

High-yielding grain sorghum

cultivars released in India for enhanced productivity

Hariprasanna K^{1*}, Aruna C¹ and R Madhusudhana¹

¹ICAR-Indian Institute of Millets Research, Hyderabad, Telangana 500 030

Sorghum is one of the important dryland crops grown mostly under rainfed conditions for food, feed and fodder. It has good adaptation to different soil and weather conditions. In case of grain sorghum, there are distinct types adapted to kharif (rainy) and rabi (post-rainy) seasons. The crop improvement efforts in grain sorghum starting from early 1960s has resulted in the release of nearly 80 high-yielding cultivars (hybrids as well as varieties) for cultivation across the country. Apart from these, a number of locally adapted high-yielding cultivars have been released through the research efforts at various AICRP on Sorghum centres spread across the states. Availability of an array of high-yielding cultivars possessing biotic and abiotic stress tolerance, and good grain quality provides ample opportunity to the sorghum farmers in different states to choose the appropriate cultivars for enhancing the profit out of dryland farming.

Keywords: Dryland, Grain sorghum, Hybrid, State release, Variety

SORGHUM is the fifth most important food grain crop in India and continues to play an important role in the diet of people living in the semi-arid regions of the Deccan plateau. At the time of India's independence, sorghum used to be grown in about 15 m ha area, acting as one of the important food grains in the country. It had a special place in the diets of people, especially in the rural areas as fine cereals were low in supply, unaffordable and were grains of rich people. Besides as a food grain, sorghum is also an important fodder for the livestock, both dry fodder (stover remaining after harvest of grains) and green fodder (where crop is raised for fodder alone). It is a unique crop of dryland agriculture, which can withstand moisture stress and can recover fast once rains are received, coupled with highest dry matter production potential. Sorghum is grown in both the major crop seasons in India: *kharif* (rainy) season as a rainfed crop, *rabi* (post-rainy) season under depleting



GJ 44 (Madhu) – High-yielding *kharif* sorghum variety for Gujarat



Palem Pacha Jonna 1 – Yellow pericarp sorghum variety for Telangana



Tandur Jonna 1 – High-yielding *rabi* dual purpose variety for Telangana



GDJ 1 (Banas Surya) – High-yielding *kharif* sorghum variety for Gujarat

residual soil moisture or limited-irrigated conditions. The seasonal adaptations are quite different due to diverse agro-climatic conditions where the crop is grown. There was limited research effort on sorghum improvement in the pre-independence period and the yield levels used to be ~ 350 kg/ha only.

In the early 1960s, the Indian Council of Agricultural Research (ICAR), with the assistance of Rockefeller Foundation, initiated research on hybrid sorghum. In 1962, the ICAR launched the Accelerated Sorghum and Millet Improvement Project (ASMIP) with an objective of yield improvement through hybrid breeding in sorghum and millets. Prior to this organized research under accelerated hybrid sorghum programme, though there were efforts at different Agricultural Research Stations in the arid and semi-arid regions like those located in Maharashtra, Andhra Pradesh, Tamil Nadu, Karnataka, etc. the progress in crop improvement was limited. However, there was a steady increase in area from 15 m ha to more than 18 m ha by 1960s due to increased interest by the farmers in this crop. This trend continued till 1969-70 when the area peaked up to 18.61 m ha with the availability of hybrids starting from CSH 1. Realizing the potential and need for coordinated research, ICAR started the All India Coordinated Sorghum Improvement Project (AICSIP) in the year 1969.

