

Tropical Forages

Sorghum (annual)

Scientific name

Sorghum bicolor (L.) Moench



Subordinate taxa:

Sorghum bicolor (L.) Moench subsp. *bicolor*

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

Sorghum bicolor (L.) Moench subsp. *verticilliflorum* (Steud.) de Wet ex Wiersema & J. Dahlb.

***Note:** "notho" denotes a hybrid formed by direct hybridization of two subspecies, not other hybrids - in this case between subsp. *bicolor* and subsp. *verticilliflorum*.

Synonyms

subsp. *bicolor*: Basionym: *Holcus bicolor* L.;

Andropogon sorghum (L.) Brot.; *Andropogon sorghum* subvar. *japonicus* Hack.; *Andropogon sorghum* subvar. *rubidus* Burkill ex C. Benson & C.K. Subba Rao; *Andropogon sorghum* var. *agricolarum* Burkill ex C. Benson & C.K. Subba Rao; *Andropogon sorghum* var. *arduinii* Körn.; *Andropogon sorghum* var. *caudatus* Hack.; *Andropogon sorghum* var. *compactus* Burkill ex C. Benson & C.K. Subba Rao; *Andropogon sorghum* var. *ehrenbergianus* Körn.; *Andropogon sorghum* var. *elegans* Körn.; *Andropogon sorghum* var. *hians* Stapf;

Andropogon sorghum var. *lasiorrhachis* Hack.; *Andropogon sorghum* var. *miliiformis* Hack.; *Andropogon sorghum* var. *splendidus* Hack.; *Andropogon sorghum* var. *subglobosus* Hack.; *Andropogon sorghum* var. *technicus* Körn.; *Andropogon subglabrescens* Steud.; *Holcus cernuus* Ard.; *Holcus dochna* Forssk.; *Holcus durra* Forssk.; *Holcus saccharatus* L.; *Holcus sorghum* L.; *Milium nigricans* Ruiz & Pav.; *Panicum caffrorum* Retz.; *Sorghum basutorum* Snowden; *Sorghum bicolor* var. *arduinii* (Körn.) Snowden; *Sorghum bicolor* var. *subglobosum* (Hack.) Snowden; *Sorghum bicolor* var. *technicum* (Körn.) Stapf ex Holland; *Sorghum caffrorum* (Thunb.) P. Beauv.; *Sorghum caffrorum* var. *brunneolum* Snowden; *Sorghum caffrorum* var. *lasiorrhachis* (Hack.) Snowden; *Sorghum caudatum* (Hack.) Stapf; *Sorghum cernuum* (Ard.) Host; *Sorghum cernuum* var. *agricolarum* (Burkill ex C. Benson & C.K. Subba Rao) Snowden; *Sorghum cernuum* var. *orbiculatum* Snowden; *Sorghum conspicuum* Snowden; *Sorghum conspicuum* var. *pilosum* Snowden; *Sorghum conspicuum* var. *rubicundum* Snowden; *Sorghum coriaceum* Snowden; *Sorghum coriaceum* var. *subinvolutum* Snowden; *Sorghum dochna* (Forssk.) Snowden; *Sorghum dochna* var. *technicum* (Körn.) Snowden; *Sorghum durra* (Forssk.) Stapf; *Sorghum elegans* (Körn.) Snowden; *Sorghum gambicum* Snowden; *Sorghum guineense* Stapf; *Sorghum japonicum* (Hack.) Roshev.; *Sorghum margaritiflorum* Stapf; *Sorghum melaleucum* Stapf; *Sorghum mellitum* Snowden; *Sorghum membranaceum* Chiov.; *Sorghum membranaceum* var. *ehrenbergianum* (Körn.) Snowden; *Sorghum miliiforme* (Hack.) Snowden; *Sorghum nervosum* Chiov.; *Sorghum nervosum* Besser ex Schult. & Schult. f.; *Sorghum nigricans* (Ruiz & Pav.) Snowden; *Sorghum notabile* Snowden; *Sorghum roxburghii* Stapf; *Sorghum roxburghii* var. *hians* (Stapf) Stapf; *Sorghum saccharatum* (L.) Moench; *Sorghum simulans* Snowden; *Sorghum splendidum* (Hack.) Snowden; *Sorghum subglabrescens* (Steud.) Schweinf. & Asch.; *Sorghum subglabrescens* var. *compactum* (Burkill ex C. Benson & C.K. Subba Rao) Snowden; *Sorghum subglabrescens* var. *oviforme* Snowden; *Sorghum subglabrescens* var. *rubidum* (Burkill ex C. Benson & C.K. Subba Rao) Snowden; *Sorghum technicum* Batt. & Trab.; *Sorghum vulgare* Pers.; *Sorghum vulgare* var. *caffrorum* (Retz.) F.T. Hubb. & Rehder; *Sorghum vulgare* var. *durra* (Forssk.) F.T. Hubb. & Rehder; *Sorghum vulgare* var. *roxburghii* (Stapf) Haines; *Sorghum vulgare* var. *saccharatum* (L.) Boerl.; *Sorghum vulgare* var. *technicum* (Körn.) Fiori & Paol.

