A STUDY OF THE GENETIC DIVERSITY AND AGRONOMIC IMPROVEMENT POTENTIAL IN EASTERN GAMAGRASS, *TRIPSACUM DACTYLOIDES* L.

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in partial fulfillment of the requirements
for the Degree of
DOCTOR OF PHILOSOPHY
May, 1978

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ACKNOWLEDGMENTS

The author expresses sincere appreciation to Dr. C. M. Taliaferro, major adviser, for his guidance and understanding throughout the course of this study. Grateful acknowledgments are also extended to Dr. F. P. Horn, Dr. R. W. McNew, Dr. L. G. Morrill, and Dr. D. E. Weibel for serving on the advisory committee and for their valuable assistance and constructive criticism in the preparation of this manuscript.

Special appreciation is extended to Dr. F. P. Horn and the laboratory staff at the Southwestern Livestock and Forage Research Station for their assistance in conducting this research and to Dr. R. W. McNew for his assistance in conducting the statistical analysis of the data.

The author expresses his sincere gratitude to W. L. Richardson for his assistance in conducting this study.

The author is especially indebted to the Department of Agronomy, Oklahoma State University, and the USDA Science and Education Administration, for the financial assistance while conducting this research.

Sincere gratitude is expressed to the author's wife, Linda, and daughter, Jolie, for their sacrifice and encouragement during this study.

Appreciation is extended to the author's wife, Linda, for typing the draft copies of this dissertation and to Emma Tusing for typing the final copy.

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CHAPTER I

INTRODUCTION

Worldwide human population increases, presently estimated to be about 200,000 individuals per day, dictate an urgent need for the development of effective means of producing adequate quantities of food efficiently and economically. Much of the feed grains now used to "finish" livestock may ultimately have to be diverted to direct human consumption. With this event, continued production of beef at the same levels would have to be accomplished by increasing the role of forages in the finishing process. The challenge of increasing this role is primarily contingent on our ability to provide higher and more uniformly distributed quality forages. The late spring and summer months constitute a period in the forage calendar that is deficient in high quality forages. Native and other introduced warm-season perennial grasses have high production potential throughout the growing season but usually decline in nutritive value after the first six to eight weeks of growth, to the extent that animal performance is mediocre at best. Consequently, the development of grasses with higher nutritive value during the summer period would be of significant value to improve livestock performance.

Eastern gamagrass, *Tripsacum dactyloides* L., is a species that may have potential for furnishing higher quality forage during the summer. It is native to a large portion of the central and eastern United States where it once flourished on alluvial soils, but it is now found only on sites protected from grazing. Eastern gamagrass has accrued a reputation as a highly palatable, high quality grass with high production potential. Because of difficulties associated with it's propagation it has not been used extensively and there has been very little scientific investigation of either it's present value as a forage or it's improvement potential.

The study reported herein was undertaken to assess the magnitude of genetic variability existing in eastern gamagrass for important agronomic characteristics and to estimate their heritability and selection response. Phenotypic and genetic correlations are used to estimate associations among traits.

The manuscript will be presented in a form acceptable to Crop Science Society of America for publication in it's journal, Crop Science[1]. The same format is currently being adopted by many professional journals. Additional data pertaining to the study are presented in tabular form in the appendix.

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[1]Fuccillo, D. A., and R. C. Dinauer (co-chairmen). 1976. Handbook and style manual for ASA, CSSA, and SSSA publications. Crop Sci. Soc. Am., Madison, Wisc.

CHAPTER II

A Study of the Genetic Diversity and Agronomic Improvement Potential in Eastern Gamagrass, *Tripsacum dactyloides* L.

ABSTRACT

Seventy five parental plants and 50 of their F_1 hybrid offspring populations were used to estimate quantitative genetic parameters for several important morphological and agronomic characters of eastern gamagrass, *Tripsacum dactyloides* L. The characters studied were: 1) the length of staminate spikelet axis of terminal and axillary inflorescences (cm), 2) the number of racemes/terminal inforescence, 3) the number of pistillate spikelets/raceme on terminal and axillary inflorescences, 4) leaf width (mm), 5) percent *in vitro* dry matter digestibility (IVDMD), and 6) percent crude protein. Data were taken on individual plants to estimate heritability, response from selection, and interrelationships among the characters studied. The heritability estimates were calculated using the variance components and parent-offspring regression methods.

Staminate spikelet axis length for both terminal and axillary inflorescences was the most highly heritable character (0.28-1.05). The number of pistillate spikelets/raceme for axillary inflorescences had intermediate heritability (0.19-0.66), and the number of pistillate spikelets/raceme of the terminal inflorescences had comparatively low

heritability (0.08-0.45). The number of racemes/terminal inflorescence and the crude protein content had low heritabilities (0.19-0.37 and 0.0-0.24, respectively). The IVDMD and leaf width had intermediate heritabilities (0.34-0.62 and 0.32-0.38, respectively). The male component of variance was larger than the female component for staminate spikelet axis length and the number of pistillate spikelets/raceme on both terminal and axillary inflorescences indicating paternal inheritance.

Predicted selection responses indicate that considerable changes can be effected in all the characters except crude protein percentage, the number of racemes/terminal inflorescence, and the number of pistillate spikelets/raceme of terminal inflorescences.

The phenotypic and genetic correlation coefficients indicate close association between the staminate spikelet axis length of terminal and axillary inflorescence, and between the number of pistillate spikelets/raceme on the terminal and axillary inflorescences. Significant negative phenotypic correlation coefficients and negative genetic correlation coefficients between IVDMD and the number of pistillate spikelets/raceme on the terminal and axillary inflorescences were obtained.

Additional index words: Heritability, Phenotypic correlation, Genetic correlations, Selection response.

Eastern gamagrass, Tripsacum dactyloides L., is a warm-season perennial bunch grass that grows in clumps ranging up to 122 cm in diameter. It is endemic to a large part of the United States, ranging from the central Great Plains to the Gulf and Atlantic Coasts. Its principal habitat is alluvial soils on flood plains.

Eastern gamagrass has long been recognized as a vigorous and highly palatable forage plant, being described in 1843 by Magoffin (7) as "a most productive, nutritious, and palatable hay crop." In the terminology of range management it is described as an "ice cream" plant because it is relished and selectively grazed by all classes of livestock. Consequently, nearly all stands of gamagrass have been destroyed in pastures and presently pure stands are found only in protected areas. Polk and Adcock (10) reported marketable beef gains of 202 kg ha^{-1} $year^{-1}$ from eastern gamagrass growing near Bellville, Texas. They also reported seasonal total hay yields of 9 metric tons ha^{-1} $year^{-1}$ from cuttings in May and August. This yield was obtained without fertilizers or irrigation. The hay was sold at a premium price for horse feed.

In spite of the reputation given eastern gamagrass for its palatability and apparent forage yield potential, it has not been extensively propagated and used as a forage plant. Likewise there has been very little scientific investigation of its potential for this purpose.

However, considerable effort has been and currently is devoted to study of its cytology and its relationship to corn. Recently Newell and de Wet (9) reported results of studies they made on the distribution and cytology of eastern gamagrass in the United States. They found naturally occuring diploids (2n=36), triploids (2n=54), and tetraploids (2n=72). The tetraploids were previously thought to occur only along the Florida gulf coast, but they were found to occupy a substantially larger area. They also concluded that Tripsacum dactyloides "consist of highly variable populations encompassing a wide range of morphological entities."

Important questions concerning the agronomic potential of this species relate to: 1) the feasibility for its efficient and economic propagation, 2) the potential for prolonged productivity when used for grazing or hay production, and 3) its nutritive value.

The objective of this research was to characterize the range of variability and to estimate the heritability of several important morphological and agronomic characters of eastern gamagrass. The characters studied were: 1) the length of the staminate spikelet axis (henceforth referred to as staminate axis) of terminal and axillary inflorescences (cm), 2) the number of racemes/terminal inflorescence, 3) the number of pistillate spikelets/raceme (henceforth referred to as spikelets/raceme) on terminal and axillary inflorescences, 4) leaf width (mm), 5) percent in vitro dry matter digestibility (IVDMD), and 6) percent crude protein.

CHAPTER III

MATERIALS AND METHODS

Plant material used in this study consisted of 75 parental plants and 50 of their F_1 hybrid progeny populations. The parental plants were randomly selected from among several hundred space-planted plants that originated from seed taken from a highly heterogeneous composite population maintained at the Southwestern Livestock and Forage Research Station, El Reno, Oklahoma. Gamagrass strains collected throughout the southern Great Plains were composited into this germplasm pool, and it is presumed to be sufficiently representative to allow the drawing of inferences about the population as a whole.

The 75 randomly selected parental plants were arbitrarily grouped into sets of three. In each set two plants were randomly chosen to serve as female parents with the third serving as the male parent. The crosses were made in the greenhouse from 1973 to 1976 by William L. Richardson. In January 1976 the seed from the crosses were planted in plastic germination trays and placed in cold storage at 10^{o}C for 4 weeks. This aids in breaking dormancy as described by Ahring and Frank (1). The trays were then transferred to a germination chamber. Soon after germination seedlings were transplanted to 7.6 cm diameter peat pots and placed in the greenhouse. Water and a balanced fertilizer were applied to the progenies so that vigorous plants were maintained.

During May 1976, the parents and F_1 hybrids were transplanted to the field at the Agronomy Research Station at Perkins, Oklahoma. The field plot design was a randomized block with four replications. Individual plots contained 10 F_1 plants of each mating or 10 clones of each parent. The plants were spaced 122 cm apart, with 3.7 m alleys separating relications.

Three kg/ha of simazine (a.i.) was applied 28 May 1976 and 1.7 kg/ha was applied 31 March 1977 for control of weeds. The plots were irrigated as needed to obtain maximum growth. On 7 April 1977 336 kg/ha of 18-46-0 fertilizer was applied. During the spring and summer of 1977, measurements were taken on the following morphological characters: 1) the staminate axis length of terminal and axillary inflorescences (cm), 2) the number of racemes/terminal inflorescence, 3) the number of spikelets/raceme on terminal and axillary inflorescences, and 4) leaf width (mm). Three measurements per plant were made for each character.

The plants were clipped to a height of approximately 20 cm on 6 July 1977 so that uniform regrowth could be sampled and analyzed for IVDMD and crude protein content. Because of the large number of plants involved it was necessary to randomly select two plants for each parental plot and four plants from each offspring plot for IVDMD and crude protein content determinations. The selected plants were harvested 8-10 August 1977. Dried samples were subsequently ground through a 1 mm screen in a Wiley mill. The IVDMD and crude protein analyses were conducted at the Southwestern Livestock and Forage Research Station, El Reno, Oklahoma.

The IVDMD of the samples was determined using the method developed by Tilley and Terry (12) as modified by Monson et al. (8). Duplicate measurements were made on each sample within each digestion run, and the mean of these measurements was used as the IVDMD value of the sample. The crude protein content of the samples was determined using the standard macro Kjeldahl procedure as described in AOAC Methods (2).

Analysis of variance was used to determine the variability of each of the characters studied.

Narrow sense heritability (h^2_{NS}) estimates for each of the characters studied were derived by the following two methods; 1) using estimates of variance components and 2) doubling the regression coefficient derived from parent offspring regressions. The analyses of variance used to estimate the variance components are presented in Table 1. The response data other than that on IVDMD and crude protein represented the average of three measurements per plant. The heritabilities were calculated by the formulae:

$$h^2_{NS} = \frac{4\sigma^2_M}{\sigma^2_T},\ h^2_{NS} = \frac{4\sigma^2_F}{\sigma^2_T},\ \text{and}\ h^2_{NS} = \frac{2(\sigma^2_M + \sigma^2_F)}{\sigma^2_T}$$

where σ^2_M, σ^2_F, and σ^2_T represent the male, female, and total component of variance, respectively. The standard errors of the heritability estimates computed from variance components were calculated using the conservative method described by Dickerson (5). Heritability estimates were calculated by regressing offspring on male parents and by intra-male regression of offspring on females. The plot means were used to calculate the parent offspring regressions. For each character the two heritability estimates based on parent-offspring regression were averaged.

The expected responses to selection for the various traits were calculated as:

$$R = i\sigma_p h^2$$

where i is the intensity of selection, σp is the standard deviation, and h^2 is the heritability of the phenotypic values of individuals. The heritability estimates calculated from male and female variance components were used to calculate the expected response to selection.

The relationship among all characters was determined by computing phenotypic and genetic correlation coefficients among all pairs of variables based on progeny means from each block. Phenotypic correlations were calculated from plot averages using the standard method. Genetic correlations were calculated as

$$\left(\frac{b_{12}\ b_{21}}{b_{11}\ b_{22}}\right)^{1/2}$$

where b_{11} and b_{22} represent the regression coefficient offspring on parent for characters one and two, respectively, and b_{12} is the regression coefficients of character one in the offspring on character two in the parents, and b_{21} is similarly defined. Two sets of phenotypic correlations were calculated, one using data from male parents, the other using data from female parents. Two sets of genetic correlations were also calculated, one using data from male parents and their offspring, the other using data from female parents and their offspring. Throughout the remainder of the text correlations based on data from male parents will be referred to as the male estimate, and those based on data from female parents will be referred to as the female estimate.