With the launch of AICSIP, the sorghum research in the country got a boost. Concerted research efforts carried out at the IARI Regional Research Station, Hyderabad, and in different AICSIP centres located at different State Agricultural Universities resulted in the development of several high-yielding hybrids and varieties leading to major increase in production of sorghum due to increased yield levels, especially in case of *kharif* sorghum. Though the area under the crop started declining soon after the takeoff of green revolution era, the quantity of grain production remained stable hovering around 11-12 m t for the next two decades,



TRJP 1-5 – High-yielding *rabi* sorghum variety for Karnataka



Parbhani Supermoti - High-yielding *rabi* sorghum variety for Maharashtra



RVJ 2357 - *kharif* dual purpose variety for Madhya Pradesh



SPV 2217 - High-yielding *rabi* sorghum variety for Karnataka

because of the adoption of high-yielding cultivars by the farmers and better management practices. In 1987, a full-fledged 'National Research Centre for Sorghum' was established at Hyderabad to address and support the basic and strategic research needs of sorghum, which has subsequently evolved into the Indian Institute of Millets Research (IIMR) in 2015 to address research needs of all the millets in the country. The crop improvement efforts in sorghum since inception of AICRP

on Sorghum (formerly AICSIP) have resulted in the release of 54 sorghum hybrids and 60 varieties (grain, forage, sweet and special purpose sorghums) for general cultivation at National level, specifically to suit different seasons across India. As a result, the average grain yield levels have reached up to 1005 kg/ha during *kharif* season and 833 kg/ha during *rabi* season. Some of the popular and recently released grain sorghum cultivars at national level developed by public sector agencies are given in Table 1.

Apart from nationally released cultivars, the research efforts at various AICRP centres spread across the country also led to development of many high-yielding locally adapted cultivars. Many centres could identify high-yielding open-pollinated varieties, which were preferred by the farmers due to both grain and fodder advantage compared to hybrids. Some of these location specific cultivars released in different states continue to be popular among the farmers in spite of the availability of nationally



Phule Yashomati - *rabi* sorghum variety for shallow soils in Maharashtra

Table 1. Popular and recently released grain sorghum cultivars at National level

Cultivar	Year of release	Grain yield (q/ha)	Fodder yield (q/ha)	Maturity (days)	Area of adaptation
Kharif hybrids					
CSH 30	2013	44	141	105	Maharashtra, Karnataka, Madhya Pradesh, Gujarat, Andhra Pradesh
CSH 35	2016	41	126	109	Maharashtra, Karnataka, Madhya Pradesh and Gujarat
CSH 41	2018	47	124	106-110	All <i>kharif</i> sorghum growing areas
CSH 42	2021	40	117	98-105	Karnataka, Andhra Pradesh, Madhya Pradesh and Gujarat
CSH 45	2022	44	121	105	Karnataka, Maharashtra, Rajasthan, Telangana
CSH 48	2023	40	110	104	Karnataka, Tamil Nadu, Telangana, Madhya Pradesh, Rajasthan and Gujarat
Kharif varieties					
CSV 20	2006	31	133	109	All <i>kharif</i> sorghum growing areas
CSV 27	2012	28	193	116	All <i>kharif</i> sorghum growing areas
CSV 41	2019	32	159	106-110	Andhra Pradesh, Telangana, Tamil Nadu, Rajasthan and Gujarat
CSV 42	2020	38	140	115-118	Karnataka, Maharashtra, Madhya Pradesh and Gujarat
CSV 45	2021	33	130	110-112	Maharashtra, Tamil Nadu and Madhya Pradesh
CSV 50 Red	2023	40	132	110-118	Karnataka, Telangana, Maharashtra
CSV 51	2023	43	138	110-115	Karnataka, Tamil Nadu, Telangana
Rabi hybrids					
CSH 39R	2018	27	69	115	All rabi sorghum growing areas
Rabi varieties					
CSV 29R	2013	25-30	50-75	115-120	All rabi sorghum growing areas - suitable for medium to deep soils

released varieties and hybrids. Such cultivars released in different states are also the testimony for the successful operation of AICRP on Sorghum system across the country. One of the earliest grain sorghum cultivars released at state level was M 35-1, developed in 1938 by Agricultural Research Station at Mohol, Solapur (currently under MPKV, Rahuri) by selection from local Maldandi population, which became very popular in post-rainy

