



# Sorghum & Sorghum-Sudangrass purity weights study

Region 2

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# Sorghum & Sudangrass: A History

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- Sorghums are native to tropical Asia and Africa and introduced to the US in 1855 for sugar/syrup production
- Settlement west increased popularity to its drought resistance and winter storage capabilities as a high value forage crop. The popularity spread in the Great Plains states, from Texas to SD
- Many different varieties and types were introduced from around the world throughout the next 50 years
  - Grain sorghums - grain, fodder
  - Sweet sorghums – forage, syrup, silage
  - Grass sorghums – grazing, forage
  - Broomcorns
- All sorghums species can cross-pollinate freely, and the original varieties were quickly cross-bred, and desirable traits selected for

SOURCE: Wheeler, W.A. (1950). Forage and Pasture Crops: A Handbook of Information about the Grasses and Legumes Grown for Forage in the United States. D Van Nostrand Company, Inc. New York, Toronto, London. pp. 631-661.

# Sorghum & Sudangrass: A History (cont.)

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- Sudangrass was introduced into the US in 1909 from Africa to find a better alternative to johnsongrass rootstock
- Efforts to cross sorghums with sudangrass started in the 1930s as a means to make the plant material as palatable as sweet sorghums, but retaining the grass characteristics, increasing disease resistance, as well as lowering prussic acid content
  - “Sweet”, “Tift”, “Sudangrass No. 23” and “Piper” were some of these original crossings
- And as modern breeding practices have developed, most commercial varieties of *Sorghum* species are trending to be hybrids (crossing of two parents) with the intention of creating more vigorous, uniform, and higher quality production

## SOURCES:

Hughes, H.D., Heath, M. E., Metcalfe, D.S. et al. (1953) Forages: The Science of Grassland Agriculture. The Iowa State College Press. Ames, IA. pp. 400-411

Food and Agriculture Organization of the United Nations (FAO-UN). 1996. The World Sorghum and Millet Economies: Facts, Trends and Outlook. Rome. [Online]. <https://www.fao.org/3/w1808e/w1808e00.htm#Contents>. Accessed August 17, 2023.

# Some Common names

(my personal experience)

- Sorghum
- Sorghum-sudangrass
- Sorghum hybrid sudangrass
- Sorghum hybrid
- Sorghum-sudangrass hybrid
- Sudangrass hybrid
- Egyptian wheat
- Sorghum bicolor – we don't distinguish
- Sweet sorghum
- Sorghum sudan
- Shattercane
- Sordan
- Sorgo
- Milo
- \_\_\_\_\_ BMR

\*\*\* Or some kind of mixture of the above



# Taxonomy

Sorghum-Sudangrass  
/Sudangrass

***Sorghum bicolor* (L.) Moench  
nothosubsp. *drummondii*  
(Steud.) de Wet ex Davidse**

## Autonyms (not in current use), synonyms and invalid designations

### Basionym

*Andropogon drummondii* Steud.

### Homotypic Synonym(s)

*Andropogon sorghum* (L.) Brot. var. *drummondii* (Steud.) Hack.

*Sorghum* ×*drummondii* (Steud.) Nees ex Millsp. & Chase

*Sorghum bicolor* (L.) Moench var. *drummondii* (Steud.) Mohlenbr.

*Sorghum vulgare* Pers. var. *drummondii* (Steud.) Hitchc.

### Heterotypic Synonym(s)

*Andropogon sorghum* (L.) Brot. subsp. *hewisonii* Piper

*Andropogon sorghum* (L.) Brot. subsp. *sudanensis* Piper

*Holcus sorghum* L. var. *hewisonii* (Piper) Hitchc.

*Holcus sorghum* L. var. *sudanensis* (Piper) Hitchc.