CHAPTER IV

RESULTS

Staminate Axis Length

The mean staminate axis length of terminal and axillary inflorescences was slightly larger in the parents than in the F_1 offspring. The ranges of the staminate axis length of terminal inflorescences were almost equal in parental and offspring populations; however, for axillary inflorescences the range was greater in the parents than in the F_1 offspring (Table 2). The variability in staminate axis length was significant at the .01 probability level.

The staminate axis length of axillary inflorescences is apparently the most highly heritable of the characters studied with estimates ranging from 0.28 to 1.05 (Table 3). The staminate axis length of the terminal inflorescences had heritabilities ranging from .38 to .93. Heritability estimates of staminate axis length derived by the different methods are in fairly close agreement except for the estimate calculated using the female component of variance which was appreciably smaller than other components resulting in lower heritability estimates.

The results indicate that selection would be very effective in shortening or lengthening the staminate axis portion of gamagrass inflorescences (Table 4). The staminate axis length of terminal inflorescences would be expected to increase 3.29, 2.93, and 2.30 cm for the 5, 10, and 20% selection levels, respectively. The staminate axis length of axillary inflorescences would be expected to increase 2.85, 2.53, and 1.99 cm for the 5, 10, and 20% selection levels, respectively. Selection for shorter staminate axis length should be possible with the same response.

The staminate axis length of axillary and terminal inflorescences was highly associated as indicated by both the phenotypic and genetic correlation coefficients (Table 5). This high association indicates that selection for increased staminate axis length in terminal inflorescences should substantially increase the character in axillary inflorescences and vise-versa. The staminate axis length of axillary inflorescences and the number of racemes/terminal inflorescence were significantly, phenotypically associated by the male estimate; however, the female estimate is opposite in sign and nonsignificant. The staminate axis length of axillary inflorescences and the number of spikelets/raceme for axillary inflorescences are negatively correlated as indicated by the female estimate. For the female estimate the negative phenotypic correlation was highly significant, and the genetic correlation was negative; however, the male estimate was not significant. The staminate axis length was not significantly correlated with any of the remaining characters.

Spikelets/Raceme

The mean number of spikelets/raceme for terminal and axillary inflorescences was slightly higher in the parents than in the F_1 offspring. The range in the number of spikelets/raceme for terminal inflorescences was larger in the parents than in the F_1 offspring; however, for axillary inflorescences the F_1 offspring had the largest range (Table 2). The variability for number of spikelets/raceme was found to be significant at the .01 probability level.

Heritability values for the number of spikelets/raceme on axillary inflorescences ranged from 0.19 to 0.66. The number of spikelets/raceme on terminal inflorescences had considerably lower heritabilities, ranging from 0.08 to 0.45 (Table 3). The male component of variance for spikelets/raceme was also larger than the female component of variance.

The number of spikelets/raceme for terminal and axillary inflorescences could prove to be important in seed production. The results indicate that selection would be effective in increasing the number of spikelets in axillary inflorescences and thus substantially increasing the number of spikelets per plant and presumably increasing per hectare seed production; however, progress from selection of spikelets/raceme of terminal inflorescence may be difficult. The number of spikelets/raceme for axillary inflorescences should be increased by one selection cycle by 1.58, 1.40, and 1.10 spikelets for the 5, 10, and 20% selection levels, respectively. The expected response to selection for increased number of spikelets/raceme for terminal inflorescences is considerably less; 0.52, 0.46, and 0.36 spikelets for the 5, 10, and 20% selection levels, respectively (Table 4).

High phenotypic and genetic correlations were found between the number of spikelets/raceme on axillary inflorescences and the number of spikelets/raceme on terminal inflorescences; therefore, selection for increased numbers of spikelets on either the terminal or axillary inflorescences should also result in the improvement of the other (Table 5). The phenotypic correlations for number of spikelets/raceme on axillary inflorescences and racemes/terminal inflorescence were significant for both the male and female estimates. The genetic correlations were opposite in sign. The genetic correlations had large standard errors so that inferences cannot be drawn from them for these two characters. The number of spikelets/raceme of the terminal and axillary inflorescences and crude protein were found to have significant negative phenotypic associations by the male estimate. The genetic correlations were negative and had large standard errors. The female estimate indicated no significance for these characters. Both the female and male estimates indicate that there was a negative association between the number of spikelets/raceme (on both terminal and axillary inflorescences) and IVDMD. This could be explained if inflorescences were included in the quality samples, because an increased number of spikelets would be expected to reduce the IVDMD measurements; however, inflorescences were not included in the forage samples.

Racemes/Terminal Inflorescence

The means in the number of racemes/terminal inflorescence were approximately equal for the parents and the F_1 offspring. The ranges were also about equal for the parents and F_1 offspring (Table 2). The variability for the number of racemes/terminal inflorescence was significant at the .01 probability level.

The number of racemes/inflorescence had low heritability, with estimates ranging from 0.19 to 0.37 (Table 3).

Increasing the number of racemes per terminal and axillary inflorescences would be another way to increase seed production. The axillary inflorescences usually only have one raceme. The data indicate that little progress would be made in selecting for number of racemes/

terminal inflorescence (Table 4).

The associations of racemes/terminal inflorescence has been presented under different sub-headings.

Leaf Width

The means and ranges in leaf width were slightly larger in the parents than in the F_1 offspring (Table 2). The variability for leaf width was significant at the .01 probability level.

Leaf width had intermediate heritability estimates, ranging from 0.32 to 0.38 (Table 3). This is considerably lower than the estimate of 0.66 for leaf width of reed canary grass (*Phalaris arundinacea* L. I.) reported by Baltensperger and Kalton (3).

The expected increase of leaf width from selection is 1.96, 1.74, and 1.37 mm for 5, 10, and 20% selection levels, respectively (Table 4).

Phenotypic correlation coefficients of leaf width with the other characters were not significant. The genetic correlation coefficients were characterized by large standard errors (Table 5).

IVDMD

The mean and range IVDMD were slightly larger than those for F_1 offspring (Table 2). The variability for IVDMD was significant to the .01 probability level.

IVDMD had intermediate heritability values ranging from 0.34 to 0.62 (Table 3). These estimates are in close agreement with those obtained for IVDMD of bermudagrass (*Cynodon dactylon* (L.) pers.) (0.27 to 0.69) by Burton and Monson (4).

The results indicate that there is sufficient genetic variation in

IVDMD of eastern gamagrass to develop varieties with improved digestibility. The expected response to selection for IVDMD is 2.66, 2.37, and 1.86 digestion percentage units for 5, 10, and 20% selection levels, respectively (Table 4). These rates of increase would result in significant improvement in the nutritive value of eastern gamagrass forage. Although this expected selection response is valid only for the first cycle of selection, some positive response would be expected through several cycles of selection.

The female estimate indicated a significant phenotypic association between crude protein and IVDMD (Table 5). The negative association between IVDMD and spikelets/raceme was presented under the sub-heading spikelets/raceme.

Crude Protein

The mean and range in crude protein were slightly larger in the parents than in the F_1 offspring (Table 2). The variability for crude protein was significant at the .01 level of significance.

The percent crude protein content had the lowest heritability estimates of all the characters studied, ranging from 0.0 to 0.24 (Table 3). These estimates are lower than those obtained for alfalfa (*Medicago sativa* L.) by Hill and Barnes (6) which ranged from 0.22 to 0.64.

The expected response to selection for crude protein is 0.51, 0.45, and 0.36 percentage units for 5, 10, and 20% selection levels, respectively (Table 4).

The associations of crude protein has been presented under different sub-headings.

CHAPTER V

DISCUSSION

The staminate axis length and the number of spikelets/raceme for both terminal and axillary inflorescences had components of variance attributable to males that were considerably larger than the female variance components. For most characters studied in other plants the female component of variance is larger than the male component, which is usually attributed to cytoplasmic inheritance. The data indicate that there may be some type of paternal inheritance involved with the length of the staminate axis and the number of spikelets/raceme of eastern gamagrass.

Substantial change for all the characters studied with exceptions of crude protein, number of racemes/terminal inflorescence, and spikelets/terminal inflorescence can be made by plant breeding. The breeding procedure will depend to a great extent on the method of gamagrass propagation. If vegetative reproduction is found to be an agronomically efficient means of propagation, only one superior plant will need to be identified and then increased as an improved asexual variety. If seed proves to be the most efficient and economical means of propagation, then mass selection should be the most effective plant breeding procedure, with the ultimate goal of producing a superior open-pollinated variety.

Although this preliminary research indicates that there is sufficient genetic variability for improvement of most of the characters studied, much more work is needed to fully characterize the breeding improvement potential of eastern gamagrass. The heritability of characters studied will need further elucidation, and the potential improvement of yield by plant breeding will need to be investigated.

Table 1. Analyses of variance used to estimate variance components.

Source of variation	Mean Square	Expected mean square
Blocks		
Between males	M_1	$\sigma^2 + K_2\sigma_F^2 + K_3\sigma_M^2$
Between females within males	M_2	$\sigma^2 + K_1\sigma_F^2$
Error	M_3	σ^2

Under the assumption of no interaction between blocks and genotypes, σ^2 includes the variance among plants within a plot and the variance among plots within blocks. K's depend on number of plants in plots.

$$\sigma^2 = M_3$$

$$\sigma_F^2 = \frac{1}{K_1}(M_2 - M_3)$$

$$\sigma_M^2 = \frac{1}{K_1}(M_1 - \sigma^2 - K_2\sigma_F^2)$$

Table 2. Means and ranges for indicated characters in parents and F_1 offspring.

Character	Parents		F_1 Offspring	
	Mean	Range	Mean	Range
Staminate axis length (cm)				
Terminal inflores.	15.06	10.73 - 20.47	14.72	10.33 - 20.12
Axillary inflores.	13.29	1.62 - 19.39	12.91	8.33 - 16.87
No. spikelets/raceme				
Terminal inflores.	5.11	1.83 - 10.00	4.67	2.67 - 8.17
Axillary inflores.	10.78	7.67 - 14.72	10.25	7.33 - 15.79
No. racemes/term. inflores.	2.82	2.00 - 4.33	2.94	2.00 - 4.00
Leaf width (mm)	20.70	14.33 - 28.07	20.21	14.67 - 24.67
IVDMD	58.49	48.68 - 66.52	58.37	51.98 - 65.22
Crude protein %	13.28	9.84 - 16.35	12.83	9.75 - 15.17

Table 3. Estimates of heritability and their standard errors for indicated plant characters.

	Methods of Estimation					
	Variance components			Regression		
	Male	Female	Average	Male parent	Female parent	Average
Staminate axis length						
Terminal inflorescence	.75 ± .34	.52 ± .20	.64 ± .16	.93 ± .12	.38 ± .11	.66 ± .08
Axillary inflorescence	1.05 ± .38	.28 ± .13	.66 ± .19	1.01 ± .13	.45 ± .11	.73 ± .09
No. spikelets/raceme						
Terminal inflorescence	.25 ± .12	.08 ± .08	.17 ± .06	.45 ± .11	.29 ± .07	.37 ± .09
Axillary inflorescence	.49 ± .20	.19 ± .11	.34 ± .10	.66 ± .14	.42 ± .08	.54 ± .08
No. racemes/terminal inflores.	.27 ± .14	.19 ± .11	.23 ± .07	.37 ± .11	.22 ± .08	.30 ± .10
Leaf width	.36 ± .19	.34 ± .15	.35 ± .09	.38 ± .11	.32 ± .08	.35 ± .07
IDVDM	.34 ± .17	.54 ± .17	.44 ± .08	.62 ± .14	.47 ± .07	.55 ± .08
Crude Protein	.20 ± .25	.23 ± .24	.22 ± .12	.24 ± .14	.0 ± .09	.12 ± .06

Table 4. Expected response to individual plant selection reported in standard deviation units and percent of the mean for the 5, 10, and 20% levels of selection, based on F_1 data.

Character	F_1 Mean	5% Expected response	5% % of mean	5% Expected mean	10% Expected response	10% % of mean	10% Expected mean	20% Expected response	20% % of mean	20% Expected mean
Staminate axis length (cm)										
Terminal inflores.	14.72	3.29	22.35	18.01	2.93	19.90	17.65	2.30	15.63	17.02
Axillary inflores.	12.91	2.84	22.00	15.75	2.53	19.60	15.44	1.99	15.41	14.90
No. spikelets/raceme										
Terminal inflores.	4.67	.52	11.00	5.19	.46	9.85	5.13	.36	7.71	5.03
Axillary inflores.	10.25	1.58	15.41	11.83	1.40	13.66	11.65	1.10	10.73	11.35
No. racemes/term. inflores.	2.94	.21	7.41	3.15	.18	6.12	3.12	.14	4.76	3.08
Leaf width (mm)	20.21	1.96	9.70	22.17	1.74	8.60	21.95	1.37	6.78	21.58
IVDMD (%)	58.37	2.66	4.56	61.03	2.37	4.06	60.74	1.86	3.19	60.23
Crude protein (%)	12.83	.51	3.98	13.34	.45	3.51	13.28	.36	2.81	13.19

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Table 5. Phenotypic and genetic correlations between eight characters of eastern gamagrass using data on parents and offspring.

