

Results of Sudangrass and Pearl Millet Performance Tests in Virginia

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RESULTS OF SUDANGRASS AND PEARL MILLET PERFORMANCE TESTS IN VIRGINIA
1958 - 1962^{1/}

P. T. Gish, T. J. Smith and A. S. Williams^{2/}

Introduction

Sudangrass and pearl millet variety tests have been conducted since 1954 at four locations representing three principal agricultural regions of Virginia. The results of these tests through 1960 were reported in Virginia Agricultural Experiment Station Bulletin 528. The purpose of this report is to present data on the performance of some new varieties not previously evaluated and to summarize the results for the past several years.

Information obtained from tests conducted for several years on many factors, including yield, disease resistance, recovery, and quality of forage are used to determine the varietal recommendations. The constant introduction of new strains and varieties makes varietal testing a continuing process and new evaluations must be made periodically.

Experimental Methods

In order to compare the relative performance of the different crops, varieties of Sudangrass, Sudangrass-sorghum crosses and pearl millet were included in the same tests. Four replications were used for each test and all plots were randomized completely within each replication.

^{1/}The following individuals were responsible for conducting the tests at the following locations: Piedmont Research Station, Orange--G. D. Jones; Virginia State College Research Station, Petersburg--M. T. Carter; Southside Virginia Research Station, Charlotte Court House--R. D. Sears; Eastern Virginia Research Station, Warsaw--H. M. Camper, Jr.; and Virginia Agricultural Experiment Station, Blacksburg--T. J. Smith, P. T. Gish and A. S. Williams. The data were analyzed by the Virginia Polytechnic Institute Statistical Laboratory.

^{2/}Assistant Professor of Agronomy, Professor of Agronomy, and Associate Professor of Plant Pathology, respectively.

Seeding was at the rate of 20 pounds per acre in 3-row plots, 20 feet long, spaced 1 foot apart. Seed used in the experiment was furnished by the Crops Research Division, Agricultural Research Service, United States Department of Agriculture and by commercial seed companies. Lime and fertilizer applications were based on the needs of the crop on each particular soil. In most instances plots were fertilized with 600 pounds per acre of 10-10-10 fertilizer with additional nitrogen applied later where needed. Experiments were generally seeded about 2 weeks after the average date for planting corn in each area. Green weights were obtained from the center row of each plot and subsamples of approximately 2 pounds were taken to determine dry matter in the green weight. Except at Petersburg, where air dry weights were used, samples were oven-dried and yields adjusted to 12% moisture. The number of cuttings varied with the growing season but in most instances 3 cuttings were made---the cutting height being 4 to 5 inches above ground.

Sudangrass

Sudangrass is a rapid growing annual forage species, originally from Africa. Best suited for a warm climate, its short growing season and resistance to drought make it a valuable emergency or supplemental crop for pasture, hay or silage.

Although Sudangrass has the potential for prussic acid poisoning, there is little danger to livestock where proper precautions are followed. The content of acid varies with the variety, stage of growth, weather conditions and other factors. The common or dry stem varieties of Sudangrass are low in prussic acid; varieties of sweet Sudangrass are intermediate; and Sudangrass-sorghum crosses vary from medium to high. Sudangrass contains more

prussic acid if soil is high in nitrogen and deficient in phosphorus and potash. Young plants are higher in prussic acid than those approaching maturity and young second growth that follows clipping, frost, or grazing contains more prussic acid than does the first growth. There is little or no danger of prussic acid poisoning if plants are allowed to reach a height of 18 inches before grazing. However, better yields are obtained by permitting Sudangrass to grow taller than 18 inches before grazing; and in the case of the more vigorous and rapid growing varieties---especially the Sudangrass hybrids and the Sudangrass-sorghum crosses---plants should reach the minimum height of 24 inches before use. Frosted or frozen Sudangrass should not be grazed until it is completely dry with no evidence of new growth. Sudangrass forage in excess of grazing needs may be harvested for silage or hay. When used for hay or silage it should be cut between the time of initiation of heading and when the crop is fully headed---the highest quality forage being obtained at the time the first heads appear.

When weeds are not expected to be a serious problem, Sudangrass may be broadcast or drilled at the rate of 25 to 30 pounds per acre. Where weeds are expected to be excessive, planting in narrow rows at the rate of 10 to 20 pounds per acre allows for cultivation and weed control. Occasionally Sudangrass, when planted for silage, is seeded in wide rows and cultivated similar to corn.

Sudangrass Diseases

Sudangrass grown in Virginia is affected by several leaf diseases. One of the most destructive diseases is leaf blight, caused by Helminthosporium turcicum, a fungus which is also destructive on corn, sorghum and Johnsongrass. As the name implies, symptoms are characterized by a conspicuous blighted or scalded appearance of the foliage. In warm, moist weather, usually after midsummer, entire fields of Sudangrass may become blighted and appear burned or frosted within a few days. The fungus which causes the disease may be observed in the blighted areas of the leaf as a black fuzzy growth.

Other important leaf diseases of Sudangrass are bacterial spot, caused by Pseudomonas syringae, and bacterial stripe, caused by Pseudomonas andropogoni. Initial infection of the bacterial spot diseases appears as circular to elliptical water-soaked areas on the lower leaves. These spots later become dry and have a tan, paperlike center with a red border. This disease appears soon after seedlings emerge in the spring and progresses with plant development throughout the entire growing season, gradually spreading from the lower to the upper leaves. Bacterial stripe is characterized by elongated red streaks and blotches on the leaves, with red crusts of dried bacterial exudate on the lower surface. Severely infected leaves dry and wither. Stripe first appears about midsummer and continues until plant maturity. Both of these bacterial diseases are favored by warm, moist weather.

