131.5 abcde
Princeton SP935	131.0 abcde
Princeton SX805	131.0 abcde
Stull SP2825	128.9 abcde
Asgrow RX132	126.8 abcde
Golden Harvest XC-4728	126.1 abcde
Coker 56	125.5 abcde
T-0107	124.0 abcde
McCurdy 73-90	123.9 abcde
McNair X300	123.1 abcde
T.E. 6980	120.4 bcde
Pioneer brand 3080	119.8 cde
Tenn. 505	119.2 cde
Funk G-4762	115.8 de
T-3015L	114.9 e
C.V. %	17.8

*Values followed by the same letter are not significantly different at the .05 level of probability.

Table 22. Number of Days (Means of Four Replications) From Planting to Silking of Forty Medium Season Corn Hybrids at Knoxville, Tennessee, 1975

Hybrid	Days to Silking
P.A.G. 644W	70.8 a*
Funk G-4864	70.0 ab
Pioneer brand 3147	69.3 bc
DeKalb XL390A	69.3 bc
McNair X233	69.3 bc
Golden Harvest H-2750	68.8 cd
DeKalb XL94	68.8 cd
Funk G-4747W	68.8 cd
Pioneer brand 3145	68.3 cd
McNair S338	68.0 d
McCurdy 72-44A	67.0 e
Funk G-4810	66.8 e
DeKalb XL80A	66.5 e
T-4021	66.5 e
P.A.G. SX17	66.5 e
Asgrow RX114	66.5 e
Pioneer brand 3177	66.3 e
P.A.G. SX39	66.3 e
DeKalb XL80	66.3 e
McNair X210	66.0 ef
T-4020	66.0 ef
Pioneer brand 3368A	66.0 ef
Northup, King PX91	65.0 fg
DeKalb XL75	64.8 gh
Excel RA116	64.3 ghi
Pioneer brand 3368	64.0 ghi
McNair X194	63.8 hi
Pioneer brand 3369A	63.5 ij
Golden Harvest H-2666	63.5 ij
DeKalb XL72B	63.3 ij

Table 22 (continued)

Hybrid	Days to Silking
FFR 890C	62.5 j
McCurdy MSX70	62.5 j
Princeton SX850	62.5 j
McCurdy MSX88	62.5 j
Northup, King PX76	61.3 k
T.E. 6968.	61.3 k
P.A.G. 494	61.3 k
McNair X170	61.0 k
FFR 808C	60.8 k1
Golden Harvest H-2655	60.0 l
C.V. %	1.0

*Values followed by the same letter are not significantly different at the .05 level of probability.

Table 23. Number of Days (Means of Four Replications) From Planting to Tasseling of Forty Medium Season Corn Hybrids at Knoxville, Tennessee, 1975

Hybrid	Days to Tasseling
P.A.G. 644W	70.8 a*
DeKalb XL94	70.0 ab
DeKalb XL390A	69.8 ab
McNair X233	69.8 ab
Funk G-4864	69.3 b
Pioneer brand 3147	69.3 b
McNair S338	69.0 bc
Funk G-4747W	68.8 bc
Pioneer brand 3145	68.0 cd
P.A.G. SX17	68.0 cd
Pioneer brand 3368A	67.5 de
Golden Harvest H-2750	67.0 def
Pioneer brand 3177	67.0 def
Asgrow RX114	66.8 efg
Funk G-4810	66.5 efg
Pioneer brand 3368	66.3 fgh
P.A.G. SX39	66.0 fghi
DeKalb XL80A	66.0 fghi
DeKalb XL80	65.5 ghij
T-4021	65.5 ghij
Pioneer brand 3369A	65.0 hijk
T-4020	65.0 hijk
McNair X210	65.0 hijk
Northup, King PX91	64.8 ijkl
McCurdy MSX88	64.8 ijkl
Princeton SX850	64.8 ijkl
Golden Harvest H-2666	64.8 ijkl
DeKalb XL75	64.3 jkl
McCurdy MSX70	64.3 jkl
DeKalb XL72B	64.0 kl

Table 23 (continued)

Hybrid	Days to Tasseling
McNair X194	64.0 k1
McCurdy 72-44A	64.0 k1
Excel RA116	63.5 lm
FFR 890C	62.8 mn
T.E. 6968	62.8 mn
P.A.G. 494	62.3 n
Northup, King PX76	62.0 no
McNair X170	62.0 no
FFR 808C	61.0 op
Golden Harvest H-2655	60.5 p
C. V. %	1.2

*Values followed by the same letter are not significantly different at the .05 level of probability.

Table 24. Number of Days (Means of Four Replications) From Planting to Silking of Thirty Full Season Corn Hybrids at Knoxville, Tennessee, 1975

Hybrid	Days to Silking
McCurdy 72-22	72.8 a*
Asgrow RX132	72.3 ab
Tenn. 505	71.8 abc
T-0107	71.5 bcd
T-2008	71.3 bcde
Princeton SP935	71.3 bcde
Coker 56	71.0 cde
T-4108L	71.0 cde
Golden Harvest H-2660W	70.8 cde
DeKalb XL394	70.8 cde
Pennington 9P-3A	70.5 cdef
Pioneer brand 3147	70.5 cdef
McCurdy 73-56	70.5 cdef
McCurdy 73-90	70.3 defg
Princeton SX910	70.0 efg
Asgrow RX125W	69.5 fgh
Stull SP2825	69.3 gh
T-4030L	68.8 hi
T-3015L	68.8 hi
Pioneer brand 3145	68.8 hi
Pioneer brand 511A	68.5 hi
Tenn. 606	68.5 hi
Pioneer brand 3080	68.3 hi
Golden Harvest XC-4728	68.3 hi
Funk G-4762	67.8 ij
McCurdy 67-14	67.8 ij
McNair X300	67.8 ij
Golden Harvest H-2775	67.0 j
Princeton SX805	65.5 k
T.E. 6980	65.3 k
C.V. %	1.1

*Values followed by the same letter are not significantly different at the .05 level of probability.