Character	Staminate axis length axillary inflorescence	Spikelets/raceme terminal inflorescence	Spikelets/raceme axillary inflorescence	Racemes/ terminal inflores.	Leaf width	IVDMD %	Crude protein %
Staminate axis length (cm) terminal inflores.	(a) .73** .72** (b) .85 ± .04	.23 .06 -.77 ± .57	.04 -.08 -.68 ± .36	.33* .05 .49 ± .18 .62 ± .77	-.09 .06 .11 ± .53	-.16 -.16 .19 ± .17 -.19 ± .42	.02 -.03 -.41 ± .17
Staminate axis length (cm) axillary inflores.		.05 -.18** .18 ± .20 -.73 ± .35	.09 -.23** .09 ± .20 -.44 ± .33	.23** -.02 .39 ± .20 -.61 ± .52	.10 .01	-.07 .05 -.11 ± .39	.05 .10 -.08 ± .34
Spikelets/raceme terminal inflores.			.66** .75** .70 ± .10 .98 ± .13	-.21** -.19** -.73 ± .42	.09 -.09 -.26 ± .29 -.51 ± .57	-.37** -.30** -.46 ± .19	-.16** .00 -.20 ± .45
Spikelets/raceme axillary inflores.				.17* .22** .37 ± .22 -.89 ± .73	-.05 -.07	-.26** -.20 -.55 ± .14 -.19 ± .42	-.20* .00 -.40 ± .33
Racemes/terminal inflorescence					.12 .14 .31 ± .32 .70 ± .72	.10 -.08 -.12 ± .68	.14 .11
Leaf width						-.10 .11 -.32 ± .50	.09 .15 .71 ± .30
IVDMD %							.15 .23** .53 ± .32

* Significant at .05 level, ** significant at .01 level.
(a) The first and second values in each cell are the phenotypic correlation coefficients based on male and female parents respectively.
(b) The third and fourth values in each cell are the genetic correlation coefficients and their standard errors based on male and female parents, respectively. Value missing for correlation indicates regression coefficient between the two characters are opposite in sign and cannot be estimated using this method. The missing values should be close to zero.

REFERENCES

1. Ahring, R. M., and H. Frank. 1968. Establishment of eastern gamagrass from seed and vegetative propagation. J. Range Management 21(1):27-30.

2. AOAC Methods. 1975. Official methods of analysis of the Association of Official Analytical Chemists. Association of Official Analytical Chemists. Washington D. C.

3. Baltensperger, A. A., and R. R. Kalton. 1958. Variability in reed canarygrass, *Phalaris arundinacea* L. I. agronomic characteristics. Agron. J. 50:659-663.

4. Burton, G. W. and W. G. Monson. 1972. Inheritance of dry matter digestibility in bermudagrass. *Cynodon dactylon* (L.) Pers. Crop Sci. 12:375-378.

5. Dickerson, G. E. 1960. Techniques and procedures in animal production research. Amer. Soc. of Animal Sci. Q Corporation, Albany, New York. 84-93.

6. Hill, R. R. Jr., and R. F. Barnes. 1977. Genetic variability for chemical composition of alfalfa. II. Yield and traits associated with digestibility. Crop Sci. 17:948-952.

7. Magoffin, R. 1843. United States Bureau of Patents Report Article 477.

8. Monson, W.G., R. S. Lowrey, and I. Forbes, Jr. 1969. In vivo bag vs. two-stage in vitro digestion: Comparison of two techniques for estimating dry matter digestibility of forages. Agron. J. 61:587.

9. Newell, A. A. and J. M. de Wet. 1974. Morphological and cytological variability in Tripsacum dactyloides (Gramineae). Amer. J. of Bot. 61(6):652-664.

10. Polk, D. B., and W. L. Adcock. 1974. Eastern gamagrass. The Cattleman. 50:82-83.

11. Reeve, E. E. R. 1955. The variance of the genetic correlation coefficient. Biometrics 11:357-374.

12. Tilley, J. M. A., and R. A. Terry. 1963. A two-stage technique for the in vitro digestion of forage crops. J. Brit. Grassl. Soc. 18:104-111.

Table 6. Mean, range, standard deviation, and coefficient of variation for staminate axis length (cm) of terminal inflorescences of each entry, based on plot averages.

F_1 Parent or Offspring*	Mean	Range	Standard Deviation	Coefficient of Variation
1	15.08	14.32 - 16.53	0.99	6.58
1 - 1	16.12	15.23 - 17.47	0.99	6.13
1 - 2	16.32	16.25 - 16.39	0.07	0.42
1 - 1 X 1	14.25	13.37 - 14.67	0.61	4.25
1 - 2 X 1	14.92	13.80 - 15.67	0.80	5.34
2	14.80	14.17 - 15.60	0.66	4.45
2 - 1	17.13	16.75 - 17.83	0.48	2.81
2 - 2	15.24	14.50 15.98	0.61	4.00
2 - 1 X 2	15.86	15.62 - 16.23	0.28	1.75
2 - 2 X 2	14.42	13.48 - 15.00	0.70	4.85
3	14.05	13.10 - 14.78	0.71	5.04
3 - 1	14.07	13.81 - 14.37	0.23	1.64
3 - 2	16.04	15.21 - 17.13	0.99	6.15
3 - 1 X 3	14.04	13.17 - 15.17	0.90	6.43
3 - 2 X 3	14.18	11.93 - 15.17	1.51	10.66
4	17.10	16.81 - 17.56	0.32	1.88
4 - 1	15.54	14.75 - 16.28	0.78	5.02
4 - 2	15.42	14.50 - 16.71	0.95	6.16
4 - 1 X 4	15.27	14.90 - 15.62	0.29	1.89
4 - 1 X 4	14.96	14.25 - 15.76	0.68	4.55
5	14.62	13.83 - 15.47	0.88	6.05
5 - 1	15.89	15.33 - 17.47	1.06	6.65
5 - 2	14.38	13.50 - 14.98	0.63	4.36
5 - 1 X 5	13.75	11.33 - 15.00	1.64	11.95
5 - 2 X 5	14.42	13.11 - 16.00	1.26	8.69
6	14.34	13.76 - 14.64	0.39	2.74
6 - 1	11.88	11.33 - 12.17	0.38	3.19
6 - 2	12.07	11.81 - 12.61	0.37	3.10
6 - 1 X 6	12.31	11.54 - 13.52	0.85	6.92
6 - 2 X 6	12.78	12.23 - 13.15	0.45	3.48
7	14.95	14.24 - 15.92	0.74	4.95
7 - 1	16.32	14.44 - 17.17	1.28	7.86
7 - 2	14.09	12.95 - 14.88	0.83	5.91
7 - 1 X 7	13.96	11.33 - 15.00	1.77	12.66
7 - 2 X 7	14.25	13.08 - 15.60	1.06	7.42
8	13.27	12.70 - 13.50	0.38	2.86

Table 6. (Continued)

Parent or F_1 Offspring	Mean	Range	Standard Deviation	Coefficient of Variation
8 - 1	14.29	13.12 - 14.97	0.85	5.94
8 - 2	12.85	12.14 - 13.50	0.58	4.50
8 - 1 X 8	12.44	10.33 - 14.33	2.01	16.15
8 - 2 X 8	12.99	12.08 - 13.98	0.82	6.34
9	14.02	13.46 - 14.85	0.60	4.31
9 - 1	12.59	12.19 - 12.96	0.32	2.55
9 - 2	15.33	14.08 - 15.96	0.86	5.61
9 - 1 X 9	14.00	14.00 - 14.00		
9 - 2 X 9	18.67	18.67 - 18.67		
10	19.35	18.74 - 19.90	0.48	2.48
10 - 1	14.25	13.22 - 14.83	0.76	5.32
10 - 2	13.47	12.98 - 13.79	0.43	3.21
10 - 1 X 10	16.55	14.37 - 18.00	1.66	10.02
10 - 2 X 10	15.82	15.50 - 16.05	0.28	1.75
11	15.25	14.87 - 15.47	0.33	2.15
11 - 1	17.15	16.43 - 17.53	0.50	2.91
11 - 2	12.33	12.08 - 12.57	0.21	1.68
11 - 1 X 11	16.23	15.67 - 16.83	0.60	3.73
11 - 2 X 11	13.66	13.23 - 14.07	0.40	2.94
12	19.10	18.19 - 20.05	0.94	4.91
12 - 1	13.53	13.10 - 14.05	0.40	2.96
12 - 2	13.77	13.23 - 14.17	0.41	3.01
12 - 1 X 12	14.04	12.89 - 15.11	0.93	6.63
12 - 2 X 12	14.00	14.00 - 14.00		
13	12.87	12.00 - 13.29	0.58	4.55
13 - 1	14.14	12.67 - 15.61	1.42	10.08
13 - 2	15.65	15.33 - 16.11	0.36	2.31
13 - 1 X 13	12.38	11.67 - 13.33	0.69	5.61
13 - 2 X 13	14.39	13.17 - 15.83	1.10	7.62
14	19.74	19.11 - 20.17	0.48	2.41
14 - 1	11.46	10.73 - 12.22	0.64	5.55
14 - 2	18.44	17.52 - 19.24	0.78	4.14
14 - 1 X 14	15.52	13.00 - 19.67	3.62	23.33
14 - 2 X 14				
15	14.97	14.81 - 15.15	0.15	0.97
15 - 1	17.46	16.92 - 17.87	0.41	2.37
15 - 2	14.51	14.30 - 14.87	0.26	1.81
15 - 1 X 15	15.96	15.18 - 16.80	0.67	4.23
15 - 2 X 15				

Table 6. (Continued)

Parent or F_1 Offspring	Mean	Range	Standard Deviation	Coefficient of Variation
16	13.92	12.52 - 14.86	0.99	7.13
16 - 1	13.67	12.00 - 15.00	1.53	11.18
16 - 2	18.62	17.75 - 19.56	0.75	4.04
16 - 1 X 16	14.06	13.11 - 15.53	1.06	7.55
16 - 2 X 16	14.17	14.00 - 14.53	0.23	1.65
17	15.36	14.00 - 17.67	1.61	10.45
17 - 1	12.84	12.47 - 13.14	0.28	2.16
17 - 2	14.58	12.78 - 15.46	1.23	8.45
17 - 1 X 17	13.80	13.27 - 14.07	0.38	2.74
17 - 2 X 17	14.24	13.87 - 14.73	0.39	2.72
18	14.16	13.71 - 14.71	0.70	4.93
18 - 1	15.05	14.56 - 16.52	1.03	6.64
18 - 2	15.51	14.67 - 16.50	0.90	5.84
18 - 2 X 18	15.38	14.00 - 16.50	1.04	6.77
19	16.07	15.73 - 16.46	0.35	2.17
19 - 1	15.80	15.00 - 16.86	0.88	5.54
19 - 2	14.02	10.89 - 17.00	3.06	21.81
19 - 1 X 19	16.30	15.25 - 17.27	0.92	5.65
19 - 2 X 19	12.33	11.63 - 13.35	0.74	6.04
20	13.88	13.26 - 14.75	0.72	5.20
20 - 1	14.37	13.58 - 14.88	0.60	4.15
20 - 2	13.07	12.91 - 13.29	0.19	1.42
20 - 1 X 20	13.45	12.27 - 14.60	1.14	8.46
20 - 2 X 20	12.51	12.13 - 13.00	0.43	3.42
21	16.64	15.98 - 17.58	0.74	4.46
21 - 1	15.48	14.17 - 16.78	1.48	9.57
21 - 2	16.81	16.44 - 17.43	0.43	2.55
21 - 1 X 21	16.69	15.48 - 19.50	1.89	11.30
21 - 2 X 21	16.11	14.00 - 18.00	2.01	12.47
22	20.09	19.69 - 20.47	0.32	1.59
22 - 1	15.14	14.60 - 15.96	0.64	4.21
22 - 2	16.24	14.28 - 18.40	2.24	13.78
22 - 1 X 22	17.44	15.00 - 19.00	1.75	10.03
22 - 2 X 22	19.08	18.00 - 20.12	1.03	5.40
23	14.78	14.29 - 15.90	0.76	5.14
23 - 1	12.45	12.00 - 12.89	0.63	5.06
23 - 2	12.85	12.29 - 13.93	0.74	5.75
23 - 1 X 23	14.21	13.17 - 14.78	0.72	5.03
23 - 2 X 23	12.25	11.50 - 13.00	1.06	8.66

Table 6. (Continued)

F_1 Parent or Offspring	Mean	Range	Standard Deviation	Coefficient of Variation
24	16.03	15.06 - 17.44	1.01	6.27
24 - 1	15.51	11.50 - 17.56	2.84	18.34
24 - 2	15.81	14.08 - 17.06	1.35	8.51
24 - 1 X 24	14.67	12.00 - 16.67	2.40	16.40
24 - 2 X 24	16.91	16.14 - 17.50	0.57	3.36
25	15.30	14.24 - 16.19	0.83	5.44
25 - 1	13.78	12.67 - 14.33	0.77	5.56
25 - 2	13.63	12.92 - 14.33	1.00	7.32
25 - 1 X 25	15.65	14.83 - 16.16	0.65	4.14
25 - 2 X 25	13.85	13.33 - 14.33	0.48	3.46

*Each group of five includes the male parent (single digit number), the two female parents (hyphenated numbers e.g. 1 - 1 and 1 - 2) and hybrids between the female and male plants.