BRIEF DESCRIPTIONS OF IMPORTANT SUDANGRASS VARIETIES, SUDANGRASS HYBRIDS
AND THE SUDANGRASS-SORGHUMS INCLUDED IN THE 1962 TESTS

Piper was released in 1950 by the Wisconsin Agricultural Experiment Station. It is the result of a double-cross made in 1942 from Tift Sudangrass and lines obtained from the Texas and Kansas Agricultural Experiment Stations. It is characterized by good vigor, early maturity, moderate disease resistance, and has a low level of prussic acid potential. It is well adapted to Virginia, and has produced relatively high yields in all area tests. Certified seed supplies are adequate, and it is recommended for Virginia.

Greenleaf is a late maturing, vigorous variety released by Kansas Agricultural Experiment Station in 1952. It contains a relatively high proportion of sweet plants and has moderate resistance to bacterial foliage diseases. It has a low to average prussic acid potential. Certified seed is available and it is recommended for Virginia.

Sweet Sudangrass (Texas 372) is a variety developed and released by the Texas Agricultural Experiment Station in cooperation with the United States Department of Agriculture. It is characterized by broad leaves and heavy tall stalks, is sweet and juicy, intermediate in prussic acid potential, and more palatable to

livestock than common Sudangrass. This variety was dropped from the Virginia recommended list because of severe disease damage in some years. However, disease damage varies from one year to another and many farmers still grow this variety due to its excellent palatability. Seed is generally available.

Suhi-1 is a hybrid Sudangrass developed by the Georgia Agricultural Experiment Station and released in 1961. Suhi-1 is the result of seed produced by controlled pollination between male-sterile Rhodesian Sudangrass and Tift Sudangrass. In the Georgia tests Suhi-1 has produced 22 percent more prussic acid potential than some of the other Sudangrass varieties and the usual grazing precautions should be taken. Suhi-1 has not been included in the Virginia tests over a sufficient period for full evaluation; however, in limited tests it has produced high yields and gives promise of becoming a suitable variety for Virginia. Limited seed supplies are available.

Sudax SX-11 is a cross between male sterile Kaffir and Sweet and Greenleaf Sudangrass. The seed is a sorghum type, but the plants tend more towards the Sudan type. It is late in maturity and more stemmy with larger leaves than the regular Sudangrasses. It has good disease resistance. This is the only Sudangrass-grain sorghum cross that has been in the tests over a long

enough period for satisfactory evaluation. Yields have been high at all locations and it is recommended for Virginia.

Sweet Sioux, T. E. Haygrazer, S-100 and Hydan 37---all commercial Sudangrass-sorghum crosses---were included for the first time in the 1962 tests. They performed well at all locations and were generally similar in growth characteristics to Sudax SX-11. Commercial seed of these strains is available and the fact that none of these has been placed on the recommended list does not necessarily mean that they are not desirable varieties but only that they have not been tested long enough for satisfactory evaluation.

Several experimental strains, including Piper x S. pro-
pinquum, Stoneville Synthetic, Rhodesian x Stoneville Synthetic were included in the tests. None of these strains has been released for commercial production.

Separate summaries of data obtained in 1962 from each location and an overall 1962 summary for data from all four test locations are presented in Tables 1 to 5. Five year summaries of yields at each location are given in Tables 6 to 10. Direct comparisons of the varieties of Sudangrasses and pearl millet for the years 1959 through 1962 are given in Tables 21 to 24.

Table 1. Summary of Sudangrass Variety Test. Orange, 1962.

Variety	Total yield ^{4/} Tons/A	Height (Inches)			% Stand ^{5/} 6/29	Recovery ^{6/}		Diseases ^{7/} 9/11
		6/26	7/26	9/11		7/7	7/25	
Greenleaf	2.73	36	37	32	100	3	1	1
Piper	3.65	42	39	40	100	3	1	3
Sweet 372	2.86	30	36	38	100	3	2	4
Stoneville Syn. ^{1/}	2.97	32	32	44	87	6	7	1
Piper x <u>S. propinquum</u> ^{1/}	3.44	29	41	46	100	3	2	2
Suhi-1 ^{2/}	4.07	32	42	51	100	3	2	1
Rhodesian x Stoneville Syn. ^{1/}	3.89	27	47	54	95	2	4	1
Sudax SX-11 ^{3/}	4.10	40	47	51	86	4	7	1
T. E. Haygrazer ^{3/}	5.19	49	53	56	97	3	6	1
Sweet Sioux ^{3/}	4.40	51	49	59	100	4	6	1
S-100 ^{3/}	4.88	46	53	60	95	3	7	2
Hydan 37 ^{3/}	3.51	34	50	54	97	3	7	1

^{1/} Experimentals.

^{2/} Sudangrass hybrid.

^{3/} Sudangrass-sorghum crosses.

^{4/} Average of 4 replications; 12% moisture.

^{5/} Estimated.

^{6/} Based on score of 1-9; 1 = best, 9 = very poor.

^{7/} Based on 0-9; 0 = none, 9 = severe. This score is a rating of all leaf diseases, but is primarily Helminthosporium turcicum.

Table 2. Summary of Sudangrass Variety Test. Blacksburg, 1962.

Variety	Total yield ^{4/} Tons/A	Percent yield at each cutting			Height, (inches)			Disease ^{5/} 9/20
		1st	2nd	3rd	7/10	8/9	9/21	
Greenleaf	3.77	41	36	23	40	36	35	5
Piper	4.26	38	38	25	45	39	40	6
Sweet 372	3.47	41	41	18	37	33	31	8
Stoneville Syn. ^{1/}	3.74	33	39	28	38	39	34	3
Piper x <u>S. propinquum</u> ^{1/}	3.47	35	41	24	39	35	32	6
Suhi-1 ^{2/}	5.14	31	39	30	45	38	34	3
Rhodesian x Stoneville Syn. ^{1/}	4.38	30	41	29	37	39	37	3
Sudax SX-11 ^{3/}	4.54	32	42	26	48	44	40	3
T. E. Haygrazer ^{3/}	4.63	40	38	22	53	44	39	3
Sweet Sioux ^{3/}	5.81	39	39	22	56	45	41	3
S-100 ^{3/}	5.16	38	40	23	54	44	42	3
Hydan 37 ^{3/}	4.54	33	30	27	45	46	44	3

^{1/} Experimentals.