tracts of Deccan plateau. It was formally released for cultivation in 1969. This variety proved its merit by stable performance under rainfed (residual moisture) situations and producing bold lustrous grains. The fodder quality was also good and thus became cultivar of choice in *rabi* sorghum tracts across the country. Subsequently, a number of varieties adapted to both rainy as well as post-rainy seasons were developed and released for cultivation in

major sorghum growing states. The details of high yielding and popular cultivars released for different states in recent years are compiled in Tables 2 to 8 for the benefit of sorghum farmers of different growing regions. Apart from grain sorghum, some of the varieties were also released in special purpose sorghums like *hurda*, popping, flaking, etc., which are popular in certain regional pockets in Maharashtra and Karnataka.

Table 2. Popular and recently released cultivars for Maharashtra

Name of cultivar	Name of AICRP Centre	Notification No. & Date of release	Area of adaptation	Grain yield (q/ha)	Fodder yield (q/ha)	Duration (days)	Salient features
PKV Ashwini (41 11/6)	Dr PDKV, Akola	S.O. 2817(E) 19.09.2013	Vidarbha region	40-42	-	110-120	<i>Kharif</i> hurda variety, early with soft sweet green grains, easy threshability, pleasant aroma and taste
PDKV Kalyani (AKSV 181)	Dr PDKV, Akola	S.O. 1007(E) 30.03.2017	<i>Kharif</i> areas	39-40	141-142	115-120	Dual purpose variety with good grain and roti quality, tolerant to shoot fly and stem borer
PDKV Hurda Kartiki (Wani 103)	Dr PDKV, Akola	S.O. 3220(E) 5.09.2019	Vidarbha region	42-43	-	110-120	<i>Kharif</i> hurda variety with soft sweet green grains, easy threshability, pleasant aroma and taste
SPH 1635	Dr PDKV, Akola	S.O. 268(E) 28.01.2015	Vidarbha region	48-50	125-130	110-115	<i>Kharif</i> dual purpose hybrid, good grain quality
Trombay Akola Suruchi (TAKPS 5)	Dr PDKV, Akola	S.O. 1056(E) 6.03.2023	Vidarbha region	42-44	-	108-110	<i>Rabi</i> hurda variety, sweet grains with good aroma, moderately tolerant to major diseases and pests
SPV 1411 (Parbhani Moti)	VNMKV, Parbhani	S.O.122 (E) 02.02.2005	Marathwada	18-20	58-60	118-120	<i>Rabi</i> variety, bold grains, pearly white, good <i>bhakri</i> quality

Table 2 (Concluded)