Table 7. Mean, range, standard deviation, and coefficient of variation for staminate axis length (cm) of axillary inflorescences of each entry, based on plot averages.

Parent or F_1 Offspring*	Mean	Range	Standard Deviation	Coefficient of Variation
1	12.31	11.13 - 13.35	0.91	7.41
1 - 1	13.27	12.40 - 13.78	0.61	4.60
1 - 2	12.31	12.00 - 12.77	0.36	2.96
1 - 1 X 1	11.42	10.80 - 11.83	0.45	3.90
1 - 2 X 1	11.90	11.27 - 13.53	1.09	9.16
2	14.12	13.44 - 15.44	0.90	6.39
2 - 1	14.92	14.50 - 15.67	0.51	3.45
2 - 2	14.44	13.71 - 14.93	0.56	3.89
2 - 1 X 2	14.71	14.23 - 15.63	0.65	4.43
2 - 2 X 2	13.85	13.38 - 14.05	0.31	2.27
3	11.87	11.57 - 12.57	0.48	4.01
3 - 1	13.45	13.13 - 13.83	0.29	2.14
3 - 2	15.09	14.83 - 15.33	0.25	1.66
3 - 1 X 3	12.16	11.72 - 12.61	0.43	3.55
3 - 2 X 3	13.01	12.60 - 13.42	0.43	3.31
4	14.52	13.93 - 15.14	0.51	3.54
4 - 1	13.94	13.67 - 14.22	0.22	1.61
4 - 2	13.86	13.19 - 15.11	0.88	6.32
4 - 1 X 4	14.04	13.62 - 14.46	0.36	2.58
4 - 2 X 4	12.95	12.48 - 13.46	0.45	3.48
5	13.66	13.05 - 14.44	0.61	4.46
5 - 1	14.26	14.17 - 14.40	0.10	0.70
5 - 2	12.49	12.22 - 12.81	0.27	2.13
5 - 1 X 5	13.25	12.33 - 14.33	0.92	6.93
5 - 2 X 5	13.44	11.44 - 15.50	1.66	12.34
6	11.31	10.52 - 12.62	0.91	8.05
6 - 1	9.66	9.47 - 10.24	0.39	3.98
6 - 2	10.83	10.48 - 11.20	0.30	2.73
6 - 1 X 6	10.23	9.67 - 10.72	0.43	4.24
6 - 2 X 6	10.89	10.50 - 11.50	0.43	3.97
7	12.13	11.78 - 12.52	0.31	2.59
7 - 1	13.32	13.06 - 13.67	0.29	2.16
7 - 2	12.16	11.33 - 12.95	0.90	7.39
7 - 1 X 7	9.84	8.33 - 11.67	1.44	14.60
7 - 2 X 7	11.82	11.10 - 12.93	0.89	7.44
8	12.72	11.85 - 13.21	0.62	4.85
8 - 1	12.32	12.05 - 12.75	0.33	2.71

Table 7. (Continued)

Parent or F_1 Offspring	Mean	Range	Standard Deviation	Coefficient of Variation
8 - 2	11.26	10.17 - 12.05	0.86	7.63
8 - 1 X 8	11.11	9.33 - 12.33	1.58	14.20
8 - 2 X 8	12.27	12.00 - 12.81	0.37	2.98
9	12.92	12.26 - 13.34	0.51	3.91
9 - 1	11.54	9.81 - 12.24	1.16	10.10
9 - 2	14.48	14.40 - 14.67	0.13	0.87
9 - 1 X 9	11.67	11.67 - 11.67		
9 - 2 X 9	16.33	16.33 - 16.33		
10	15.64	14.29 - 16.30	0.94	6.01
10 - 1	12.93	12.43 - 13.50	0.51	3.92
10 - 2	12.28	12.00 - 12.67	0.35	2.84
10 - 1 X 10	13.99	12.55 - 15.50	1.43	10.23
10 - 2 X 10	14.21	13.43 - 15.12	0.72	5.08
11	14.11	13.30 - 14.83	0.77	5.45
11 - 1	13.68	12.42 - 14.33	0.87	6.38
11 - 2	11.50	11.22 - 12.00	0.36	3.10
11 - 1 X 11	13.12	12.44 - 14.25	0.80	6.13
11 - 2 X 11	12.02	12.02 - 13.30	0.52	4.13
12	16.48	15.65 - 17.76	0.96	5.85
12 - 1	13.31	12.90 - 13.67	0.32	2.41
12 - 2	13.29	12.58 - 14.07	0.61	4.60
12 - 1 X 12	13.28	12.00 - 14.78	1.40	10.57
12 - 2 X 12	14.33	14.33 - 14.33		
13	11.43	9.93 - 12.40	1.06	9.30
13 - 1	12.69	12.27 - 13.42	0.50	3.96
13 - 2	13.23	11.58 - 14.42	1.29	9.74
13 - 1 X 13	11.54	10.63 - 12.07	0.64	5.53
13 - 2 X 13	12.31	11.33 - 14.08	1.28	10.38
14	16.38	15.52 - 17.50	0.87	5.38
14 - 1	10.76	9.39 - 11.75	1.06	9.86
14 - 2	17.78	17.43 - 18.00	0.28	1.55
14 - 1 X 14	12.47	10.33 - 16.33	2.78	22.28
14 - 2 X 14				
15	12.44	11.85 - 12.83	0.44	3.50
15 - 1	13.81	13.61 - 14.17	0.25	1.82
15 - 2	12.11	11.80 - 12.63	0.38	3.11
15 - 1 X 15	13.81	12.60 - 14.63	0.87	6.33
15 - 2 X 15				

Table 7. (Continued)

F_1 Parent or Offspring	Mean	Range	Standard Deviation	Coefficient of Variation
16	12.54	11.19 - 13.30	0.94	7.53
16 - 1	13.45	13.00 - 13.67	0.39	2.88
16 - 2	15.44	14.69 - 16.17	0.60	3.91
16 - 1 X 16	12.91	11.44 - 13.89	1.07	8.30
16 - 2 X 16	11.50	11.33 - 11.67	0.24	2.09
17	12.61	10.50 - 14.00	1.68	13.33
17 - 1	11.62	10.48 - 12.67	0.90	7.73
17 - 2	12.34	11.72 - 12.57	0.41	3.36
17 - 1 X 17	12.18	11.60 - 12.63	0.47	3.84
17 - 2 X 17	12.48	12.03 - 13.07	0.43	3.47
18	14.50	13.42 - 15.17	0.79	5.45
18 - 1	13.37	12.72 - 14.07	0.60	4.46
18 - 2	13.09	12.67 - 13.50	0.40	3.09
18 - 1 X 18	13.40	11.70 - 14.54	1.21	9.00
18 - 2 X 18	13.32	11.89 - 14.83	1.24	9.33
19	14.61	14.17 - 14.87	0.30	2.07
19 - 1	14.13	13.42 - 14.67	0.52	3.68
19 - 2	11.72	10.00 - 14.67	2.56	21.87
19 - 1 X 19	14.01	12.92 - 14.61	0.79	5.65
19 - 2 X 19	11.55	10.97 - 12.47	0.67	5.76
20	13.11	12.48 - 14.22	0.79	6.02
20 - 1	13.13	12.27 - 14.08	0.85	6.44
20 - 2	11.09	10.48 - 11.63	0.53	4.74
20 - 1 X 20	12.37	11.40 - 13.50	0.87	7.17
20 - 2 X 20	11.58	11.10 - 12.10	0.43	3.72
21	12.57	12.19 - 12.75	0.26	2.04
21 - 1	13.61	13.11 - 14.00	0.42	3.06
21 - 2	15.07	14.43 - 15.52	0.52	3.42
21 - 1 X 21	13.78	12.67 - 15.33	1.12	8.15
21 - 2 X 21	13.67	11.67 - 15.33	1.85	13.56
22	17.05	16.60 - 18.27	0.81	4.78
22 - 1	14.96	14.20 - 15.75	0.74	4.96
22 - 2	14.31	12.58 - 15.17	1.18	8.21
22 - 1 X 22	15.44	14.33 - 16.58	0.94	6.10
22 - 2 X 22	16.02	14.71 - 16.87	0.94	5.89
23	14.09	13.56 - 14.87	0.63	4.50
23 - 1	13.31	13.22 - 13.39	0.12	0.90
23 - 2	12.03	11.58 - 12.41	0.34	2.84
23 - 1 X 23	13.74	13.08 - 14.50	0.58	4.24

Table 7. (Continued)

F_1 Parent or Offspring	Mean	Range	Standard Deviation	Coefficient of Variation
23 - 2 X 23	11.67	11.67 - 11.67		
24	13.65	13.05 - 14.04	0.42	3.09
24 - 1	13.14	10.50 - 14.25	1.78	13.55
24 - 2	13.34	12.67 - 13.87	0.52	3.93
24 - 1 X 24	14.28	14.00 - 14.67	0.35	2.44
24 - 2 X 24	13.72	12.67 - 14.93	1.10	8.00
25	14.28	13.78 - 15.00	0.52	3.62
25 - 1	12.37	12.17 - 12.58	0.22	1.80
25 - 2	13.08	11.83 - 14.33	1.77	13.52
25 - 1 X 25	13.31	13.00 - 13.78	0.35	2.59
25 - 2 X 25	13.68	13.00 - 14.22	0.54	3.98

*Each group of five includes the male parent (single digit number), the two female parents (hyphenated numbers e.g. 1 - 1 and 1 - 2) and hybrids between the female and male plants.

Table 8. Mean, range, standard deviation, and coefficient of variation for the number of spikelets/raceme of terminal inflorescences of each entry, based on plot averages.

Parent or F_1 Offspring*	Mean	Range	Standard Deviation	Coefficient of Variation
1	5.16	4.57 - 5.71	0.63	12.27
1 - 1	5.22	4.60 - 6.40	0.81	15.45
1 - 2	5.51	5.04 - 5.89	0.37	6.71
1 - 1 X 1	4.57	3.96 - 5.50	0.67	14.71
1 - 2 X 1	4.71	3.98 - 5.42	0.59	12.58
2	4.67	3.50 - 5.33	0.83	17.71
2 - 1	4.15	3.17 - 4.83	0.76	18.39
2 - 2	5.25	4.42 - 5.89	0.61	11.65
2 - 1 X 2	4.06	3.92 - 4.28	0.16	3.83
2 - 2 X 2	4.64	3.67 - 5.33	0.79	17.02
3	4.84	4.50 - 5.38	0.38	7.80
3 - 1	4.63	3.89 - 5.24	0.69	14.85
3 - 2	4.51	3.67 - 5.80	1.13	25.15
3 - 1 X 3	4.22	3.14 - 5.67	1.06	25.11
3 - 2 X 3	4.44	3.73 - 4.92	0.55	12.45
4	4.01	3.33 - 4.37	0.47	11.80
4 - 1	4.10	3.73 - 4.41	0.29	7.04
4 - 1 X 4	4.16	3.58 - 4.78	0.57	13.67
4 - 2 X 4	4.57	4.15 - 5.43	0.59	12.86
5	6.20	5.48 - 7.06	0.65	10.55
5 - 1	3.98	2.65 - 5.00	1.04	26.25
5 - 2	7.01	6.64 - 7.50	0.36	5.10
5 - 1 X 5	4.92	2.67 - 6.67	1.41	38.87
5 - 2 X 5	5.64	4.83 - 6.00	0.54	9.63
6	5.65	5.00 - 5.94	0.44	7.74
6 - 1	6.10	5.07 - 6.58	0.70	11.40
6 - 2	4.54	4.25 - 4.94	0.31	6.81
6 - 1 X 6	5.15	4.19 - 5.92	0.73	14.17
6 - 2 X 6	4.76	4.00 - 5.15	0.52	10.94
7	3.51	3.07 - 4.27	0.53	15.14
7 - 1	5.38	4.89 - 5.78	0.38	7.14
7 - 2	5.25	3.86 - 6.31	1.13	21.63
7 - 1 X 7	4.04	3.00 - 5.67	1.24	30.56
7 - 2 X 7	4.89	3.54 - 5.67	0.97	19.88
8	4.03	3.74 - 4.33	0.24	6.05
8 - 1	7.01	6.19 - 7.79	0.84	12.02

Table 8. (Continued)