^{2/} Sudangrass hybrid.

^{3/} Sudangrass-sorghum crosses.

^{4/} Average of 4 replications; 12% moisture.

^{5/} Based on 0-9; 0 = none, 9 = severe. This score is a rating of all leaf diseases, but is primarily Helminthosporium turcicum.

Table 3. Summary of Sudangrass Variety Test. Petersburg, 1962.

Variety	Total yield ^{4/} Tons/A	Height, (Inches)		
		7/16	8/13	9/25
Greenleaf	4.47	58	30	24
Piper	3.76	62	36	25
Sweet 372	3.95	56	29	18
Stoneville Syn. ^{1/}	2.41	57	29	20
Piper x <u>S. propinquum</u> ^{1/}	4.47	62	29	23
Suhi-1 ^{2/}	5.38	68	29	39
Rhodesian x Stoneville Syn. ^{1/}	5.16	67	31	28
Sudax SX-11 ^{3/}	5.63	70	37	30
T. E. Haygrazer ^{3/}	6.26	76	35	33
Sweet Sioux ^{3/}	8.12	78	37	32
S-100 ^{3/}	6.96	79	36	35
Hydan 37 ^{3/}	5.04	74	34	32

^{1/} Experimentals.

^{2/} Sudangrass hybrid.

^{3/} Sudangrass-sorghum crosses.

^{4/} Average of 4 replications; air-dry weights.

Table 4. Summary of Sudangrass Variety Test. Charlotte C.H., 1962.

Variety	Total yield ^{4/} Tons/A	Height, (inches)		
		1st cut	2nd cut	3rd cut
Greenleaf	3.44	34	31	37
Piper	3.68	35	34	37
Sweet 372	3.40	32	29	32
Stoneville Syn. ^{1/}	2.28	32	25	31
Piper x <u>S. propinquum</u> ^{1/}	4.12	34	33	41
Suhi-1 ^{2/}	4.06	37	31	43
Rhodesian x Stoneville Syn. ^{1/}	4.68	35	32	45
Sudax SX-11 ^{3/}	4.18	39	38	45
T. E. Haygrazer ^{3/}	4.60	42	39	47
Sweet Sioux ^{3/}	4.56	49	38	42
S-100 ^{3/}	5.32	47	42	49
Hydan 37 ^{3/}	4.28	42	42	43

^{1/} Experimentals.

^{2/} Sudangrass hybrid.

^{3/} Sudangrass-sorghum crosses.

^{4/} Average of 4 replications; 12% moisture.

Table 5. Summary of Sudangrass Variety Tests in Virginia, 1962.

Variety	Forage yields in tons per acre ^{1/}					Avg. ht. (in.)			Avg. Diseases ^{2/}
	Orange	Blacksburg	Petersburg	Charlotte C.H.	Avg.	1st Cut	2nd Cut	3rd Cut	Orange and Blacksburg
Greenleaf	2.73	3.77	4.47	3.44	3.61	42	33	32	3
Piper	3.65	4.26	3.76	3.68	3.84	46	37	35	4
Sweet 372	2.86	3.47	3.95	3.40	3.42	39	32	30	6
Stoneville Syn.	2.97	3.74	2.41	2.28	2.85	40	49	32	2
Piper x <u>S. propinquum</u>	3.44	3.47	4.47	4.12	3.88	41	34	35	4
Suhi-1	4.07	5.14	5.38	4.06	4.66	45	35	42	2
Rhod. x Ston. Syn.	3.89	4.38	5.16	4.68	4.54	41	37	41	2
Sudax SX-11	4.10	4.54	5.63	4.18	4.61	49	41	39	2
T. E. Haygrazer	5.19	4.63	6.26	4.60	5.17	55	43	39	2
Sweet Sioux	4.40	5.81	8.12	5.56	5.97	58	42	43	2
S-100	4.88	5.16	6.96	5.32	5.58	55	44	46	2
Hydan 37	3.51	4.54	5.04	4.28	4.34	49	43	43	2
L.S.D. (.05)	0.88	0.76	0.97	0.79					

^{1/} Air dry weights at Petersburg; 12% moisture at other locations.

^{2/} Based 0-9; 0 = none, 9 = severe. This score is a rating of all leaf diseases but is primarily Helminthosporium turcicum.

Table 6. Forage Yields of Sudangrass Varieties at Orange.

Tons per acre at 12% moisture.

Variety ^{1/}	1958	1959	1960	1961	1962	Avg.	Relative ^{2/}
Piper	4.41	5.29	3.93	5.46	3.65	4.55	100
Sweet 372	2.88‡	3.71‡	3.05	4.19	2.86	3.34	73
Greenleaf	3.77‡	4.70	3.35	5.25	2.75	3.96	87
Sudax SX-11 ^{3/}	--	6.75†	4.97	5.59	4.10	--	--
Suhi-1 ^{4/}	--	--	--	5.18	4.07	--	--
Stoneville Syn.	2.87‡	--	4.17	4.35	2.97	--	--
Stoneville Sel.	2.72†	4.10	3.24	3.96	--	--	--
Lahoma	2.72‡	3.04‡	3.11	3.71‡	--	--	--
Tift	3.85‡	4.93	3.70	--	--	--	--
Ga. 337	3.74‡	4.73	3.27	--	--	--	--

† Significant (0.05) above check (Piper).

‡ Significant (0.05) below check (Piper).

^{1/} For data on all entries included in the tests in 1962, 1961, 1960 and 1959 see summary tables 21, 22, 23, and 24.

^{2/} Yields of Piper were used as checks and assigned the relative value of 100.

^{3/} Sudangrass-sorghum cross.