nothosubsp. *drummondii*: Basionym: *Andropogon drummondii* Steud.; *Andropogon sorghum* subsp. *hewisonii* Piper; *Andropogon sorghum* subsp. *sudanensis* Piper; *Andropogon sorghum* var. *drummondii* (Steud.) Hack.; *Holcus sorghum* var. *hewisonii* (Piper) Hitchc.; *Holcus sorghum* var. *sudanensis* (Piper) Hitchc.; *Sorghum bicolor* var. *drummondii* (Steud.) Mohlenbr.; *Sorghum hewisonii* (Piper) Longley; *Sorghum niloticum* (Stapf ex Piper) Snowden; *Sorghum sudanense* (Piper) Stapf; *Sorghum vulgare* var. *drummondii* (Steud.) Hitchc.; *Sorghum vulgare* var. *sudanense* (Piper) Hitchc.; *Sorghum* × *drummondii* (Steud.) Nees ex Millsp. & Chase

subsp. *verticilliflorum*: Basionym: *Andropogon verticilliflorus* Steud.; *Andropogon arundinaceus* Willd.; *Andropogon sorghum* subsp.



Pre-flowering sudan hybrid



nothosubsp. *drummondii*, a leafy, erect tufted annual with numerous, sparsely branched culms



Young stand of sudan grass



Sudan grass inflorescence



Comparison of forage growth of multi-cut (left) and single-cut (right) harvest sorghum-sudan grass hybrids



Cattle grazing 'FeedEx' Sudan hybrid

vogelianus Piper; *Andropogon sorghum* var. *aethiopicus* Hack.; *Andropogon sorghum* var. *effusus* Hack.; *Andropogon sorghum* var. *virgatus* Hack.; *Andropogon stapfii* Hook. f.; *Holcus sorghum* var. *effusus* Hitchc.; *Holcus sorghum* var. *verticilliflorus* (Steud.) Hitchc.; *Rhaphis arundinacea* Desv.; *Sorghum aethiopicum* (Hack.) Rupr. ex Stapf; *Sorghum arundinaceum* (Desv.) Stapf; *Sorghum bicolor* subsp. *arundinaceum* (Desv.) de Wet & J.R. Harlan ex Davidse; *Sorghum brevicarinatum* Snowden; *Sorghum lanceolatum* Stapf; *Sorghum macrochaeta* Snowden; *Sorghum pugionifolium* Snowden; *Sorghum stapfii* (Hook. f.) C.E.C. Fisch.; *Sorghum usambarense* Snowden; *Sorghum verticilliflorum* (Steud.) Stapf; *Sorghum virgatum* (Hack.) Stapf; *Sorghum vogelianum* (Piper) Stapf

Family/tribe

Family: *Poaceae* (alt. *Gramineae*) subfamily: *Panicoideae* tribe: *Andropogoneae* subtribe: *Sorghinae*.