Parent or F_1 Offspring*	Mean	Range	Standard Deviation	Coefficient of Variation
8 - 2	5.88	5.08 - 6.67	0.86	14.66
8 - 1 X 8	4.44	3.67 - 5.33	0.84	18.81
8 - 2 X 8	5.01	4.64 - 5.52	0.41	8.25
9	3.93	2.83 - 4.94	0.87	22.11
9 - 1	4.94	4.48 - 5.26	0.33	6.68
9 - 2	4.53	3.42 - 5.58	0.95	21.08
9 - 1 X 9	4.33	4.33 - 4.33		
9 - 2 X 9	4.00	4.00 - 4.00		
10	5.17	4.30 - 5.87	0.76	14.70
10 - 1	3.69	2.61 - 4.83	0.99	26.75
10 - 2	4.92	4.21 - 5.35	0.62	12.55
10 - 1 X 10	4.60	4.17 - 5.11	0.39	8.47
10 - 2 X 10	3.99	4.21 - 4.40	0.44	11.14
11	6.34	5.96 - 6.87	0.47	7.46
11 - 1	5.36	4.78 - 6.03	0.61	11.44
11 - 2	5.19	4.80 - 5.65	0.37	7.16
11 - 1 X 11	5.12	4.75 - 5.67	0.42	8.24
11 - 2 X 11	4.83	3.88 - 5.60	0.90	18.71
12	5.54	4.60 - 6.72	0.90	16.31
12 - 1	5.08	4.60 - 5.62	0.54	10.64
12 - 2	6.38	4.83 - 7.59	1.34	20.97
12 - 1 X 12	5.46	4.56 - 6.50	0.80	14.62
12 - 2 X 12	5.00	5.00 - 5.00		
13	5.40	4.50 - 6.10	0.69	12.77
13 - 1	3.94	3.17 - 4.33	0.52	13.26
13 - 2	4.82	4.06 - 5.61	0.63	13.16
13 - 1 X 13	3.88	3.37 - 4.23	0.40	10.42
13 - 2 X 13	4.04	3.42 - 5.00	0.75	18.52
14	2.71	1.83 - 3.30	0.71	6.83
14 - 1	6.10	4.78 - 7.53	1.13	18.45
14 - 2	4.55	3.63 - 5.30	0.75	16.57
14 - 1 X 14	3.72	3.50 - 4.00	0.25	26.24
14 - 2 X 14				
15	7.16	6.50 - 7.71	0.54	7.56
15 - 1	6.46	6.33 - 6.75	0.20	3.03
15 - 2	3.23	2.09 - 4.18	0.87	26.92
15 - 1 X 15	6.07	5.65 - 7.05	0.66	10.88
15 - 2 X 15				

Table 8. (Continued)

F_1 Parent or Offspring	Mean	Range	Standard Deviation	Coefficient of Variation
16	4.17	2.48 - 5.14	1.17	28.02
16 - 1	5.67	5.00 - 7.00	1.15	20.38
16 - 2	5.33	4.53 - 6.03	0.69	12.89
16 - 1 X 16	4.94	4.11 - 5.67	0.65	13.18
16 - 2 X 16	5.50	5.00 - 6.00	0.71	12.86
17	4.26	3.00 - 4.89	0.88	20.61
17 - 1	4.25	3.95 - 4.88	0.42	9.97
17 - 2	4.78	4.61 - 5.02	0.18	3.69
17 - 1 X 17	4.48	4.07 - 4.90	0.34	7.60
17 - 2 X 17	4.09	3.43 - 4.93	0.64	15.56
18	6.80	6.12 - 8.00	0.86	12.61
18 - 1	4.44	3.44 - 5.25	0.79	17.81
18 - 2	8.06	6.58 -10.00	1.42	17.66
18 - 1 X 18	4.80	3.57 - 5.48	0.84	17.53
18 - 2 X 18	6.00	4.78 - 7.67	1.26	21.03
19	6.40	6.23 - 6.50	0.12	1.94
19 - 1	3.92	3.31 - 4.50	0.58	14.72
19 - 2	6.50	5.50 - 7.67	1.09	16.85
19 - 1 X 19	4.56	4.17 - 4.89	0.30	6.49
19 - 2 X 19	5.46	4.77 - 5.96	0.57	10.51
20	4.12	3.61 - 4.54	0.43	10.36
20 - 1	5.81	4.83 - 6.78	0.92	15.84
20 - 2	5.89	5.75 - 6.05	0.15	2.60
20 - 1 X 20	4.15	2.70 - 5.07	1.03	24.72
20 - 2 X 20	4.86	4.07 - 5.60	0.63	13.01
21	5.97	5.60 - 6.50	0.38	6.38
21 - 1	4.53	3.67 - 5.39	0.80	17.72
21 - 2	5.50	4.78 - 6.00	0.53	9.57
21 - 1 X 21	5.23	3.81 - 8.17	2.00	38.29
21 - 2 X 21	4.33	3.00 - 6.00	1.53	35.25
22	4.16	3.13 - 5.08	0.83	19.96
22 - 1	4.34	4.00 - 4.53	0.24	5.60
22 - 2	4.73	3.43 - 5.61	0.79	16.79
22 - 1 X 22	4.63	3.83 - 5.00	0.55	11.94
22 - 2 X 22	4.56	3.52 - 6.50	1.34	29.49
23	4.86	4.58 - 5.37	0.37	7.58
23 - 1	4.69	4.44 - 4.94	0.35	7.54
23 - 2	5.97	5.52 - 6.54	0.45	7.62
23 - 1 X 23	4.59	4.00 - 5.26	0.62	13.43

Table 8. (Continued)

F_1 Parent or Offspring	Mean	Range	Standard Deviation	Coefficient of Variation
23 - 2 X 23	4.25	3.50 - 5.00	1.06	24.96
24	5.22	4.25 - 5.83	0.71	13.53
24 - 1	5.94	4.50 - 7.38	1.18	19.80
24 - 2	4.56	4.00 - 4.89	0.39	8.47
24 - 1 X 24	5.20	4.92 - 5.67	0.41	7.93
24 - 2 X 24	4.64	3.93 - 5.47	0.72	15.62
25	5.48	4.54 - 5.95	0.64	11.61
25 - 1	4.15	3.47 - 4.75	0.58	13.99
25 - 2	4.17	4.42 - 5.00	0.41	8.71
25 - 1 X 25	4.63	3.00 - 6.17	1.34	29.08
25 - 2 X 25	4.52	3.83 - 5.00	0.49	10.93

*Each group of five includes the male parent (single digit number), the two female parents (hyphenated numbers e.g. 1 - 1 and 1 - 2) and hybrids between the female and male plants.

Table 9. Mean, range, standard deviation, and coefficient of variation for number of spikelets/raceme of axillary inflorescences of each entry, based on plot averages.

Parent or F_1 Offspring*	Mean	Range	Standard Deviation	Coefficient of Variation
1	10.99	10.77 - 11.63	0.43	3.88
1 - 1	11.13	10.53 - 11.55	0.43	3.87
1 - 2	11.01	10.40 - 11.53	0.48	4.40
1 - 1 X 1	9.97	8.63 - 10.56	0.90	9.04
1 - 2 X 1	9.42	9.13 - 9.90	0.35	3.69
2	9.82	9.50 - 10.22	0.35	3.54
2 - 1	8.16	8.07 - 8.33	0.12	1.48
2 - 2	11.35	10.88 - 11.76	0.36	3.20
2 - 1 X 2	8.74	8.57 - 9.00	0.18	2.10
2 - 2 X 2	10.01	9.50 - 10.19	0.34	3.37
3	8.69	8.21 - 9.17	0.39	4.51
3 - 1	10.04	9.63 - 10.42	0.35	3.49
3 - 2	10.37	9.92 - 11.07	0.62	5.95
3 - 1 X 3	9.37	8.67 - 10.13	0.68	7.23
3 - 2 X 3	9.46	8.80 - 10.50	0.74	7.87
4	8.86	8.43 - 9.37	0.39	4.36
4 - 1	8.42	7.98 - 8.62	0.30	3.52
4 - 2	12.73	12.33 - 13.62	0.60	4.71
4 - 1 X 4	9.35	8.96 - 9.56	0.28	2.98
4 - 2 X 4	10.25	9.44 - 10.92	0.61	5.95
5	12.36	11.93 - 12.62	0.30	2.44
5 - 1	8.90	8.21 - 9.27	0.50	5.64
5 - 2	14.31	14.00 - 14.52	0.25	1.73
5 - 1 X 5	9.67	8.00 - 11.33	1.92	19.89
5 - 2 X 5	11.19	9.83 - 12.17	0.98	8.77
6	10.33	9.78 - 10.81	0.43	4.13
6 - 1	11.86	11.47 - 12.48	0.49	4.10
6 - 2	9.80	9.60 - 10.10	0.22	2.27
6 - 1 X 6	11.01	10.59 - 11.50	0.39	3.56
6 - 1 X 6	10.22	9.63 - 10.90	0.52	5.10
7	11.40	10.69 - 11.74	0.48	4.25
7 - 1	12.39	12.00 - 12.78	0.32	2.60
7 - 2	12.19	10.69 - 12.95	1.05	8.65
7 - 1 X 7	10.34	9.67 - 10.67	0.47	4.56
7 - 2 X 7	12.72	12.60 - 12.93	0.15	1.17
8	8.66	8.19 - 8.90	0.33	3.84
8 - 1	12.52	11.33 - 13.21	0.85	6.82

Table 9. (Continued)

Parent of F_1 Offspring	Mean	Range	Standard Deviation	Coefficient of Variation
8 - 2	13.43	12.81 - 14.17	0.68	5.04
8 - 1 X 8	11.33	10.33 - 12.00	0.88	7.80
8 - 2 X 8	9.86	8.83 - 10.62	0.75	7.60
9	8.69	8.57 - 8.80	0.10	1.12
9 - 1	11.11	9.43 - 11.81	1.12	10.10
9 - 2	10.62	10.50 - 10.83	0.15	1.37
9 - 1 X 9	8.67	8.67 - 8.67		
9 - 2 X 9	7.33	7.33 - 7.33		
10	11.22	10.90 - 11.47	0.24	2.12
10 - 1	8.54	7.81 - 8.87	0.49	5.78
10 - 2	10.14	10.03 - 10.30	0.14	1.42
10 - 1 X 10	10.36	9.88 - 11.17	0.56	5.41
10 - 2 X 10	10.22	9.54 - 10.86	0.55	5.39
11	12.25	12.09 - 12.50	0.22	1.81
11 - 1	10.51	9.80 - 11.08	0.55	5.22
11 - 2	10.67	10.26 - 11.04	0.38	3.55
11 - 1 X 11	10.34	8.71 - 12.67	1.70	16.47
11 - 2 X 11	10.99	10.49 - 11.33	0.37	3.37
12	11.62	11.10 - 11.89	0.35	3.03
12 - 1	11.75	11.38 - 12.33	0.41	3.47
12 - 2	13.37	11.83 - 14.63	1.21	9.02
12 - 1 X 2	11.52	10.56 - 12.67	0.87	7.57
12 - 2 X 12	10.00	10.00 - 10.00		
13	11.50	10.90 - 12.13	0.51	4.45
13 - 1	8.44	8.25 - 8.70	0.19	2.22
13 - 2	10.13	9.08 - 10.81	0.77	7.63
13 - 1 X 13	8.59	8.17 - 9.07	0.39	4.57
13 - 2 X 13	8.90	8.00 - 10.08	0.87	9.82
14	9.28	9.15 - 9.50	0.16	1.74
14 - 1	12.67	12.53 - 12.83	0.14	1.11
14 - 2	9.08	8.61 - 9.50	0.40	4.36
14 - 1 X 14	10.00	9.00 - 10.17	0.72	7.21
14 - 2 X 14				
15	13.41	12.52 - 13.87	0.61	4.58
15 - 1	12.58	12.33 - 12.72	0.17	1.39
15 - 2	11.42	11.13 - 11.57	0.21	1.80
15 - 1 X 15	12.31	11.67 - 12.80	0.54	4.35
15 - 2 X 15				

Table 9. (Continued)

F_1 Parent of Offspring	Mean	Range	Standard Deviation	Coefficient of Variation
16	10.33	9.85 - 10.81	0.39	3.80
16 - 1	11.25	9.75 - 12.67	1.46	12.99
16 - 2	11.71	11.44 - 12.06	0.28	2.36
16 - 1 X 16	9.63	9.33 - 9.89	0.29	3.05
16 - 2 X 16	12.17	12.00 - 12.33	0.23	1.92
17	9.27	9.00 - 9.67	0.33	3.57
17 - 1	10.44	9.43 - 11.00	0.69	6.62
17 - 2	9.35	8.72 - 9.75	0.44	4.73
17 - 1 X 17	10.39	9.87 - 10.83	0.40	3.81
17 - 2 X 17	9.57	8.83 - 10.10	0.57	6.00
18	11.48	11.17 - 11.75	0.24	2.07
18 - 1	10.95	10.35 - 11.58	0.53	4.85
18 - 2	14.04	13.17 - 14.72	0.80	5.67
18 - 1 X 18	10.68	9.93 - 11.04	0.51	4.79
18 - 2 X 18	11.90	11.11 - 12.83	0.72	6.04
19	13.58	13.37 - 13.90	0.22	1.65
19 - 1	9.63	8.95 - 10.24	0.58	6.01
19 - 2	11.76	11.44 - 12.00	0.29	2.44
19 - 1 X 19	10.52	10.00 - 11.29	0.56	5.36
19 - 2 X 19	12.01	11.10 - 13.13	0.86	7.16
20	9.86	9.52 - 10.23	0.32	3.25
20 - 1	11.07	10.42 - 11.751	0.55	5.01
20 - 2	12.55	11.77 - 12.96	0.54	4.32
20 - 1 X 20	10.46	9.77 - 11.53	0.80	7.65
20 - 2 X 20	11.28	11.07 - 11.60	0.24	2.18
21	11.71	11.28 - 12.04	0.32	2.75
21 - 1	8.66	8.50 - 8.90	0.18	2.04
21 - 2	10.35	10.10 - 10.75	0.24	2.75
21 - 1 X 21	11.02	9.24 - 15.79	3.19	28.91
21 - 2 X 21	9.45	8.67 - 11.00	1.35	14.24
22	10.10	9.90 - 10.33	0.23	2.30
22 - 1	9.62	8.83 - 10.33	0.62	6.42
22 - 2	9.73	9.13 - 10.29	0.48	4.92
22 - 1 X 22	8.76	8.50 - 8.83	0.13	1.56
22 - 2 X 22	9.64	9.12 - 9.90	0.36	3.69
23	10.56	10.08 - 10.98	0.47	4.42
23 - 1	10.06	10.00 - 10.11	0.08	0.77
23 - 2	11.07	11.50 - 11.83	0.15	1.25
23 - 1 X 23	10.11	9.32 - 11.19	0.78	7.75

Table 9. (Continued)

Parent of F_1 Offspring	Mean	Range	Standard Deviation	Coefficient of Variation
23 - 2 X 23	9.67	9.67 - 9.67		
24	10.87	10.60 - 11.10	0.21	1.96
24 - 1	11.08	10.17 - 11.50	0.62	5.63
24 - 2	9.36	8.92 - 9.62	0.32	3.44
24 - 1 X 24	9.50	8.67 - 10.50	0.93	9.76
24 - 2 X 24	9.42	8.73 - 10.07	0.68	7.25
25	11.49	11.13 - 12.00	0.40	3.48
25 - 1	7.94	7.67 - 8.33	0.28	3.54
25 - 2	9.00	9.00 - 9.00	0.00	0.00
25 - 1 X 25	11.21	10.67 - 12.17	0.68	6.09
25 - 2 X 25	10.71	9.50 - 12.50	1.27	11.88

*Each group of five includes the male parent (single digit number), the two female parents (hyphenated numbers e.g. 1 - 1 and 1 - 2) and hybrids between the female and male plants.