^{4/} Hybrid Sudangrass.

Table 7. Forage Yields of Sudangrass Varieties at Blacksburg.

Tons per acre at 12% moisture.

Variety ^{1/}	1958	1959	1960	1961	1962	Avg.	Relative ^{2/}
Piper	1.66	4.06	2.42	3.03	4.26	3.09	100
Sweet 372	1.51	3.07‡	1.97	3.04	3.47‡	2.61	84
Greenleaf	2.01	4.30	2.52	3.26	3.77	3.17	102
Sudax SX-11 ^{3/}	--	5.10†	3.33	4.48	4.54	--	--
Suhi-1 ^{4/}	--	--	--	3.57	5.14	--	--
Stoneville Syn.	1.78	--	--	2.88	3.74	--	--
Stoneville Sel.	1.67	2.83‡	3.62	2.06	--	--	--
Lahoma	1.76	2.60‡	2.03	2.25	--	--	--
Tift	1.84	5.23†	2.95	--	--	--	--
Ga. 337	1.57	4.21	2.81	--	--	--	--

† Significant (0.05) above check (Piper).

‡ Significant (0.05) below check (Piper).

^{1/} For data on all entries included in the tests in 1962, 1961, 1960 and 1959 see summary tables 21, 22, 23, and 24.

^{2/} Yields of Piper were used as checks and assigned the relative value of 100.

^{3/} Sudangrass-sorghum cross.

^{4/} Hybrid Sudangrass.

Table 8. Forage Yields of Sudangrass Varieties at Petersburg.

Tons per acre at air dry weights.

Variety ^{1/}	1958	1959	1960	1961	1962	Avg.	Relative ^{2/}
Piper	2.88	2.02	4.13	4.58	3.76	3.47	100
Sweet 372	2.84	2.46	3.23	3.01‡	3.95	3.10	89
Greenleaf	2.89	3.04	4.40	3.47	4.47†	3.65	105
Sudax SX-11 ^{3/}	--	3.05†	4.67	5.06	5.63†	--	
Suhi-1 ^{4/}	--	--	--	5.05	5.38†	--	
Stoneville Syn.	2.09‡	--	3.81	4.45	2.42‡	--	
Stoneville Sel.	2.58	1.87	3.58	3.42	--	--	
Lahoma	3.17	1.86	3.40	2.87‡	--	--	
Tift	2.95	2.36	4.17	--	--	--	
Ga. 337	2.86	1.21‡	3.96	--	--	--	

† Significant (0.05) above check (Piper).

‡ Significant (0.05) below check (Piper).

^{1/} For data on all entries included in the tests in 1962, 1961, 1960, and 1959 see summary tables 21, 22, 23, and 24.

^{2/} Yields of Piper were used as checks and assigned the relative value of 100.

^{3/} Sudangrass-sorghum cross.

^{4/} Hybrid Sudangrass.

Table 9. Forage Yields of Sudangrass Varieties at Charlotte C. H.
Tons per acre at 12% moisture.

Variety ^{1/}	1961	1962	Avg.	Relative ^{2/}
Piper	5.32	3.68	4.50	100
Sweet 372	3.86‡	3.40	3.63	81
Greenleaf	4.73	3.44	4.08	91
Sudax SX-11 ^{3/}	5.73	4.18	4.45	99
Suhi-1 ^{4/}	5.24	4.06	4.65	103
Stoneville Syn.	4.58	2.28‡	3.43	76
Stoneville Sel.	3.98‡	--	--	--
Lahoma	4.09‡	--	--	--

‡ Significant (0.05) below check (Piper).

^{1/} For data on all entries included in the tests in 1962, 1961, 1960 and 1959 see tables 21, 22, 23, and 24.

^{2/} Yields of Piper were used as checks and assigned the relative value of 100.

^{3/} Sudangrass-sorghum cross.

^{4/} Hybrid Sudangrass.

Table 10. Forage Yields of Sudangrass Varieties at Warsaw^{1/}
Tons per acre at 12% moisture.

Variety	1954	1955	1956	1957	1958	1959	Avg.	Relative ^{2/}
Piper	1.78	4.24	4.03	2.48	2.03	2.91	2.91	100
Sweet 372	1.95	3.64	3.96	2.01	1.50	2.43	2.48	89
Greenleaf	2.10	5.61	4.88†	1.99	2.85	3.09	3.42	117
Lahoma	2.06	5.48	4.09	2.25	2.03	1.69‡	2.93	100
Ga. 337	1.49‡	--	4.25	2.48	2.46	2.37	--	--
Tift	2.13	5.20	--	2.73	2.24	2.69	--	--
Stoneville Sel.	--	--	--	2.32	1.65	2.35	--	--
Stoneville Syn.	--	--	--	2.28	2.48	--	--	--
Sudax SX-11 ^{3/}	--	--	--	--	--	3.52	--	--

† Significant (0.05) above check (Piper).

‡ Significant (0.05) below check (Piper).

^{1/} Tests were discontinued after 1959 at Warsaw so that the 5 year averages are not for the same years as for other locations.

^{2/} Yields of Piper were used as checks and assigned the relative value of 100.

^{3/} Sudangrass-sorghum cross.

Pearl Millet

Pearl millet, a rapid growing summer annual grass originally imported from semi-tropical regions of the world, is quite similar to Sudangrass and is adapted for the same uses. It tends to grow slowly in the seedling stage, but recovers rapidly after cutting. Pearl millet normally produces forage with thicker stalks and broader leaves than Sudangrass but not as heavy leaves and stalks as the Sudangrass-grain sorghum crosses. It is not as palatable as the sweet Sudans but is readily eaten by animals if grazed at the proper stage of growth. Pearl millet is preferred over Sudangrass or Sudangrass-sorghum crosses by some farmers due to the non-toxicity (prussic acid) to animals of millet forage at any stage of growth.