Table 25. Number of Days (Means of Four Replications) From Planting to Tasseling of Thirty Full Season Corn Hybrids at Knoxville, Tennessee, 1975

Hybrid	Days to Tasseling
Asgrow RX132	72.0 a*
T-4108L	71.0 ab
Tenn. 505	70.8 bc
Princeton SP935	70.5 bcd
T-0107	70.0 bcde
McCurdy 72-22	70.0 bcde
Golden Harvest H-2660W	69.8 cdef
Coker 56	69.5 defg
McCurdy 73-90	69.5 defg
Pioneer brand 3147	69.5 defg
T-2008	69.3 efgh
Princeton SX910	69.3 efgh
Pennington 9P-3A	69.0 efghi
DeKalb XL394	68.8 fghi
T-4030L	68.5 ghij
Pioneer brand 511A	68.3 hijk
Stull SP2825	68.3 hijk
McCurdy 73-56	68.0 ijkl
Asgrow RX125W	68.0 ijkl
Pioneer brand 3145	67.5 jkl
Golden Harvest XC-4728	67.5 jkl
T-3015L	67.5 jkl
Tenn. 606	67.5 jkl
Pioneer brand 3080	67.3 klm
Funk G-4762	67.0 lmn
McCurdy 67-14	67.0 lmn
McNair X300	66.3 mn
Golden Harvest H-2775	66.0 no
Princeton SX805	65.0 o
T.E. 6980	63.8 p
C.V. %	1.1

*Values followed by the same letter are not significantly different at the .05 level of probability.

Table 26. Stepwise Regression Models Significant at the .10 Level of Probability, Using Yield as the Dependent Variable and Ear Height, Number of Days to Silking and Tasseling, and Percent Senescent and Lodged Plants as the Independent Variables for Forty Medium Season and Thirty Full Season Corn Hybrids at Knoxville, Tennessee, 1975

Regression Models	R-Square
Medium Season	
Ear Height	0.163
Ear Height, Silking	0.189
Ear Height, Silking, Percent Senescence	0.228
Ear Height, Silking, Tasseling, Percent Senescence	0.264
Full Season	
Ear Height	0.169
Ear Height, Silking	0.343
Ear Height, Silking, Tasseling	0.370

Pioneer brand 3145 and Pioneer brand 3147, full season hybrids included in the medium season test as checks, had 68.3 and 69.3 days to silking and 68.0 and 69.3 days to tasseling respectively. P.A.G. 644W, a medium season hybrid, had 70.8 days to silking and tasseling.

The final analysis of the data was a stepwise regression analyses of the effects of ear height, number of days to silking and tasseling, percent senescence, and percent lodged plants on yield (Table 26). This analysis produced four significant models at the .10 level of probability for the medium season hybrids and three models for the full season hybrids at Knoxville. Ear height was the best one-variable model for both the medium and full season tests with R-squares of 0.163 and 0.169 respectively. The largest significant model for the medium season hybrids contained the variables ear height, number of days to silking and tasseling, and percent senescent plants with an R-square of 0.264. The model for the full season hybrids which contained the variables ear height and number of days to silking and tasseling gave an R-square of 0.370.

CHAPTER V

SUMMARY AND CONCLUSIONS

The purpose of this study was to determine the lodging performances over time of forty medium season and thirty full season corn hybrids. Other characteristics including senescence over time, yield, ear height, and number of days to silking and tasseling were also determined.

Significant differences at the .05 level of probability were found among the percentage of lodged plants for both tests at Knoxville and at Crossville. Yields were significantly different among the full season hybrids at both locations and among the medium season hybrids at Knoxville.

At Knoxville significant differences at the .05 level of probability were found among the medium season and among the full season hybrids for percentage of senescent plants on October 28, ear height, and number of days to silking and tasseling.

Linear regression analyses of the effects on lodging of senescence, ear height and yield were conducted on the medium and full season hybrids at Knoxville. Senescence contributed only a small amount to lodging and more to the full season than to the medium season tests. Ear height made no significant contributions to lodging except for the date of December 9 for the full season hybrids. Yield contributed no significant amount to lodging for the medium season hybrids and only 9.6 percent for the full season hybrids which would indicate that yield does not contribute significantly to lodging.

In stepwise regression analyses, ear height, number of days to silking and tasseling, and percent senescent plants contributed to 26.4 percent of the variation in yields for the medium season hybrids. Ear height and number of days to silking and tasseling contributed to 37.0 percent of the variation in yields for the full season hybrids.

The variables evaluated in this study were found to have very little influence on lodging. In future investigations of factors affecting lodging in corn, other variables will need to be evaluated.

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VITA

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