Table 10. Mean, range, standard deviation, and coefficient of variation for number of racemes/terminal inflorescence of each entry, based on plot averages.

Parent or F_1 Offspring*	Mean	Range	Standard Deviation	Coefficient of Variation
1	2.85	2.70 - 3.08	0.16	5.71
1 - 1	2.73	2.53 - 3.13	0.28	10.12
1 - 2	2.32	2.15 - 2.67	0.24	10.34
1 - 1 X 1	2.79	2.70 - 2.93	0.11	4.00
1 - 2 X 1	2.58	2.15 - 2.85	0.19	7.25
2	2.99	2.22 - 4.00	0.74	24.80
2 - 1	2.46	2.42 - 2.50	0.05	1.88
2 - 2	2.48	2.28 - 3.00	0.21	8.53
2 - 1 X 2	2.83	2.73 - 2.95	0.10	3.56
2 - 2 X 2	2.86	2.74 - 2.72	0.11	3.77
3	2.30	2.00 - 2.57	0.28	12.09
3 - 1	2.71	2.56 - 3.04	0.22	8.26
3 - 2	2.85	2.62 - 3.20	0.31	10.89
3 - 1 X 3	2.88	2.67 - 3.22	0.24	8.19
3 - 2 X 3	2.79	2.60 - 3.08	0.21	7.60
4	2.71	2.48 - 2.89	0.18	6.63
4 - 1	2.91	2.72 - 3.00	0.13	4.40
4 - 2	2.46	2.33 - 2.62	0.13	5.37
4 - 1 X 4	3.11	2.92 - 3.22	0.14	4.59
4 - 2 X 4	2.85	2.67 - 2.95	0.13	4.57
5	2.95	2.67 - 3.28	0.26	8.86
5 - 1	2.34	2.17 - 2.67	0.22	9.70
5 - 2	3.13	2.90 - 3.33	0.18	5.76
5 - 1 X 5	3.00	2.67 - 3.67	0.47	15.70
5 - 2 X 5	3.00	3.00 - 3.00		
6	2.59	2.43 - 2.80	0.16	6.00
6 - 1	2.81	2.73 - 3.00	0.13	4.58
6 - 2	2.59	2.37 - 2.83	0.20	7.62
6 - 1 X 6	2.85	2.69 - 2.92	0.11	3.81
6 - 2 X 6	2.67	2.50 - 2.83	0.16	6.07
7	3.60	3.40 - 3.83	0.18	5.10
7 - 1	3.67	3.22 - 4.00	0.33	8.95
7 - 2	2.48	2.38 - 2.60	0.10	4.01
7 - 1 X 7	3.52	3.33 - 4.00	0.32	9.17
7 - 2 X 7	3.03	2.88 - 3.15	0.11	3.73
8	2.53	2.28 - 2.69	0.18	7.09

Table 10. (Continued)

Parent or F_1 Offspring	Mean	Range	Standard Deviation	Coefficient of Variation
8 - 1	2.50	2.00 - 2.81	0.37	14.90
8 - 2	3.35	3.17 - 3.50	0.15	4.44
8 - 1 X 8	2.56	2.33 - 2.67	0.20	7.68
8 - 2 X 8	2.80	2.54 - 3.13	0.27	9.66
9	2.83	2.70 - 2.88	0.08	2.98
9 - 1	2.92	2.81 - 3.00	0.08	2.73
9 - 2	2.59	2.22 - 2.83	0.27	10.32
9 - 1 X 9	3.00	3.00 - 3.00		
9 - 2 X 9	2.33	2.33 - 2.33		
10	2.69	2.62 - 2.78	0.07	2.67
10 - 1	2.74	2.50 - 2.92	0.18	6.47
10 - 2	2.96	2.62 - 3.20	0.30	10.27
10 - 1 X 10	2.73	2.67 - 2.92	0.13	4.58
10 - 2 X 10	2.91	2.67 - 3.05	0.16	5.66
11	2.76	2.67 - 2.87	0.10	3.64
11 - 1	2.58	2.47 - 2.69	0.11	4.40
11 - 2	2.43	2.30 - 2.55	0.10	4.21
11 - 1 X 11	2.79	2.33 - 3.00	0.32	11.36
11 - 2 X 11	2.92	2.73 - 3.03	0.14	4.79
12	3.25	3.19 - 3.37	0.08	2.46
12 - 1	2.76	2.62 - 2.82	0.09	3.40
12 - 2	2.48	2.33 - 2.67	0.14	5.77
12 - 1 X 12	3.10	2.67 - 3.33	0.29	9.45
12 - 2 X 12	3.00	3.00 - 3.00		
13	2.81	2.62 - 3.13	0.22	7.84
13 - 1	2.77	2.40 - 3.28	0.38	13.76
13 - 2	2.78	2.61 - 3.06	0.20	7.17
13 - 1 X 13	2.88	2.83 - 2.93	0.04	1.48
13 - 2 X 13	2.85	2.73 - 3.00	0.13	4.61
14	2.83	2.63 - 3.07	0.19	6.75
14 - 1	2.51	2.33 - 2.73	0.17	6.95
14 - 2	2.90	2.79 - 3.00	0.10	3.28
14 - 1 X 14	2.95	2.67 - 3.17	0.25	8.63
14 - 2 X 14				
15	2.93	2.80 - 3.11	0.15	5.16
15 - 1	2.48	2.33 - 2.73	0.18	7.27
15 - 2	3.50	3.20 - 4.00	0.35	10.03
15 - 1 X 15	3.06	2.95 - 3.22	0.13	4.36

Table 10. (Continued)

Parent or F_1 Offspring	Mean	Range	Standard Deviation	Coefficient of Variation
15 - 2 X 15				
16	3.54	3.22 - 3.71	0.22	6.29
16 - 1	2.67	2.00 - 3.00	0.58	21.65
16 - 2	2.86	2.25 - 3.27	0.49	17.23
16 - 1 X 16	2.94	2.72 - 3.13	0.22	7.51
16 - 2 X 16	2.50	2.33 - 2.67	0.24	9.62
17	3.23	2.67 - 4.33	0.75	23.24
17 - 1	2.76	2.57 - 3.19	0.29	10.57
17 - 2	2.75	2.33 - 2.97	0.29	10.45
17 - 1 X 17	3.06	2.93 - 3.27	0.15	4.83
17 - 2 X 17	3.31	3.23 - 3.33	0.29	1.51
18	2.87	2.67 - 3.00	0.14	4.91
18 - 1	3.09	3.00 - 3.25	0.12	3.84
18 - 2	2.80	2.58 - 3.00	0.19	6.86
18 - 1 X 18	2.96	2.70 - 3.07	0.17	5.88
18 - 2 X 18	2.89	2.83 - 3.00	0.08	2.78
19	3.19	3.15 - 3.21	0.03	0.90
19 - 1	3.00	2.83 - 3.12	0.13	4.40
19 - 2	2.63	2.33 - 3.17	0.47	17.82
19 - 1 X 19	3.36	3.17 - 3.60	0.18	5.45
19 - 2 X 19	3.09	2.87 - 3.23	0.16	5.12
20	2.90	2.50 - 3.28	0.36	12.48
20 - 1	2.78	2.56 - 3.00	0.20	7.17
20 - 2	2.96	2.83 - 3.13	0.14	4.60
20 - 1 X 20	2.97	2.87 - 3.13	0.12	3.91
20 - 2 X 20	2.91	2.80 - 3.07	0.13	4.59
21	3.00	2.87 - 3.08	0.10	3.18
21 - 1	2.55	2.44 - 2.74	0.13	5.11
21 - 2	2.83	2.56 - 3.02	0.20	6.89
21 - 1 X 21	3.00	2.79 - 3.38	0.27	8.97
21 - 2 X 21	2.70	2.00 - 3.33	0.67	24.72
22	3.80	3.17 - 4.31	0.47	12.38
22 - 1	3.08	2.83 - 3.29	0.19	24.68
22 - 2	2.61	2.00 - 3.50	0.64	4.04
22 - 1 X 22	2.97	2.00 - 4.00	0.82	5.16
22 - 2 X 22	2.96	2.83 - 3.14	0.15	5.87
23	2.82	2.63 - 3.17	0.24	8.55

Table 10. (Continued)

F_1 Parent or Offspring	Mean	Range	Standard Deviation	Coefficient of Variation
23 - 1	2.98	2.89 - 3.06	0.12	4.04
23 - 2	2.75	2.58 - 2.96	0.16	5.73
23 - 1 X 23	3.11	2.95 - 3.33	0.18	5.87
23 - 2 X 23	3.00	3.00 - 3.00		
24	2.98	2.81 - 3.17	0.18	6.01
24 - 1	2.85	2.50 - 3.25	0.34	12.06
24 - 2	2.88	2.72 - 3.06	0.14	4.94
24 - 1 X 24	2.92	2.00 - 3.42	0.79	27.26
24 - 2 X 24	3.27	2.97 - 3.67	0.32	9.70
25	2.65	2.52 - 2.81	0.12	4.64
25 - 1	2.32	2.00 - 2.75	0.32	13.62
25 - 2	2.67	2.33 - 3.00	0.47	17.78
25 - 1 X 25	3.06	2.67 - 3.33	0.29	9.53
25 - 2 X 25	3.20	3.00 - 3.50	0.22	6.74

*Each group of five includes the male parent (single digit number), the two female parents (hyphenated numbers e.g. 1 - 1 and 1 - 2) and hybrids between the female and male plants.

Table 11. Mean, range, standard deviation, and coefficient of variation for leaf width (cm) of each entry, based on plot averages.

Parent or F_1 Offspring*	Mean	Range	Standard Deviation	Coefficient of Variation
1	19.53	18.73 - 20.07	0.62	3.18
1 - 1	21.99	21.47 - 22.63	0.55	2.49
1 - 2	18.80	18.37 - 19.30	0.43	2.27
1 - 1 X 1	19.82	18.89 - 20.30	0.67	3.36
1 - 2 X 1	18.11	17.33 - 19.03	0.75	4.15
2	20.81	19.89 - 21.78	0.97	4.66
2 - 1	20.51	18.89 - 21.42	1.19	4.82
2 - 2	19.39	18.76 - 20.25	0.63	3.27
2 - 1 X 2	20.57	20.13 - 21.43	0.59	2.89
2 - 2 X 2	20.27	19.46 - 21.67	0.96	4.75
3	18.56	16.67 - 20.05	1.43	7.73
3 - 1	22.41	20.78 - 24.33	1.67	7.46
3 - 2	20.12	19.50 - 20.80	0.65	3.24
3 - 1 X 3	20.12	19.10 - 20.67	0.70	3.48
3 - 2 X 3	19.45	18.17 - 20.75	1.11	5.72
4	20.08	19.50 - 20.44	0.43	2.16
4 - 1	18.44	17.08 - 19.61	1.26	6.82
4 - 2	21.47	20.89 - 22.50	0.71	3.30
4 - 1 X 4	18.89	18.10 - 20.11	0.97	5.12
4 - 2 X 4	19.80	18.78 - 20.70	0.80	4.05
5	20.50	20.00 - 21.22	0.52	2.52
5 - 1	20.81	20.00 - 22.22	0.97	4.66
5 - 2	20.92	20.19 - 21.94	0.74	3.52
5 - 1 X 5	19.54	16.50 - 24.67	3.67	18.79
5 - 2 X 5	21.72	19.92 - 22.50	1.22	5.61
6	18.95	17.33 - 19.73	1.10	5.83
6 - 1	22.62	21.29 - 23.53	0.97	4.27
6 - 2	20.48	19.58 - 21.42	0.91	4.43
6 - 1 X 6	19.18	18.59 - 20.50	0.89	4.64
6 - 2 X 6	18.57	17.77 - 19.67	0.80	4.30
7	21.90	21.33 - 22.50	0.53	2.41
7 - 1	22.30	20.94 - 23.83	1.19	5.32
7 - 2	20.47	19.92 - 21.12	0.53	2.57
7 - 1 X 7	19.25	17.22 - 21.33	1.72	8.92
7 - 2 X 7	20.65	20.23 - 21.00	0.35	1.70
8	25.25	21.93 - 28.07	3.06	12.13
8 - 1	20.62	20.14 - 21.46	0.58	2.82