Millet Diseases

Diseases have not been a problem on millets grown in Virginia varietal tests. However, several diseases have been observed, including bacterial spot, caused by Pseudomonas syringae, zonate leaf spot, caused by Gleocercospora sorghii, and several species of Helminthosporium. The destructive leaf blight (H. turcicum) of Sudangrass does not attack the millets.

BRIEF DESCRIPTION OF THE PEARL MILLET VARIETIES INCLUDED IN THE 1962 TESTS

Gahi-1 is a hybrid developed at the Georgia Coastal Plains Experiment Station. It is characterized by good seedling vigor, leafiness, high total yield, late maturity and good recovery. This is an excellent variety but plants often produce heavy growth and poor quality forage results if allowed to get too large prior to grazing. More care must be taken in management than with slower growing varieties if advantage is to be obtained from the high yield produced by this variety. It is recommended for Virginia.

Starr, a synthetic variety of pearl millet developed and released by the Georgia Coastal Plains Experiment Station and the United States Department of Agriculture, is characterized by broader leaves, shorter internodes and stems, and more leaves per stem than other pearl millet varieties now available. It is also late maturing and quite adapted to grazing due to slow growth which tends to delay the production of stemmy growth. In the Virginia tests, it ranked first in quality but yields were considerably less than Gahi-1. It is recommended for Virginia.

Common pearl millet is commercial seed with no varietal identity. Different seed lots may vary in yield and other characteristics. In Virginia tests this entry ranked high in yield, but showed considerable variation in growth factors in different years.

Hybrid S. J. was released by the J. R. McNeal Seed Co., Spur, Texas. In the Virginia tests it has produced high yields, but has shown considerable stemminess resulting in poorer quality than either Gahi-1 or Starr. Certified seed is not available, although it is in commercial production.

Results of Tests

Separate summaries of data obtained from each location in 1962 and an overall 1962 summary for data from all four test locations are presented in Tables 11 to 15. Five year summaries of yields at each location are given in Tables 16 to 20. Direct comparisons of the varieties of Sudangrass and pearl millet for the years 1959 through 1962 are given in Tables 21 to 24.

Table 11. Summary of Pearl Millet Variety Test. Orange, 1962.

Variety	Total yield ^{1/} Tons/A	Height, (inches)			% Stand ^{2/}		Recovery ^{3/}		Diseases ^{4/} 9/11
		6/26	7/26	9/11	6/29	7/7	7/26		
Common	2.41	32	34	40	100	2	4	0	
Gahi-1	2.76	20	33	42	70	1	5	0	
Starr	2.28	24	30	41	95	1	4	0	
Hybrid S. J.	2.98	23	39	46	83	1	6	0	

^{1/} Average of 4 replications; 12% moisture.

^{2/} Estimated.

^{3/} Based on score of 1-9; 1 = best, 9 = very poor.

^{4/} Based on 0-9; 0 = none, 9 = severe. This score is a rating of all leaf diseases.

Table 12. Summary of Pearl Millet Variety Test. Blacksburg, 1962.

Variety	Total yield ^{1/} Tons/A	Percent yield at each cutting			Height, (inches)			Diseases ^{2/} 9/20
		1st	2nd	3rd	7/10	8/9	9/21	
Common	3.83	45	34	21	39	33	27	2
Gahi-1	3.76	35	45	20	34	33	26	2
Starr	3.75	29	45	26	28	31	27	3
Hybrid S. J.	3.61	37	40	23	35	34	31	2

^{1/} Average of 4 replications; 12% moisture.

^{2/} Based on 0-9; 0 = none, 9 = severe. The score is a rating of all leaf diseases.

Table 13. Summary of Pearl Millet Variety Test. Petersburg, 1962.

Variety	Total yield ^{1/} Tons/A	Height, (inches)		
		7/16	8/13	9/25
Common	6.33	80	30	24
Gahi-1	3.95	60	27	25
Starr	3.90	50	24	24
Hybrid S. J.	5.75	66	36	28

^{1/} Average of 4 replications; air-dry weights.

Table 14. Summary of Pearl Millet Variety Test. Charlotte C. H., 1962.

Variety	Total yield ^{1/} Tons/A	Height, (inches)		
		1st Cut	2nd Cut	3rd Cut
Common	3.90	31	15	33
Gahi-1	4.36	33	22	34
Starr	2.74	33	19	29
Hybrid S. J.	3.50	32	19	32

^{1/} Average of 4 replications; 12% moisture.

Table 15. Summary of Pearl Millet Variety Tests in Virginia, 1962.

Variety	Forage yields in tons per acre ^{1/}					Avg. ht. (in.)			Avg. Diseases ^{2/}
	Orange	Blacksburg	Petersburg	Charlotte C.H.	Avg.	1st Cut	2nd Cut	3rd Cut	Orange and Blacksburg
Common Pearl	2.41	3.83	6.33	3.90	4.12	45	28	31	1
Gahi-1	2.76	3.76	3.95	4.36	3.71	37	29	32	1
Hybrid S. J.	2.98	3.61	5.75	3.50	3.96	39	32	34	1
Starr	2.28	3.75	3.90	2.74	3.17	34	26	30	1
L.S.D. (.05)	0.88	0.76	0.97	0.79					

^{1/} Air dry weights at Petersburg; 12% moisture at other locations.

^{2/} Based on 0-9; 0 = none, 9 = severe. This score is a rating of all leaf diseases.

Table 16. Forage Yields of Pearl Millet Varieties at Orange.

Tons per acre at 12% moisture.

Variety	1958	1959	1960	1961	1962	Avg.	Relative ^{1/}
Common	3.59	3.74	3.01‡	3.03	2.41	3.16	92
Starr	2.95	3.25‡	2.70‡	2.75	2.28	2.79	81
Gahi-1	3.27	4.21	3.86	3.01	2.76	3.43	100
Hybrid S. J.	3.10	4.00	3.17	2.48	2.98	3.15	92
Texas #7	3.47	3.81	3.35	--	--	--	--

‡ Significant (0.05) below check (Gahi-1).