Name of cultivar	Name of AICRP Centre	Notification No. & Date of release	Area of adaptation	Grain yield (q/ha)	Fodder yield (q/ha)	Duration (days)	Salient features
Parbhani Shakti (PVK 1009)	VNMKV, Parbhani	S.O. 4065(E) 31.08.2022	All regions	36-38	111-115	115-118	<i>Kharif</i> variety, higher Fe and Zn content, moderately tolerant to grain mold and shoot fly
SPH 1641	VNMKV, Parbhani	S.O. 3540(E) 22.11.2016	All regions	45-50	142-145	115-118	<i>Kharif</i> hybrid with high grain and fodder yields, tolerant to grain mold, shoot fly and stem borer
Parbhani Supermoti (SPV 2407)	VNMKV, Parbhani	S.O. 8(E) 24.12.2021	Marathwada	30-32	110-115	115-120	<i>Rabi</i> variety, moderately tolerant to shoot fly, stem borer and charcoal rot
Parbhani Vasant (PVRSG 101)	VNMKV, Parbhani	S.O. 4222(E) 25.09.2023	Marathwada	32-35	132-135	95-100	<i>Rabi</i> hurda variety, tender, sweet and easily threshable, moderately tolerant to shoot fly, stem borer and charcoal rot
M 35-1	MPKV, Rahuri	S.O. 596(E) 13.08.1984	<i>Rabi</i> areas	15-18	50-60	120-125	Good grain and fodder quality, suitable for medium soil, drought tolerant
Phule Chitra (RSV 237)	MPKV, Rahuri	S.O. 72(E) 10.1.2008	Western Maharashtra	20-25	55-60	118-120	<i>Rabi</i> variety, recommended for medium soil
Phule Vasudha (RSV 423)	MPKV, Rahuri	S.O. 72(E) 10.1.2008	Western Maharashtra	25-28	55-60	116-120	<i>Rabi</i> variety, recommended for deep soil
Phule Anuradha (RSV 458)	MPKV, Rahuri	S.O. 2137(E) 31.8.2010	Western Maharashtra	8-10	30-35	105-110	<i>Rabi</i> variety, recommended for shallow soil
Phule Revati (RSV 1006)	MPKV, Rahuri	S.O. 2125(E) 10.09.2012	Western Maharashtra	40-45	90-110	118-120	<i>Rabi</i> variety, recommended for irrigated condition, fertilizer responsive
Phule Panchami (RPOSV 3)	MPKV, Rahuri	S.O. 2125(E) 10.09.2012	Western Maharashtra	12-14	40-45	118-120	<i>Rabi</i> variety, suitable for popping of the grains
Phule Suchitra (RSV 1098)	MPKV, Rahuri	S.O. 268(E) 28.1.2015	Western Maharashtra	24-28	65-70	120-125	<i>Rabi</i> variety, recommended for medium soil
Phule Rohini (RPASV 3)	MPKV, Rahuri	S.O. 2238(E) 29.06.2016	Western Maharashtra	18-20	45-50	115-120	<i>Rabi</i> variety with coloured grains, suitable for <i>pappad</i> making
Phule Madhur (RSSGV 46)	MPKV, Rahuri	S.O. 2238(E) 29.06.2016	Western Maharashtra	30-35	65-70	115-118	<i>Rabi hurda</i> variety
Phule Yashomati (RSV 1910)	MPKV, Rahuri	S.O. 1056(E) 6.03.2023	Western Maharashtra	10-12	35-40	112-115	<i>Rabi</i> variety for shallow soils, pearly white grains, moderately resistant to charcoal rot and foliar diseases

Table 3. Popular and recently released cultivars for Karnataka

Name of cultivar	Name of AICRP Centre	Notification No. & Date of release	Area of adaptation	Grain yield (q/ha)	Fodder yield (q/ha)	Duration (days)	Salient features
DSV 6 (CSV 25)	UAS, Dharwad	S.O. 2187(E) 27.8.2009	Northern zones	40-45	80-100	120-125	<i>Kharif</i> dual purpose variety for assured rainfall area, grain mold tolerant
SPV 2217	UAS, Dharwad	S.O. 1379(E) 27.03.2018	Zone 8	30-35	120-150	120-125	<i>Rabi</i> variety, bold seeded, tolerant to charcoal rot, non-lodging, good stay green fodder quality
BJV 44 (Bijapur Jowar Variety 1)	UAS, Bijapur	S.O. 1379(E) 27.03.2018	Zone 3 & 8	22-25	50-60	125-130	<i>Rabi</i> variety with good grain and roti quality, fodder quality, moderately tolerant to charcoal rot, shoot fly and aphids
AKJ-1 (Atharga Kempu Jola-1)	UAS, Bijapur	S.O. 1379(E) 27.03.2018	Zone 3	10-12	30-35	120-125	<i>Rabi</i> variety, suitable for flaking, significantly high polyphenols content, good fodder quality
KMJ-1 (Kagi Moti Jola-1)	UAS, Bijapur	S.O. 1379(E) 27.03.2018	Zone 3	9-10	25-30	120-125	<i>Rabi</i> variety, suitable for popping, good popping yield, pop expansion ratio, bright white pop colour, good flavour/aroma; grains suitable for semolina and crunchy snacks
SMJ-1 (Sakkari Mukkari Jola-1)	UAS, Bijapur	S.O. 1379(E) 27.03.2018	Zone 3	7-8	25-30	120-125	<i>Rabi</i> variety, suitable for hurda, good quality, sweet and very soft, high Fe, Zn and polyphenols content
GS-23 (Kanaka)	UAS, Raichur	S.O. 3482(E) 7.10.2020	Zone 2 & 3	11-13	-	105-112	<i>Rabi</i> variety, white grains, resistant to rust and tolerant to charcoal rot
TRJP1-5 (SPV-2538)	UAS, Raichur	S.O. 1056(E) 6.3.2023	Zone 2 & 3	20-26	80-90	110-115	<i>Rabi</i> variety, moderately tolerant to important pests and diseases