Morphological description

subsp. *bicolor*: Variable, robust tufted annual or short-lived perennial, with unbranched culms 0.5–4 (–6) m tall and 5– >30 mm diameter depending on variety and growing conditions, usually with well-developed prop roots; nodes mostly puberulent to shortly pilose. Leaf sheaths usually glabrous; leaf blades flat, linear, apex tapering, (12–) 30–60 (–135) cm long, and 1–5 (–13) cm wide, usually glabrous and waxy, the midrib prominent and pale, margins scabrous; ligule chartaceous, 1.5–5.5 mm long. Panicle erect, sometimes recurved, usually compact in grain sorghums and more open in forage types, 10–25 (–40) cm long; sessile spikelet broadly obovate, 4–6 mm long, 3–4.5 mm wide, glumes pubescent, lemma of upper floret without awn; pedicellate spikelets usually sterile, rarely staminate, narrowly lanceolate, 4–5 (–6) mm long; caryopsis ellipsoid to obovoid or globose dorsiventrally compressed, 3–4 mm diameter, white, yellow, orange, reddish or reddish brown, exposed distally through glumes at maturity. 25,000–60,000 seeds per kg.

nothosubsp. *drummondii*: Leafy, erect tufted annual with numerous, sparsely branched culms to 3 m tall, 3–9 mm thick, often with prop roots, but no rhizomes; nodes pubescent. Leaves numerous; leaf sheaths largely glabrous; leaf blade linear, apex attenuate, 15–30 (–60) cm long and 8–15 (–25) mm wide, glabrous; ligule membranous, about 2 mm long. Panicle twice as long as broad, ovoid-pyramidal, open, 15–35 (–75) cm long, with secondary and sometimes tertiary branches; spikelets paired; sessile spikelet 5.5–7.5 mm long, upper portion of the rachis internode attached when the spikelets finally fall; glumes sparsely hairy, shiny and almost hairless when mature; lemma of upper floret with awn to 16 mm long and twisted at base; pedicellate spikelet about as long as the sessile spikelet, but narrower. Caryopsis variable, enclosed by the glumes; grain not exposed at maturity. 120,000 seeds per kg.

subsp. *verticilliflorum*: Erect, loosely tufted, short-lived perennial or annual to 4 m tall, with distinct prop roots but without rhizomes; culms mostly unbranched, nodes glabrous or pubescent. Leaf sheaths glabrous; leaf blades linear, to 60 cm long, 0.8–3 cm wide, glabrous, apex attenuate. Panicle lanceolate to broadly spreading, 10–60 cm long; sessile spikelet narrowly ovate to elliptic (4–) 5.5–7.5 (–9) mm long, breaking away cleanly from rachis internodes when falling; glumes hairy at least when young, often becoming less hairy with age, lemmas of both florets ciliate, lemma of upper floret awnless or with awn 5–30 mm long, twisted at the base; pedicellate spikelet linear to lanceolate, male or barren, smaller than the sessile spikelet.

Common names

Sorghum bicolor

English: great millet, Rhodesian Sudan grass; sorghum

Africa: vernacular names used in the African countries are too numerous to list

subsp. *bicolor*

Africa: graansorghum, voersorghum (Afrikaans); mailamucheme, makonga, mabele, chiganigani (Zambia); tinkish (Amharic, Ethiopia), ala (Oromo, Ethiopia); bachanta, mashila (Ethiopia); mtama (Kenya); ipwa (Shona); aura (Sudan); duhn, durah (Arabic, Egypt); dura (Sudan)

Asia: : □□ gao liang, kaoliang; □□□□ wan tou gao liang; □□□ tian gao liang; □□□□ duo mai gao liang (China); morokoshi, satou morokoshi (satō morokoshi), sorugamu (Japan); susu (Korea); cantel, jagung cantel (Indonesia); shallu (Myanmar)