^{1/} Yields of Gahi-1 were used as checks and assigned the relative value of 100.

Table 17. Forage Yields of Pearl Millet Varieties at Blacksburg

Tons per acre at 12% moisture.

Variety	1958	1959	1960	1961	1962	Avg.	Relative ^{1/}
Common	3.15	5.29	4.13	3.50	3.83	3.98	93
Starr	3.10	5.06	4.74	2.75	3.78	3.89	90
Gahi-1	3.28	5.32	4.78	4.39	3.73	4.30	100
Hybrid S. J.	2.99	4.91	4.48	3.51	3.61	3.90	91
Texas #7	3.21	5.08	5.00	--	--	--	--

^{1/} Yields of Gahi-1 were used as checks and assigned the relative value of 100.

Table 18. Forage Yields of Pearl Millet Varieties at Petersburg.

Tons per acre at air dry weights.

Variety	1958	1959	1960	1961	1962	Avg.	Relative ^{1/}
Common	2.37	2.99	3.74	3.06	6.33†	3.70	105
Starr	2.15	2.39	3.38	4.32	3.16	3.08	88
Gahi-1	2.07	3.09	4.25	4.22	3.95	3.52	100
Hybrid S. J.	2.54	2.50	3.68	3.82	5.75†	3.66	104
Texas #7	2.47	2.64	3.74	--	--	--	--

† Significant (0.05) above check (Gahi-1).

^{1/} Yields of Gahi-1 were used as checks and assigned the relative value of 100.

Table 19. Forage Yields of Pearl Millet Varieties at Charlotte C. H.

Tons per acre at 12% moisture.

Variety	1961	1962	Avg.	Relative ^{1/}
Common	4.92	3.91	4.41	100
Starr	3.93	2.74‡	3.33	75
Gahi-1	4.49	4.36	4.42	100
Hybrid S. J.	4.09	3.49	3.78	85

‡ Significant (0.05) below check (Gahi-1).

^{1/} Yields of Gahi-1 were used as checks and assigned the relative value of 100.

Table 20. Forage Yields of Pearl Millet Varieties at Warsaw^{1/}

Tons per acre at 12% moisture.

Variety	1955	1956	1957	1958	1959	Avg.	Relative ^{2/}
Common	4.88	3.63	2.92	2.59	3.98	3.60	92
Starr	4.65	2.96	2.47‡	2.41	3.56	3.26	83
Gahi-1	6.59	3.43	2.77	2.74	4.04	3.91	100
Texas #7	4.59‡	3.63	2.87	4.61†	4.02	3.94	101
Hybrid S. J.	--	--	2.55	3.17	4.12	--	--

† Significant (0.05) above check (Gahi-1).

‡ Significant (0.05) below check (Gahi-1).

1/ Tests were discontinued after 1959 at Warsaw so that the five year averages are not for the same years as for other locations.

2/ Yields of Gahi-1 were used as checks and assigned the relative value of 100.

Table 21. Summary of Sudangrass and Pearl Millet Variety Tests in Virginia, 1962.

Variety	Forage yields in tons per acre ^{1/}					Diseases ^{2/}		
	Orange	Blacks- burg	Peters- burg	Charlotte C.H.	Avg.	Orange	Blacksburg	Avg.
Greenleaf	3.73	3.77	4.47	3.44	3.61	3	3	3
Piper	3.65	4.26	3.76	3.68	3.84	5	3	4
Sweet 37 ^{2/}	2.86	3.47	3.95	3.40	3.42	5	7	6
Suhi-12 ^{1/}	4.07	5.14	5.38	4.06	4.66	2	2	2
Stoneville Synthetic ^{4/}	2.97	3.74	2.41	2.28	2.85	1	3	.2
Piper x <i>S. propinquum</i> ^{4/}	3.44	3.47	4.47	4.12	3.88	3	5	4
Rhod. x Ston. Syn. ^{4/}	3.89	4.38	5.16	4.68	4.54	2	2	2
Sudax SX-11 ^{4/}	4.10	4.54	5.63	4.18	4.61	1	3	2
T. E. Haygrazer ^{5/}	5.19	4.63	6.26	4.60	5.17	2	2	2
Sweet Sioux ^{5/}	4.40	5.81	8.12	5.56	5.97	1	3	2
S-100 ^{5/}	4.88	5.16	6.96	5.32	5.58	1	3	2
Hydan 37 ^{5/}	3.51	4.54	5.04	4.28	4.34	2	2	2
Common Pearl	2.41	3.83	6.33	3.90	4.12	0	2	1
Gahi-1	2.76	3.76	3.95	4.36	3.71	0	2	1
Hybrid S. J.	2.98	3.61	5.76	3.50	3.96	0	2	1
Starr	2.28	3.75	3.90	2.74	3.17	0	3	1
L.S.D. (.05)	0.88	0.76	0.97	0.79				

^{1/} Air dry weights at Petersburg; 12% moisture at other locations.

^{2/} Based on 0-9; 0 = none, 9 = severe.

^{3/} Sudangrass hybrid.

^{4/} Experimentals; commercial seed not available.

^{5/} Commercial Sudangrass-sorghum crosses.

Table 22. Summary of Sudangrass and Pearl Millet Variety Tests in Virginia, 1961.