*Sorghum hewisonii* (Piper) Longley

*Sorghum niloticum* (Stapf ex Piper) Snowden

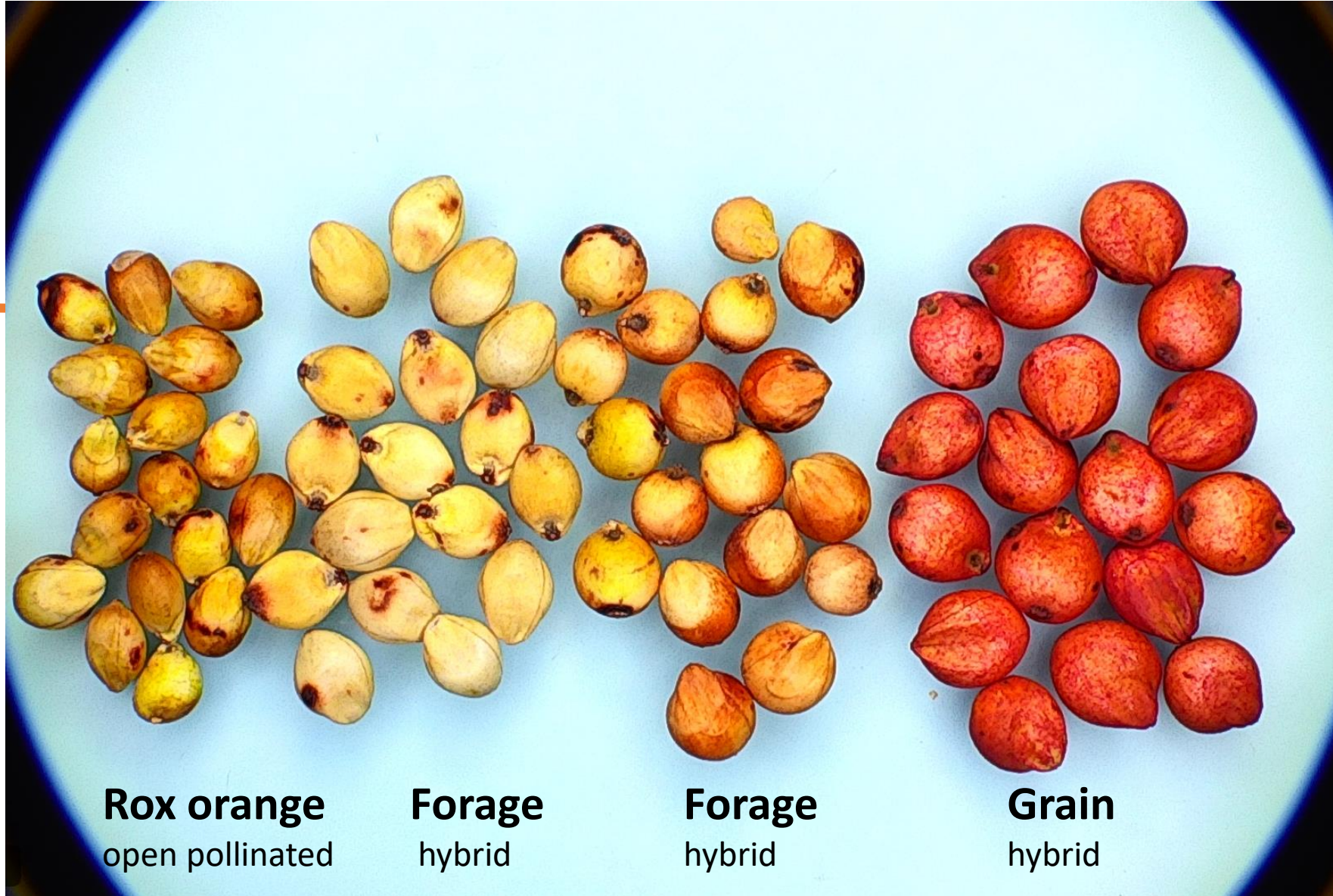
*Sorghum sudanense* (Piper) Stapf

*Sorghum vulgare* Pers. var. *sudanense* (Piper) Hitchc.

nothosubsp. = hybrid whose parents include one or more subspecies, and which has thus been assigned the rank of subspecies

# Sorghum

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# Sorghum-Sudangrass

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# Sorghum



# Sorghum-sudangrass





Sorghum

Sorghum-sudangrass



**PRESENT RULE:**

**Table 2A. Weights for working samples**

Pure Seed Unit #	Chaffy (C) or Super Chaffy (SC)	Kind of seed	Minimum weight for purity analysis	Minimum weight for noxious weed seed or bulk examination	Approximate number of seeds per gram	Approximate number of seeds per ounce
15		<i>Sorghum bicolor</i> (L.) Moench subsp. <i>bicolor</i> sorghum (incl. grain, sweet, and forage cvs.)	50	500	30-80 (55)	850-2,270
15		<i>Sorghum bicolor</i> (L.) Moench nothosubsp. <i>drummondii</i> (Steud.) de Wet ex Davidse sorghum-sudangrass, shattercane	65	500	38	1080

15		<del>sorghum-sudangrass, shattercane</del> <i>Sorghum bicolor</i> (L.) Moench nothosubsp. <i>drummondii</i> (Steud.) de Wet ex Davidse sudangrass	25	250	85-110 (100)	2,355-3,175
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Sorghum-sudangrass was added to the rules via Rule Proposal 15, 1991