English: broomcorn, durra, feterita, forage sorghum, grain sorghum, great millet, guinea corn, Kaffir-corn, milo, milo-maize, shallu, sorghum, sweet sorghum

Europe: kafferikoren (Dutch); gros mil, riz Égyptien, sorgho (French); gewöhnliche Mohrenhirse, Hirse, Mohrenhirse, Kaffernhirse, nickende Mohrenhirse, Zuckerhirse (German); sorgo, sorgo coltivato (Italian); sorgo, sorgo forrageiro (Portuguese); daza, sorgo, maiz guineo, millo, sorgo comun, sorgo de grano (Spanish); durra (Swedish)

India: zu, zuwar (Assamese); jowari (Bengali); chari, jowar (Hindi); jawari (Hindustani); ■■■■■■ jola (Kannada); ■■■■■■ jwari, jondhala (Marathi); juara (Oriya); cholam, cholum, solam (Tamil); jannalu, jonna (Telugu)

Latin America: capim massambará, mapira, massamba, milho da Guiné, sorgho, sorgho das vassouras, sorgho de espiga (Portuguese); challu, kafir, millo de Africa, pajón, sorgo blanco, sorgo de escoba (Spanish)

nothosubsp. *drummondii*

Africa: garawi (Sudan)

Asia: su dan cao, gao liang su dan, cao za jiao zhong (Chinese); chikinkoo, suudan gurasu (Japanese); batag, bukakau, layagah (Philippines); ya-sudan (Thai); sudan otu (Turkish)

English: Sudan grass, chicken-corn, shattercane, sordan, sorghum-sudangrass

Europe: soedangras (Dutch); sorgho adventice, sorgho du Soudan, sorgho menu (French); sudanisches Sorghogras, Sudangras, Sudanhirse (German); erba sudanese, erba di sudan, sorgo gentile (Italian); hierba del sudan, pasto sudán (Spanish); sudangräs (Swedish)

Latin America: capim Sudão (Brazil); hierba del Sudán, pasto del Sudán, pasto Sudán, sorgo de Sudán, sorgo sudán forrajero, zacate Sudán (Spanish)

subsp. verticilliflorum

English: common wild sorghum, wild sudan grass

Brazil: sorgo-selvagem

Distribution

Sorghum bicolor

Native:

Africa: Angola; Benin; Botswana; Burkina Faso; Cameroon; Central African Republic; Chad; Côte d'Ivoire; Democratic Republic of the Congo; Egypt; Ethiopia; Equatorial Guinea; Gabon; Gambia; Ghana; Guinea; Kenya; Liberia; Malawi; Mali; Mauritania; Mozambique; Namibia, Niger; Nigeria; Senegal; Sierra Leone; Somalia; South Africa; Sudan; Swaziland; Tanzania; Uganda; Zambia; Zimbabwe

Cultivated:

Throughout tropical, subtropical, & warm-temperate regions

Naturalized:

Asia: India

Australasia: Australia

America: North America, Central America, South America

subsp. bicolor

Cultivated: throughout tropical, subtropical, & warm-temperate regions

nothosubsp. drummondii

Cultivated: one form (Sudangrass) widely cultivated for forage

Naturalized: may occur as a weed wherever sorghum is cultivated

subsp. verticilliflorum

Native:

Africa: Angola; Benin; Botswana; Burkina Faso; Cameroon; Central African Republic; Chad; Côte d'Ivoire; Democratic Republic of the Congo; Egypt; Ethiopia; Equatorial Guinea; Gabon; Gambia; Ghana; Guinea; Kenya; Liberia; Malawi; Mali; Mauritania; Mozambique; Namibia, Niger; Nigeria; Senegal; Sierra Leone; Somalia; South Africa; Sudan; Swaziland; Tanzania; Uganda; Zambia; Zimbabwe

Naturalized:

Asia: India

Australasia: Australia

Northern America: North America

Southern America: South America; Central America

Uses/applications

Forage

Subsp. *bicolor*: Sweet sorghum varieties and inter- and intra-specific hybrids with Sudan grass have been developed for grazing and/or silage. Sorghum grain is a significant component of cattle, pig and chicken feeds in the United States, Central and South America, Australia and China, and is becoming important in chicken feed in India. It requires grinding, rolling, flaking or steaming to maximize its nutritional value.