Variety	Forage yields in tons per acre ^{1/}					Diseases ^{2/}			
	Orange	Blacks- burg	Peters- burg	Charlotte C.H.	Avg.	Orange	Blacks- burg	Char- lotte C.H.	Avg.
Greenleaf	5.25	3.26	3.47	4.73	4.18	2.0	3.1	3.0	2.7
Piper	5.46	3.03	4.58	5.32	4.59	5.7	5.3	2.5	4.5
Sweet 372	4.59	3.66	4.00	5.05	4.32	1.0	1.7	1.8	1.5
Lahoma ^{3/}	3.71	2.25	2.87	4.09	3.23	6.8	4.6	4.0	5.1
Suhi-1 ^{2/}	5.18	3.57	5.05	5.24	4.76	2.2	2.1	3.0	2.4
Redland x Sweet ^{4/}	5.04	3.94	5.70	7.36	5.51	1.5	2.1	1.0	1.5
Redland x Piper ^{4/}	5.47	3.47	5.50	5.88	5.08	3.0	1.8	1.5	2.1
Grain-grass 305 ^{4/} x Piper ^{4/}	4.78	4.22	4.78	6.82	5.15	3.0	1.8	1.5	2.1
Grain-Grass 305 ^{6/} x Sweet ^{4/}	5.89	3.78	4.80	5.96	5.11	3.2	2.4	2.0	2.5
Grain-Grass 305 ^{4/} x Sweet ^{4/}	4.00	4.39	4.67	6.00	4.75	1.3	2.2	1.5	1.7
Stoneville Synthetic ^{4/}	4.35	2.88	3.45	4.58	3.81	1.0	2.0	1.0	1.3
Stoneville Selection ^{4/}	3.96	2.06	3.42	3.98	3.35	1.0	2.8	3.0	2.3
Texas BK Kaffir x Piper ^{4/}	5.60	4.27	4.90	5.69	5.11	2.5	1.8	1.0	1.8
Piper x <i>S. propinquum</i> ^{4/}	4.43	4.47	4.16	5.02	4.52	7.0	4.9	7.0	6.6
Ga. Expt'l F ₁ hybrid ^{4/}	4.59	3.66	4.00	5.05	4.32	1.0	1.7	1.8	1.5
Texas BK Kaffir x Sweet ^{4/}	5.11	4.30	5.37	6.14	5.23	1.1	1.7	1.0	1.3
Sudax SX-11 ^{5/}	5.59	4.48	5.06	5.73	5.21	2.7	1.9	2.0	2.2
Common Pearl	3.03	3.50	3.06	4.92	3.63	1.0	2.2	2.0	1.7
Gahi-1	3.01	4.39	4.22	4.49	4.03	1.0	2.1	2.0	1.7
Hybrid S. J.	2.48	3.51	3.82	4.09	3.47	1.5	2.2	2.0	1.9
Starr	2.75	2.90	4.32	3.93	3.47	1.0	2.0	2.0	1.7
L.S.D. (.05)	0.69	1.21	1.09	0.76					

^{1/} Air dry weights at Petersburg; 12% moisture at other locations.

^{2/} Based on 0-9; 0 = none, 9 = severe. This score is a rating of all leaf diseases.

^{3/} Sudangrass hybrid.

^{4/} Experimentals; commercial seed not available.

^{5/} Sudangrass-grain sorghum hybrid.

Table 23. Summary of Sudangrass and Pearl Millet Variety Tests in Virginia, 1960.

Variety	Forage yields in tons per acre ^{1/}				Diseases ^{2/}		
	Orange	Blacksburg	Petersburg	Avg.	Orange	Blacksburg	Avg.
Greenleaf	3.35	2.52	4.40	3.42	5.0	2.8	3.9
Piper	3.93	2.42	4.13	3.49	3.7	3.2	3.4
Sweet 372	3.05	1.96	3.23	2.91	4.3	3.2	3.7
Lahoma	3.11	2.03	3.40	2.85	4.3	4.0	4.1
Tift	3.70	2.95	4.17	3.61	4.3	3.2	3.7
Ga. 337	3.27	2.81	3.96	3.35	4.7	2.0	3.3
Texas 9902 ^{3/}	4.36	3.44	4.91	4.24	4.7	3.0	3.8
Texas 9901 ^{2/}	4.07	3.14	4.55	3.92	4.3	3.0	3.6
Stoneville Selection ^{3/}	3.24	3.62	3.58	3.48	4.7	2.3	3.5
Stoneville Synthetic ^{3/}	4.17	--	3.81	--	4.0	--	--
Oklahoma Expt ^{1 3/}	3.61	2.28	4.21	3.37	5.0	4.0	4.5
Texas 9908 ^{3/}	4.36	3.44	4.91	4.24	4.7	3.0	3.8
S. Arun. x Tift ^{3/}	3.96	--	--	--	4.0	--	--
S. Arun. x Piper ^{3/}	3.99	--	--	--	3.3	--	--
Sudax SX-11 ^{4/}	4.97	3.33	4.67	4.32	3.7	2.5	3.1
Sorghum ^{5/}	3.00	--	4.07	--	5.3	--	--
Sorghum Alnum ^{5/}	3.25	2.95	3.92	3.37	5.0	2.5	3.7
Sorghum Grass ^{5/}	4.74	2.67	4.65	4.02	4.3	3.0	3.6
Common Pearl	3.01	4.13	3.74	3.63	3.7	4.2	3.9
Gahi-1	3.86	4.78	4.25	4.29	3.3	4.0	3.6
Hybrid S.J.	3.17	4.48	3.68	3.78	3.3	4.5	3.9
Starr	2.70	4.74	3.38	3.61	4.0	3.7	3.8
Texas #7	3.35	5.00	3.74	4.03	3.3	3.0	3.1
L.S.D. (.05)	0.70	0.89	0.70				

^{1/} Air dry weights at Petersburg; 12% moisture at other locations.

^{2/} Based on 0-9; 0 = none, 9 = severe. This score is a rating of all leaf diseases.

^{3/} Experimentals; commercial seed not available.

^{4/} Sudangrass-grain sorghum cross.

^{5/} Perennial types. Virginia seed law prohibits sale of seed of any of these perennial types.

Table 24. Summary of Sudangrass and Pearl Millet Variety Tests in Virginia, 1959.