Table 11. (Continued)

Parent or F_1 Offspring	Mean	Range	Standard Deviation	Coefficient of Variation
8 - 2	21.73	21.19 - 22.46	0.54	2.48
8 - 1 X 8	19.83	14.67 - 23.33	3.67	18.53
8 - 2 X 8	23.05	22.29 - 23.44	0.54	2.33
9	25.73	24.00 - 27.47	1.60	6.22
9 - 1	20.00	18.42 - 21.81	1.40	7.01
9 - 2	20.25	19.56 - 21.50	0.86	4.24
9 - 1 X 9	20.28	19.00 - 21.67	1.34	6.60
9 - 2 X 9	19.17	16.67 - 21.67	3.54	18.44
10	18.51	17.29 - 19.47	1.11	6.02
10 - 1	20.60	19.17 - 22.19	1.38	6.71
10 - 2	19.96	19.37 - 20.60	0.62	3.09
10 - 1 X 10	19.00	17.33 - 21.21	1.79	9.42
10 - 2 X 10	18.42	16.96 - 19.21	1.01	5.48
11	23.56	21.97 - 24.63	1.40	5.95
11 - 1	19.45	16.40 - 20.67	2.04	10.48
11 - 2	18.84	18.30 - 19.74	0.65	3.46
11 - 1 X 11	21.85	19.44 - 32.11	1.64	7.52
11 - 2 X 11	18.88	17.67 - 20.30	1.09	5.76
12	19.67	19.19 - 21.03	0.91	4.61
12 - 1	18.31	17.83 - 19.03	0.51	2.81
12 - 2	22.78	20.97 - 24.47	1.83	8.04
12 - 1 X 12	21.56	18.89 - 23.33	1.89	8.78
12 - 2 X 12	22.67	22.67 - 22.67		
13	21.73	19.67 - 23.60	1.64	7.55
13 - 1	22.05	19.73 - 24.40	1.91	8.68
13 - 2	18.05	16.08 - 20.67	2.02	11.20
13 - 1 X 13	20.40	18.90 - 22.07	1.43	7.03
13 - 2 X 13	19.76	19.25 - 20.27	0.54	2.73
14	20.81	20.47 - 21.30	0.35	1.70
14 - 1	17.61	16.58 - 18.27	0.78	4.45
14 - 2	26.67	24.93 - 27.57	1.19	4.47
14 - 1 X 14	18.96	18.00 - 20.00	0.84	4.45
14 - 2 X 14	22.33	22.33 - 22.33		
15	22.41	20.37 - 24.27	1.60	7.14
15 - 1	19.86	17.46 - 21.33	1.72	8.66
15 - 2	20.63	20.13 - 21.10	0.52	2.54
15 - 1 X 15	20.82	19.77 - 21.87	0.92	4.43
15 - 2 X 15				

Table 11. (Continued)

F_1 Parent or Offspring	Mean	Range	Standard Deviation	Coefficient of Variation
16	19.04	16.48 - 20.07	1.71	8.98
16 - 1	15.17	14.33 - 16.00	0.84	5.51
16 - 2	17.82	16.80 - 19.71	1.37	7.67
16 - 1 X 16	18.12	17.53 - 19.00	0.64	3.55
16 - 2 X 16	18.84	18.00 - 19.67	1.18	6.27
17	22.90	20.00 - 26.27	2.80	12.21
17 - 1	19.98	19.67 - 20.56	0.40	2.00
17 - 2	19.14	18.73 - 19.57	0.39	2.05
17 - 1 X 17	21.75	20.57 - 23.10	1.16	5.33
17 - 2 X 17	21.19	20.17 - 22.37	0.92	4.32
18	20.35	19.58 - 21.17	0.65	3.19
18 - 1	20.48	17.63 - 22.33	2.00	9.78
18 - 2	18.55	16.67 - 19.75	1.46	7.89
18 - 1 X 18	19.86	19.52 - 20.37	0.37	1.87
18 - 2 X 18	18.79	17.33 - 21.17	1.85	9.82
19	20.85	20.60 - 21.17	0.25	1.21
19 - 1	18.09	17.18 - 18.71	0.69	3.80
19 - 2	20.65	20.17 - 21.33	0.61	2.94
19 - 1 X 19	19.65	18.04 - 20.96	1.27	6.47
19 - 2 X 19	19.71	18.80 - 20.73	0.91	4.61
20	23.25	21.37 - 25.93	2.11	9.05
20 - 1	19.39	17.00 - 21.22	1.77	9.15
20 - 2	20.17	19.70 - 20.53	0.38	1.89
20 - 1 X 20	21.72	21.03 - 22.33	0.57	2.63
20 - 2 X 20	20.16	19.50 - 20.83	0.69	3.42
21	20.29	20.00 - 20.54	0.27	1.36
21 - 1	23.40	22.48 - 24.24	0.95	4.06
21 - 2	21.68	20.24 - 23.50	1.41	6.49
21 - 1 X 21	21.00	18.86 - 23.71	2.10	10.01
21 - 2 X 21	18.67	16.67 - 21.33	2.40	12.86
22	21.53	20.13 - 22.20	0.96	4.44
22 - 1	21.97	20.33 - 23.30	1.30	5.92
22 - 2	20.83	20.23 - 21.40	0.56	2.67
22 - 1 X 22	22.59	20.67 - 23.50	1.32	5.85
22 - 2 X 22	22.25	21.77 - 22.83	0.44	1.96
23	22.90	22.12 - 23.43	0.59	2.57
23 - 1	21.28	20.56 - 22.00	1.02	4.79
23 - 2	22.12	20.89 - 24.07	1.47	6.67

Table 11. (Continued)

Parent or F_1 Offspring	Mean	Range	Standard Deviation	Coefficient of Variation
23 - 1 X 23	22.27	20.57 - 23.37	1.19	5.36
23 - 2 X 23	20.17	19.44 - 20.89	0.72	3.57
24	18.75	17.79 - 19.43	0.69	3.68
24 - 1	18.66	18.07 - 19.53	0.64	3.41
24 - 2	23.91	21.11 - 25.33	1.95	8.14
24 - 1 X 24	19.55	17.33 - 21.00	1.95	10.00
24 - 2 X 24	21.70	20.41 - 22.44	0.89	4.08
25	23.11	21.93 - 24.77	1.27	5.50
25 - 1	19.49	18.83 - 20.22	0.65	3.32
25 - 2	19.42	18.17 - 20.67	1.77	9.10
25 - 1 X 25	20.96	19.75 - 21.58	0.78	3.75
25 - 2 X 25	20.34	19.73 - 20.89	0.50	2.46

*Each group of five includes the male parent (single digit number), the two female parents (hyphenated numbers e.g. 1 - 1 and 1 - 2) and hybrids between the female and male plants.

Table 12. Mean, range, standard deviation, and coefficient of variation for percent IVDMD of each entry, based on plot averages.

Parent or F_1 Offspring*	Mean	Range	Standard Deviation	Coefficient of Variation
1	55.56	52.57 - 57.18	2.11	3.80
1 - 1	56.02	54.96 - 57.05	.90	1.61
1 - 2	58.26	56.25 - 60.53	2.10	3.61
1 - 1 X 1	56.14	54.77 - 59.09	1.99	3.55
1 - 2 X 1	55.92	52.80 - 60.53	2.43	4.35
2	57.40	53.81 - 61.58	3.22	5.60
2 - 1	57.34	54.50 - 59.07	2.00	3.49
2 - 2	59.02	57.09 - 60.97	1.67	2.83
2 - 1 X 2	56.64	51-98 - 60.14	3.54	6.25
2 - 2 X 2	57.77	55.81 - 50.08	1.76	3.05
3	57.26	53.81 - 62.59	3.75	6.55
3 - 1	63.41	61.60 - 65.00	1.45	2.28
3 - 2	60.35	58.82 - 62.63	2.01	3.34
3 - 1 X 3	59.78	56.53 - 63.99	3.23	5.34
3 - 2 X 3	59.22	57.63 - 61.01	1.53	2.59
4	60.15	57.68 - 61.55	1.70	2.82
4 - 1	58.63	57.23 - 61.83	2.15	3.67
4 - 2	56.45	51.52 - 61.52	4.08	7.23
4 - 1 X 4	59.94	58.41 - 62.86	2.05	3.42
4 - 2 X 4	57.98	54.44 - 62.94	3.57	6.16
5	56.50	51.68 - 59.34	3.41	6.04
5 - 1	61.77	59.20 - 64.20	2.69	4.36
5 - 2	58.49	54.94 - 61.23	3.18	5.43
5 - 1 X 5	56.12	54.41 - 58.65	1.89	3.36
5 - 2 X 5	56.75	54.89 - 58.44	1.66	2.93
6	58.00	56.74 - 58.98	1.06	1.82
6 - 1	54.89	51.94 - 58.17	2.81	5.12
6 - 2	60.00	57.68 - 62.11	2.40	4.01
6 - 1 X 6	56.87	55.81 - 57.99	1.06	1.86
6 - 2 X 6	57.36	55.03 - 61.44	1.85	4.96
7	58.45	56.56 - 61.12	1.93	3.30
7 - 1	55.74	53.15 - 58.46	2.18	3.91
7 - 2	57.58	54.36 - 60.46	2.51	4.36
7 - 1 X 7	56.91	54.75 - 60.12	2.41	4.24
7 - 2 X 7	58.55	56.64 - 62.07	2.54	4.33
8	58.12	56.02 - 60.13	1.73	2.98
8 - 1	62.91	60.48 - 65.20	1.93	3.07
8 - 2	57.56	55.91 - 59.23	1.44	2.51

Table 12. (Continued)

Parent or F_1 Offspring	Mean	Range	Standard Deviation	Coefficient of Variation
8 - 1 X 8	58.82	53.85 - 62.11	3.52	5.98
8 - 2 X 8	57.86	55.68 - 58.91	1.48	2.55
9	58.16	57.92 - 58.37	0.24	0.41
9 - 1	57.76	55.66 - 59.99	2.36	4.09
9 - 2	60.48	59.33 - 61.85	1.05	1.74
9 - 1 X 9	57.93	54.67 - 62.80	4.30	7.42
9 - 2 X 9	61.67	59.78 - 63.55	2.67	4.32
10	57.70	56.14 - 61.76	2.72	4.72
10 - 1	62.84	60.95 - 65.73	2.24	3.56
10 - 2	56.80	54.89 - 59.46	2.01	3.54
10 - 1 X 10	62.98	60.64 - 64.94	1.93	3.06
10 - 2 X 10	57.17	54.55 - 59.75	2.31	4.04
11	56.79	54.56 - 58.83	1.75	3.08
11 - 1	53.30	52.41 - 54.88	1.10	2.07
11 - 2	60.37	58.84 - 61.75	1.20	1.98
11 - 1 X 11	55.50	52.31 - 57.28	2.19	3.94
11 - 2 X 11	57.69	55.97 - 59.48	1.47	2.55
12	57.39	51.86 - 62.02	4.19	7.30
12 - 1	60.80	58.38 - 64.09	2.57	4.23
12 - 2	58.57	55.91 - 61.26	2.24	3.82
12 - 1 X 12	59.34	57.41 - 61.49	2.23	3.75
12 - 2 X 12	59.65	59.65 - 59.65		
13	60.11	58.36 - 64.49	2.94	4.89
13 - 1	61.42	60.16 - 62.46	0.96	1.56
13 - 2	57.96	56.16 - 58.86	1.23	2.12
13 - 1 X 13	59.49	57.77 - 62.85	2.30	3.88
13 - 2 X 13	60.06	58.05 - 62.82	2.00	3.32
14	59.97	58.40 - 62.42	1.73	2.88
14 - 1	55.80	53.63 - 60.12	2.96	5.31
14 - 2	53.47	50.51 - 57.95	3.20	5.99
14 - 1 X 14	59.05	56.84 - 62.55	2.71	4.59
14 - 2 X 14	55.60	55.60 - 55.60		
15	58.03	54.58 - 60.53	2.56	4.44
15 - 1	57.00	54.89 - 58.74	1.75	3.07
15 - 2	59.35	57.12 - 61.28	1.71	2.78
15 - 1 X 15	56.63	54.88 - 58.44	1.61	2.84
15 - 2 X 15				

Table 12. (Continued)