Nothosubsp. *drummondii*: Cultivated primarily for hay or as a pioneer grass, although seldom used for silage. Valued in areas with hot dry summers for ease of establishment and for its ability to recover after grazing or cutting.

Other

Subsp. *bicolor*: Grown for grain, syrup and sugar, and industrial uses of stems and fibres. Sorghum grain is used for human food, and for the preparation of fermented beverages, alcohol and vinegar.

Subsp. *verticilliflorum*: Source of genetic material for breeding programmes.

Ecology

Soil requirements

subsp. *bicolor*: Adapted to wide range of at least moderately well-drained soils, with textures from light loams to heavy clays; best on very fertile, moderately acid to slightly alkaline (pH (4.5–) 5.7–7 (–8.7)), deep, friable soils. Performance suffers in sandy soils of high pH. Moderately salt tolerant, growing in soils with salinity levels up to 10 dS/m.

nothosubsp. *drummondii*: Adapted to wide range of soils from heavy clays (not cold and wet) to sands, but requires fertile land to give high yields. Does not tolerate alkaline, saline, or solonchaks soils.

Moisture

Adapted to tropical and subtropical summer rainfall climate with (300–) 500–1,000 (–2,000) mm of rain annually. Leaf disease is more prevalent under high rainfall conditions. Its deep rooting can extract water from low sources, though not as deep as *Cenchrus americanus* (pearl millet). While sweet sorghum will survive on less than 300 mm of rain over a season, 500 to 1,000 mm of rain and/or irrigation is necessary to obtain good yields (50 to 100 t total green weight). It resists drought by becoming dormant under adverse moisture conditions and resuming growth when moisture is available. Shoot removal lowers its capacity to withstand drought. Early drought stops growth before floral initiation and the plant remains vegetative; it will resume leaf production and flower when conditions again become favourable for growth. Late drought stops leaf development but not floral initiation. Sorghum is intolerant of sustained flooding, but will survive temporary waterlogging. Nothosubsp. *drummondii* does not thrive in the humid tropics or in cool humid temperate conditions.

Temperature

S. bicolor is a warm season plant and seed should be planted when soil temperatures are above 15 °C. Most favourable temperature for growth ranges from 25 to 30 °C. Grows well under irrigation in hot dry regions. Because there are cold-tolerant types, it can be grown to 40° N and S of the Equator. In the tropics it can be grown to 2,200 m asl, but is more commonly grown below about 1,000 m asl. As very fast-growing annuals, they can be grown wherever the growing season is long enough – from adequate soil temperature to end of wet season. Sorghum is very susceptible to frost, but thick-stemmed, standing, sweet fodder sorghum will retain stem juiciness and sweetness for some time after the leaves are killed. Sudangrass does not tolerate frost and is killed when the temperature drops to 3–5 °C below the freezing point.

Light

S. bicolor grows best with full sunlight. It has a high radiation use efficiency and is in fact one of the most radiation-efficient crops. Conversely, it is intolerant of shade.

Reproductive development

S. bicolor exhibits a short-day flowering response, and normally flowers 8 to 10 weeks after germination in warm climates, but depending on genotype, flowering may occur 4 to 14 weeks after germination. Wet and cool weather can delay flowering. Flowers begin to open 2 days after emergence of the inflorescence from the boot. Flowering starts in the sessile spikelets at the tip of the inflorescence and progresses downwards over 4–5 days.