Variety	Forage yields in tons per acre ^{1/}					Diseases ^{2/}				
	Orange	Blacks- burg	Warsaw	Peters- burg	Avg.	Orange	Blacks- burg	Warsaw	Peters- burg	Avg.
Greenleaf	4.70	4.30	3.09	3.04	3.78	4.7	4.9	5.2	5.0	5.0
Piper	5.29	4.06	2.91	2.02	3.57	5.2	5.2	5.2	5.0	5.3
Sweet 372	3.71	3.07	2.43	2.46	2.92	7.0	7.3	6.7	7.5	7.2
Lahoma	3.04	2.60	1.69	1.86	2.30	6.7	7.0	7.5	6.2	6.9
Ga. 337	4.73	4.21	2.37	1.21	3.13	2.5	3.0	3.2	3.6	2.9
Tift	4.93	5.23	2.69	2.36	3.80	3.7	4.3	4.2	5.2	4.4
Stoneville Sel.	4.10	2.83	2.35	1.87	2.79	2.5	1.8	3.2	3.2	2.6
Texas A3056-17 x R3061 ^{3/}	7.08	5.96	3.57	4.01	5.16	4.0	2.7	5.2	4.0	3.9
Texas A3056-15 x R3061 ^{3/}	6.87	6.37	3.26	3.52	5.01	3.7	3.1	4.6	4.2	3.9
Texas A3054-20 x R3061 ^{3/}	5.77	5.47	3.32	2.57	4.29	3.5	3.3	3.5	3.7	3.5
Sweet 372 (S1) ^{3/}	3.59	2.89	1.77	1.71	2.49	7.5	7.6	7.7	7.7	7.6
Sudax SX ₂ ^{4/}	6.75	5.10	3.52	3.05	4.61	3.5	2.1	3.7	4.0	3.3
Sorghum ^{5/}	3.73	3.55	1.89	1.41	2.64	3.0	3.2	4.0	4.0	3.5
Sorghum Alum ^{5/}	5.81	3.95	2.06	1.59	3.35	4.0	3.4	4.2	3.5	3.7
Sorghum Grass ^{5/}	6.58	6.20	2.92	2.31	4.50	3.0	2.1	3.7	2.7	2.9
Common Pearl	3.74	5.29	3.98	2.99	4.00	2.0	1.8	1.2	2.2	1.8
Gahi 1	4.21	5.32	4.04	3.09	4.17	1.7	1.3	1.0	3.2	1.8
Hybrid S. J.	4.00	4.91	4.12	2.50	3.88	1.5	1.6	1.2	2.2	1.6
Starr	3.25	5.06	3.56	2.39	3.57	1.5	2.3	1.0	2.7	1.9
Texas #7	3.81	5.08	4.02	2.64	3.89	1.5	1.8	1.0	2.5	1.7
L.S.D. (.05)	0.97	0.96	0.97	0.52						

^{1/} Air dry weights at Petersburg; 12% moisture at other locations.

^{2/} Based on 0 = none, 9 = severe. This score is a rating of all leaf diseases.

^{3/} Experimentals; commercial seed not available.

^{4/} Sudangrass-grain sorghum cross.

^{5/} Perennial types. Virginia seed law prohibits sale of seed of any of these perennial types.

Summary and Conclusions

Sudangrass, Sudangrass and grain sorghum crosses, and pearl millet are high yielding, drought-resistant, summer annual grasses well adapted as supplemental forage crops for Virginia. They are versatile or many purpose crops which furnish abundant pasture or green chop feed during the hot summer months when permanent pastures normally produce little growth. They furnish hay practically equal in feeding value to other non-legume roughages and make acceptable ensilage when properly handled.

New varieties of Sudangrass, Sudangrass hybrids, Sudangrass-grain sorghum crosses and pearl millet are continually being developed and introduced by federal and state agricultural agencies and by private seed organizations. A continuous evaluation program is maintained in order to keep up to date on adaptation of these new varieties to Virginia conditions.

Data are presented from tests conducted at five locations in Virginia during the past five years and the following general conclusions have been reached:

1. The annual summer grasses are valuable supplementary forage crops for use in Virginia. Sudangrasses and crosses of Sudangrass with grain sorghums grow faster in the seedling stage and generally produce earlier grazing than pearl millet; however, pearl millet recovers rapidly after cutting and can often be grazed earlier after cutting than Sudangrasses since it does not produce toxic quantities of prussic acid at any stage of growth.

2. Although there was a wide variation in yield between varieties within each crop and between crops according to location and growing season, the better varieties at one location were relatively good at all locations. The average yield of cured forage for all tests and all locations from 1958 to 1962 was 3.65 tons per acre of Piper Sudangrass and 3.72 tons per acre for Gahi-1 pearl millet.

3. There was considerable difference in yield and disease resistance between varieties of Sudangrass. A Sudangrass variety with high disease resistance, especially to leaf blight, is generally more desirable for grazing, hay or silage than are the more susceptible varieties. Virginia tests indicated that considerable yield and quality is generally sacrificed by using disease susceptible varieties.

4. The new hybrid Sudangrass, Suhi-1, looks very promising, having excellent vigor, high yield, high quality with relatively small stems, and high resistance to disease. The newer Sudangrass-grain sorghum crosses also look very promising and have good vigor, high yield, and good disease resistance. However, these crosses tend to have rather large stems and the quality of hay may be reduced as compared to the Sudangrasses.

5. Pearl millet has produced very good yields, appears well adapted to Virginia and compares favorably with Sudangrass. The Starr variety produces leafy, high quality forage but yields have been low. Gahi-1 has produced high yields with excellent seedling vigor and good quality forage. Good management must be exercised to obtain maximum returns from Gahi-1 since it grows rapidly and produces stemmy forage in a short time.

6. The following varieties are recommended for
Virginia:

Sudangrass

Piper

Greenleaf

Sudax SX-11 (1)

Pearl Millet

Gahi-1

Starr

Common Pearl

(1) Sudangrass-grain sorghum cross.