F_1 Parent or Offspring	Mean	Range	Standard Deviation	Coefficient of Variation
16	60.77	57.22 - 65.34	3.38	5.57
16 - 1	52.30	48.68 - 58.19	5.15	9.84
16 - 2	61.20	59.03 - 64.14	2.14	3.49
16 - 1 X 16	57.00	53.80 - 61.41	3.27	5.73
16 - 2 X 16	60.67	58.54 - 62.80	3.01	4.97
17	62.30	59.73 - 66.52	3.16	5.08
17 - 1	59.69	58.79 - 60.64	0.82	1.37
17 - 2	57.07	54.80 - 59.59	2.09	3.67
17 - 1 X 17	58.63	56.06 - 61.27	2.21	3.78
17 - 2 X 17	58.46	56.78 - 59.40	1.16	1.99
18	55.76	53.49 - 59.59	2.68	4.80
18 - 1	58.79	56.90 - 60.49	1.83	3.11
18 - 2	60.53	59.09 - 62.69	1.53	2.52
18 - 1 X 18	56.57	55.01 - 58.57	1.81	3.21
18 - 2 X 18	58.76	56.86 - 62.71	2.71	4.62
19	58.09	54.96 - 60.10	2.35	4.04
19 - 1	58.11	54.15 - 62.44	3.44	5.93
19 - 2	57.43	57.43 - 57.43		
19 - 1 X 19	57.45	54.45 - 60.90	2.65	4.61
19 - 2 X 19	58.94	57.33 - 62.16	2.22	3.77
20	57.55	54.88 - 59.99	2.56	4.45
20 - 1	59.42	57.06 - 62.46	2.38	4.01
20 - 2	57.46	55.62 - 60.47	2.09	3.64
20 - 1 X 20	60.37	59.22 - 62.16	1.27	2.10
20 - 2 X 20	60.30	57.68 - 61.75	1.79	2.97
21	59.85	59.16 - 60.54	0.65	1.08
21 - 1	56.77	51.41 - 58.88	3.59	6.33
21 - 2	58.21	56.12 - 61.36	2.30	3.95
21 - 1 X 21	57.43	55.54 - 60.62	2.25	3.91
21 - 2 X 21	57.74	57.38 - 58.22	0.43	0.75
22	60.67	58.91 - 63.62	2.05	3.38
22 - 1	59.92	56.95 - 61.78	2.29	3.82
22 - 2	57.92	55.39 - 60.42	2.08	3.60
22 - 1 X 22	59.38	55.73 - 62.20	2.69	4.53
22 - 2 X 22	57.47	55.96 - 59.97	1.74	3.04
23	60.34	56.81 - 65.48	4.12	6.82
23 - 1	60.93	60.30 - 61.55	0.88	1.45
23 - 2	61.45	59.26 - 64.16	2.16	3.51
23 - 1 X 23	60.35	57.47 - 64.30	3.41	5.66

Table 12. (Continued)

F_1 Parent or Offspring	Mean	Range	Standard Deviation	Coefficient of Variation
23 - 2 X 23	63.04	60.32 - 65.22	2.49	3.96
24	61.25	58.99 - 63.44	1.85	3.02
24 - 1	54.05	52.31 - 56.57	1.86	3.43
24 - 2	59.89	57.71 - 62.57	2.04	3.40
24 - 1 X 24	59.08	57.96 - 59.90	1.00	1.70
24 - 2 X 24	59.54	58.53 - 61.55	1.38	2.32
25	59.16	57.40 - 60.95	1.52	2.57
25 - 1	56.16	53.25 - 59.29	2.77	4.94
25 - 2	61.31	61.31 - 61.31		
25 - 1 X 25	57.33	53.72 - 59.07	2.46	4.30
25 - 2 X 25	57.24	55.13 - 59.38	2.36	4.13

*Each group of five includes the male parent (single digit number), the two female parents (hyphenated numbers e.g. 1 - 1 and 1 - 2) and hybrids between the female and male plants.

Table 13. Mean, range, standard deviation, and coefficient of variation for percent crude protein of each entry, based on plot averages.

Parent or F_1 Offspring*	Mean	Range	Standard Deviation	Coefficient of Variation
1	13.32	12.43 - 14.92	1.17	8.79
1 - 1	12.80	12.20 - 13.30	0.47	3.68
1 - 2	12.26	11.91 - 12.56	0.27	2.24
1 - 1 X 1	12.54	12.38 - 12.66	0.13	1.03
1 - 2 X 1	12.26	11.62 - 13.03	0.58	4.74
2	13.69	12.98 - 14.76	0.76	5.56
2 - 1	12.76	12.07 - 13.54	0.60	4.74
2 - 2	12.91	12.10 - 15.56	0.71	5.47
2 - 1 X 1	13.40	12.90 - 14.21	0.60	4.44
2 - 2 X 2	12.73	12.09 - 13.35	0.52	4.07
3	12.61	12.30 - 12.91	0.26	2.10
3 - 1	15.10	13.92 - 15.67	0.80	5.32
3 - 2	13.38	12.62 - 14.02	0.70	5.29
3 - 1 X 3	12.92	12.32 - 13.53	0.49	3.83
3 - 2 X 3	13.22	11.99 - 14.08	0.92	6.96
4	13.47	12.01 - 15.86	1.83	13.58
4 - 1	13.65	13.14 - 14.08	0.43	3.15
4 - 2	13.65	13.05 - 14.12	0.45	3.31
4 - 1 X 4	12.77	11.57 - 13.58	0.85	6.66
4 - 2 X 4	12.60	12.11 - 13.60	0.68	5.38
5	13.00	12.17 - 13.69	0.63	4.87
5 - 1	13.87	13.47 - 14.21	0.34	2.42
5 - 2	14.14	13.73 - 14.47	0.34	2.42
5 - 1 X 5	12.69	11.72 - 14.25	1.13	8.87
5 - 2 X 5	13.38	12.59 - 14.29	0.72	5.35
6	12.99	12.56 - 13.58	0.43	3.29
6 - 1	13.08	12.01 - 13.79	0.76	5.84
6 - 2	12.36	10.62 - 13.04	1.16	9.41
6 - 1 X 6	12.72	12.06 - 13.27	0.55	4.32
6 - 2 X 6	13.19	12.40 - 13.74	0.60	4.57
7	13.04	12.23 - 13.98	0.71	5.51
7 - 1	13.37	12.52 - 14.34	0.83	6.24
7 - 2	12.54	11.94 - 13.60	0.74	5.88
7 - 1 X 7	12.64	11.20 - 14.02	1.15	9.13
7 - 2 X 7	12.91	12.52 - 13.27	0.31	2.40
8	12.69	12.40 - 13.24	0.38	3.02
8 - 1	13.19	12.04 - 14.42	0.98	7.43

Table 13. (Continued)

Parent or F_1 Offspring	Mean	Range	Standard Deviation	Coefficient of Variation
8 - 2	13.44	12.85 - 14.21	0.57	4.21
8 - 1 X 8	12.68	12.24 - 13.14	0.38	2.97
8 - 2 X 8	12.96	11.76 - 13.96	0.91	7.05
9	13.31	12.24 - 13.99	0.78	5.90
9 - 1	13.76	13.34 - 14.27	0.39	2.83
9 - 2	14.48	14.18 - 14.92	0.35	2.43
9 - 1 X 9	12.84	11.13 - 13.92	1.50	11.67
9 - 2 X 9	13.08	12.17 - 13.99	1.29	9.84
10	12.62	11.43 - 13.33	0.83	6.57
10 - 1	12.73	10.75 - 14.37	1.54	12.09
10 - 2	13.86	12.82 - 14.76	0.87	6.24
10 - 1 X 10	12.84	11.65 - 13.73	0.97	7.53
10 - 2 X 10	13.00	12.05 - 14.03	0.91	7.02
11	12.50	11.88 - 12.95	0.47	3.77
11 - 1	11.69	11.36 - 12.08	0.35	2.98
11 - 2	13.92	13.01 - 14.89	0.77	5.55
11 - 1 X 11	12.82	12.48 - 13.40	0.41	3.16
11 - 2 X 11	12.70	12.09 - 13.30	0.50	3.92
12	12.91	11.49 - 14.70	1.33	10.29
12 - 1	13.34	12.49 - 13.98	0.64	4.79
12 - 2	14.24	13.30 - 15.18	0.77	5.43
12 - 1 X 12	10.82	9.75 - 11.65	0.91	8.40
12 - 2 X 12	13.66	13.66 - 13.66		
13	13.41	12.63 - 13.92	0.63	4.68
13 - 1	14.89	14.05 - 15.47	0.62	4.16
13 - 2	14.30	13.76 - 15.38	0.75	5.25
13 - 1 X 13	13.20	12.56 - 13.56	0.47	3.53
13 - 2 X 13	13.64	13.02 - 14.15	0.48	3.50
14	12.33	12.04 - 12.62	0.32	2.58
14 - 1	13.14	11.98 - 13.94	0.84	6.36
14 - 2	11.10	10.19 - 12.04	0.84	7.53
14 - 1 X 14	13.65	13.05 - 14.70	0.74	5.45
14 - 2 X 14	11.27	11.27 - 11.27		
15	12.57	11.94 - 12.95	0.46	3.69
15 - 1	14.49	12.95 - 15.54	1.20	8.30
15 - 2	12.99	12.07 - 14.05	0.81	6.27
15 - 1 X 15	13.08	12.38 - 13.50	0.49	3.77
15 - 2 X 15				

Table 13. (Continued)

Parent or F_1 Offspring	Mean	Range	Standard Deviation	Coefficient of Variation
16	13.57	12.63 - 14.05	0.65	4.82
16 - 1	13.15	12.11 - 13.99	0.95	7.26
16 - 2	12.08	10.88 - 13.24	1.02	8.45
16 - 1 X 16	12.48	11.70 - 13.10	0.58	4.64
16 - 2 X 16	11.53	11.46 - 11.59	0.09	0.80
17	15.18	13.60 - 16.35	1.17	7.72
17 - 1	13.17	11.94 - 14.47	0.99	7.54
17 - 2	12.27	11.94 - 12.49	0.24	1.93
17 - 1 X 17	13.12	12.43 - 14.24	0.80	6.09
17 - 2 X 17	12.73	11.48 - 13.61	0.90	7.09
18	13.11	12.49 - 13.72	0.51	3.87
18 - 1	13.29	12.95 - 13.56	0.30	2.19
18 - 2	12.94	12.17 - 13.88	0.71	5.46
18 - 1 X 18	12.65	12.32 - 12.95	0.32	2.50
18 - 2 X 18	12.29	11.50 - 13.70	1.00	8.11
19	12.53	11.62 - 13.30	0.73	5.80
19 - 1	12.76	12.14 - 13.27	0.59	3.81
19 - 2	14.66	14.66 - 14.66		
19 - 1 X 19	12.68	10.96 - 13.47	1.16	9.14
19 - 2 X 19	13.42	13.06 - 13.70	0.28	2.10
20	14.12	14.05 - 14.21	0.08	0.57
20 - 1	13.73	13.21 - 14.11	0.38	2.75
20 - 2	12.87	12.24 - 13.73	0.69	5.34
20 - 1 X 20	13.72	13.13 - 14.03	0.41	2.97
20 - 2 X 20	12.89	12.46 - 13.18	0.31	2.37
21	11.24	9.48 - 11.98	0.98	8.67
21 - 1	12.67	10.29 - 13.60	1.59	12.57
21 - 2	14.27	13.47 - 14.99	0.64	4.50
21 - 1 X 21	12.55	12.03 - 13.29	0.59	4.69
21 - 2 X 21	11.67	11.17 - 12.17	0.50	4.28
22	13.78	12.67 - 14.60	0.82	5.95
22 - 1	13.86	13.01 - 14.99	0.86	6.19
22 - 2	12.96	11.88 - 13.50	0.73	5.65
22 - 1 X 22	13.16	11.37 - 15.17	1.71	13.02
22 - 2 X 22	12.91	12.54 - 13.13	0.26	1.98
23	13.57	13.17 - 14.18	0.48	3.52
23 - 1	14.29	14.05 - 14.53	0.34	2.38
23 - 2	14.06	12.33 - 16.19	1.65	11.75

Table 13. (Continued)

F_1 Parent or Offspring	Mean	Range	Standard Deviation	Coefficient of Variation
23 - 1 X 23	12.72	12.38 - 13.40	0.46	3.65
23 - 2 X 23	13.27	12.99 - 13.44	0.24	1.78
24	13.26	12.14 - 14.21	0.99	7.50
24 - 1	13.87	12.62 - 15.93	1.45	10.46
24 - 2	13.70	11.78 - 14.72	1.36	9.92
24 - 1 X 24	12.37	11.27 - 13.88	1.35	10.93
24 - 2 X 24	13.65	13.14 - 14.73	0.74	5.40
25	13.86	13.43 - 14.28	0.44	3.21
25 - 1	13.42	12.36 - 14.34	0.90	6.74
25 - 2	14.63	14.63 - 14.63		
25 - 1 X 25	12.89	11.55 - 14.15	1.07	8.28
25 - 2 X 25	13.54	12.88 - 14.48	0.74	5.50

* Each group of five includes the male parent (single digit number), the two female parents (hyphenated numbers e.g. 1 - 1 and 1 - 2) and hybrids between the female and male plants.

VITA

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Doctor of Philosophy

Thesis: A STUDY OF THE GENETIC DIVERSITY AND AGRONOMIC IMPROVEMENT POTENTIAL IN EASTERN GAMAGRASS, <u>TRIPSACUM DACTYLOIDES</u> L.

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