Defoliation

Sudan grass and sudan grass hybrids are better suited to heavy grazing due to better regrowth potential and lower prussic acid (hydrogen cyanide) levels than grain or sweet sorghum hybrids. Having a high level of residual coarse stems remaining after grazing can be avoided by grazing early, *i.e.* grazing heavily when plants reach 50–60 cm high to prevent development of coarse stems and early flowering. Below 50 cm, the risk of prussic acid poisoning increases considerably. It should not be grazed below 15–20 cm to facilitate good regrowth. Thereafter, the stand can be allowed to grow a little taller, to 1 or 1.5 m between grazings. Forage sorghum can make high quality hay provided stems are not thick and woody, best achieved by selecting fine-stemmed varieties and increasing plant density (*i.e.* sowing rate). Sugardrip and sweet sorghum hybrids provide the most palatable standover feed.

Fire

Not normally subjected to fires.

Agronomy

Guidelines for establishment and management of sown forages.

Establishment

Planted 2–5 cm deep into arable seedbed at 4–10 kg/ha seed when soil temperature is rising and exceeds about 15 °C. Higher sowing rates can be used for irrigated stands and for hay crops. Large seed and germinates and establishes vigorously.

Fertilizer

Should be grown only on fertile soils and so would need additional nitrogen on soils of marginal soil fertility. In general, crops require at least 20 kg/ha phosphorus and sulphur and 100 kg/ha nitrogen, particularly on less-fertile soils. N can be applied where irrigation or adequate soil moisture is available, but the plants can quickly grow past the optimum stage without careful grazing management. Excessive nitrogen fertilizer favours high levels of toxic prussic acid (HCN) in young growth of some varieties, and can also lead to nitrate poisoning if growth is slowed by dry or cold.

Compatibility (with other species)

May be sown with summer-growing legumes, but as these generally grow more slowly than the sorghum, it is difficult to find the optimal stage or frequency of grazing for the mixture.

Companion species

Legumes: *Lablab purpureus*, *Vigna unguiculata*.

Pests and diseases

Numerous fungal and viral diseases afflict sorghums, often not causing serious damage. The effects of fungal diseases such as ergot caused by *Claviceps africana*, head smut caused by *Sporisorium reilianum*, and leaf blight caused by *Exserohilum turcicum*, as well as viral diseases such as the leaf mosaic caused by Johnson Grass Mosaic Virus can be minimized by using genetically resistant varieties that are constantly being developed. Ergot in grazed or hay crops can be controlled by grazing or harvesting before flowering. Resistance or tolerance to the effects of the obligate hemiparasite, witchweed (*Striga hermonthica* and *Striga asiatica*), has also been identified resulting in development of suitable cultivars for striga infested areas. Push-pull technology has been developed by ICIPE to reduce the impact of witchweed as well as of stem borers (*Chilo partellus*, *Eldana saccharina*, *Busseola fusca* and *Sesamia calamistis*). The strategy involves combined use of intercrops and trap crops, using plants that are appropriate to the farmers. Repellent intercrop "push" plants deter the pest from the main crop, while the trap "pull" plants have the inherent ability of not allowing development of trapped stem borers, thus reducing the number of trapped insects.

Ability to spread

The grassy types, nothosubsp. *drummondii* and subsp. *verticilliflorum* have some propensity to spread and are often found as weeds in protected land. While both cross readily with var. *bicolor*, the crosses pose a low risk of becoming a weed as they are generally sterile or have very low fertility.

Weed potential

These annual subspecies are generally considered to pose a low weed risk in most situations. The same cannot be said for the perennial *Sorghum* spp. Shattercane, a weedy race of nothosubsp. *drummondii*, has been declared noxious in a number of states of the USA.

Feeding value

Nutritive value

Nutritive value greatly depends on stage of growth and soil fertility. As with all grasses, nutritive value is highest when the plant is leafy and declines rapidly through flowering to maturity. Nutritive value also depends greatly on soil fertility or the amount of fertilizer applied, and on grazing management where best results are achieved with a grazing height of 1–1.2 m. At this height, crude protein levels could be as high as 18% with energy levels of 8.8–9.5 MJ/kg DM.