# Counts, counts, and more counts

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	Sample #	1	2	3	4	5	6	7	8	mean	stdev	c.o.v.	seeds/g	meanx25	Lab #		
20	A19	2.396	2.464	2.345	2.397	2.365	2.328	2.411	2.388	2.387	0.039	1.651	41.898	59.669	1		
21	A20	3.466	3.425	3.451	3.389	3.455	3.418	3.480	3.408	3.437	0.029	0.852	29.099	85.913	3		
22	A21	2.366	2.294	2.467	2.342	2.296	2.388	2.373	2.329	2.357	0.053	2.230	42.429	58.922	3		
23	A22	1.231	1.174	1.221	1.177	1.227	1.230	1.196	1.200	1.207	0.022	1.820	82.850	30.175	4		
24	A23	3.549	3.493	3.562	3.519	3.427	3.466	3.540	3.515	3.509	0.042	1.206	28.499	87.722	4		
25	A24	2.859	2.867	2.825	2.849	2.821	2.741	2.812	2.767	2.818	0.041	1.467	35.491	70.441	4		
26	A25	3.285	3.409	3.292	3.457	3.308	3.264	3.263	3.383	3.333	0.069	2.066	30.006	83.316	4		
27	A26	2.407	2.377	2.442	2.439	2.442	2.399	2.348	2.402	2.407	0.032	1.309	41.545	60.175	4		
28	A27																

- 41 samples of sorghum and 41 samples of sorghum-sudangrass (industry reported)
- Sorghum samples:
  - 12 forage types, 23 grain types, and 6 unknown, miscellaneous or multi-purpose use types; at least three of the samples were open-pollinated types.
- At least seven states/regions are represented in the sample set from at least 12 different sources.

44										Average	2.868			37.214	71.692		1055.01 seeds/oz
45													range 25-82				709-2324 seeds/oz

	# of samples	Mean of 100 seed reps (g)	Average seeds per gram	Mean purity weight (g)	Range of working weights (g)	Unrounded Working Weight Average*
<b>Sorghum</b>	41	2.838	37.21	71.69	30-99	76.95
<b>Sorghum-sudangrass</b>	41	2.499	41.29	62.48	42-84	66.99
		2.683	39.25	67.09		71.98

\*This number based of the AOSA/SCST Statistics Committee *Purity Weight Calculator* using count data from 40 samples for each species

# Considerations

	AOSA	ISTA	Canada M&P	FSA
Sorghum	50 g	90 g	25 g	50 g
Sorghum- sudangrass	65 g	30 g	25 g	65 g
Sudangrass	25 g	25 g	12.5 g	25 g

- Increasingly difficult to differentiate visually
- Increasing the amount of seed to go through
- No way to harmonize between the different rules
- Generalizing the purity weights, instead of the exact amount
- Sudangrass vs. sorghum-sudangrass
- Germination differences between all three

**PROPOSED RULE:**

**Table 2A. Weights for working samples**

Pure Seed Unit #	Chaffy (C) or Super Chaffy (SC)	Kind of seed	Minimum weight for purity analysis	Minimum weight for noxious weed seed or bulk examination	Approximate number of seeds per gram	Approximate number of seeds per ounce
15		<i>Sorghum bicolor</i> (L.) Moench subsp. <i>bicolor</i> sorghum (incl. grain, sweet, and forage cvs.)	70	500	25-82 (37)	709-2324 (1055)
15		<i>Sorghum bicolor</i> (L.) Moench nothosubsp. <i>drummondii</i> (Steud.) de Wet ex Davidse sorghum-sudangrass, shattercane	70	500	29-59 (41)	822-1673 (1170)

# Whats next? – Germ study?

<i>Sorghum bicolor</i> subsp. <i>bicolor</i> sorghum: grain cvs.	B, T, S, TC	20-30	4	7	See sec. 6.9a	Prechill at 5 or 10°C for 5 days
sweet or forage cvs.	B, T, S, TC	20-30	4	7		Test at 30-45°C, maintaining 45°C for 2-4 hr per day
<i>Sorghum bicolor</i> nothosubsp. <i>drummondii</i> sorghum-sudangrass, shattercane	B, T	20-30; 25	4	10		Prechill at 5°C or 10°C for 5 days
<i>Sorghum bicolor</i> nothosubsp. <i>drummondii</i> sudangrass	B, T, S	20-30; 15-30	4	10		Prechill at 10°C for 5 days

*Sorghum bicolor* subsp. *bicolor* changed from 10 day to 7 day germ via rule proposal in 2015

# THANK YOU

- SGS Brookings
- South Dakota State University Seed Laboratory
- Illinois Crop Improvement Association
- MN Department of Agriculture
- Indiana State Seed Lab
- Eurofins BioDiagnostics
- Statistics Subcommittee
- Purity Subcommittee

For helping me come up with samples, seed count data, and looking over my results!