Palatability/acceptability

Moderately palatable and digestible when young. The sweet sorghum hybrids keep a higher free sugar content in the stem and are more suitable as stand-over feed into winter or the dry season. The various types of hybrids have different agronomic features and uses:

- Sweet sorghum hybrids tiller well, are tall with fine stems, flower early and have low prussic acid.
- Sweet sorghum × Sudan grass hybrids are more compact and leafy with more juicy and sweet stems. Prussic acid levels are low. They grow rapidly but some cultivars selected for later flowering are easier to manage as they remain leafy for longer.
- Sweet sorghum × sweet sorghum hybrids are tall, late flowering with high sugar levels in their stems. Prussic acid levels are high. More suitable as stand-over feed into autumn.

Toxicity

Leaves can be poisonous to grazing livestock due to the presence of hydrocyanic acid (prussic acid, HCN), especially in young dark-blue coloured regrowth after a dry spell. Having supplement blocks containing sulphur available will reduce the risk of prussic acid poisoning. Excessive nitrogen fertilizer favours high levels of HCN in young growth of some varieties, and can also lead to nitrate poisoning if growth is slowed by dry or cold.

Feedipedia link

<https://www.feedipedia.org/node/379> (subsp. *bicolor*)

<https://www.feedipedia.org/node/375> (nothosubsp. *drummondii*)

Production potential

Dry matter

DM yields depend strongly on temperature, soil fertility and soil moisture availability, but can be up to 30 t/ha/yr under ideal conditions. Yields are generally of the order of (10–) 15–20 t/ha/yr DM.

Animal production

Generally, liveweight gains vary between 0.5 and 1.0 kg per head per day depending on plant height and leafiness.

Genetics/breeding

$2n = 20$. *S. bicolor* is predominantly self-pollinating, but under specific conditions wind-mediated cross-pollination can occur. The level of outcrossing varies and is influenced by the panicle type of the cultivar; typically outcrossing is higher in loose-panicled nothosubsp. *drummondii* and subsp. *verticilliflorum*, and lower in compact-panicled subsp. *bicolor*. Nothosubsp. *drummondii* is a natural hybrid between subsp. *bicolor* and subsp. *verticilliflorum*. Plant breeding continues to improve pest and disease resistance, as well as to develop later flowering varieties. *S. bicolor* crosses readily with *S. propinquum*, producing hybrids that might extend the range of grain sorghum into more temperate regions.

Seed production

Subspecies *bicolor* can produce seed yields of 3–5 t/ha. Seed does not shatter readily and can be harvested easily. No dormancy. Since seed of 'Silk' (perennial *Sorghum* hybrid) and that of the noxious weed, *S. halepense*, are of similar colour to *S. bicolor*, care must be taken with the purity of seed crops.

Herbicide effects

In the U.S. (United States), volunteer *S. (Sorghum) bicolor* is controlled with herbicides including clethodim (group 1), fluazifop (group 1), imazethapyr (group 2), primisulfuron (group 2), dicamba (group 4), atrazine (group 5), glyphosate (group 9), and S-metolachlor (group 15), alone or in mixtures. Atrazine may be used as a pre-emergence herbicide for grass and broadleaf weed control with care with some hybrids (see label recommendations) but not with sudan grass. Seedlings and young plants are easily eradicated with non-residual contact herbicides such as glyphosate.

Strengths

- Easy establishment and rapid growth.
- Very productive on fertile soils.
- Pioneer species with other perennial grasses or legumes.

Limitations

- Demands high soil fertility.
- Prussic acid poisoning.
- Seed cannot be distinguished from that of *S. halepense*.
- Strips nitrogen from marginal soils making it difficult to plant following permanent pasture.
- Difficult to eradicate from subsequent grain crops.

Selected references

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Stuart, P.N. (2002) The Forage Book: A comprehensive guide to forage management. 2nd edition. Pacific Seeds, Toowoomba, Queensland, Australia.

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Cultivars

Numerous cultivars have been developed for specific purposes (grazing, hay, silage, standover feed), according to the needs of farmers in the various countries where annual forage sorghums are grown.

Promising accessions

There are no promising accessions as such.

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