Table 4. Popular and recently released cultivars for Madhya Pradesh

Name of cultivar	Name of AICRP Centre	Notification No. & Date of release	Area of adaptation	Grain yield (q/ha)	Fodder yield (q/ha)	Duration (days)	Salient features
RVJ 1862	RVSKVV, Indore	S.O. 3540(E) 22.11.2016	All areas	40-42	118-120	110-112	<i>Kharif</i> dual purpose variety
RVJ 2357 (SPV 2357)	RVSKVV, Indore	S.O.4222(E) 25.09.2023	All areas	35-43	140	105-108	<i>Kharif</i> dual purpose variety

Table 5. Popular and recently released cultivars for Gujarat

Name of cultivar	Name of AICRP Centre	Notification No. & Date of release	Area of adaptation	Grain yield (q/ha)	Fodder yield (q/ha)	Duration (days)	Salient features
GJ 42 (SR-666-1)	NAU, Surat	S.O. 3540(E) 22.11.2016	South Gujarat	30-31	100-102	110-115	Mid-late variety suitable for heavy rainfall area, round and pearl white grain
GJ 43 (DS 127)	SDAU, Deesa	S.O. 1498(E) 01.4.2019	North Gujarat	27-28	140-144	110-120	Dual purpose variety with pearly white grains
GNJ 1	NAU, Surat	S.O. 1379(E) 27.03.2018	South Gujarat	30-36	115-125	110-120	High-yielding variety, grain mould resistant with less incidence of stem borer
GJ 44 (Madhu)	NAU, Surat	S.O. 8(E) 24.12.2021	South Gujarat	28	118	103-112	<i>Kharif</i> variety with moderate resistance to shoot fly, stem borer and grain molds
GDJ 01 (Banas Surya)	SDAU, Deesa	S.O. 4065(E) 31.08.2022	North Gujarat	26	229	100-105	<i>Kharif</i> variety, moderately resistant to important diseases
GJ 101 (Madhu Moti)	NAU, Surat	S.O. 4065(E) 31.08.2022	South Gujarat	25-27	70-75	117-121	<i>Rabi</i> variety, moderately resistant to important pests

Table 6. Popular and recently released cultivars for Rajasthan

Name of cultivar	Name of AICRP Centre	Notification No. & Date of release	Area of adaptation	Grain yield (q/ha)	Fodder yield (q/ha)	Duration (days)	Salient features
Pratap Jowar 1430	MPUAT, Udaipur	S.O. 161(E) 04.02.2004	All areas	35-40	110-115	110-115	Resistant to major insect pests
Pratap Raj Jowar 1	MPUAT, Udaipur	-	All areas	30-35	185-195	110-115	Dual purpose variety, resistant to major insect pests

Table 7. Popular and recently released cultivars for Tamil Nadu

Name of cultivar	Name of AICRP Centre	Notification No. & Date of release	Area of adaptation	Grain yield (q/ha)	Fodder yield (q/ha)	Duration (days)	Salient features
CO 30	TNAU, Coimbatore	S.O. 1708(E) 26.7.2012	All areas	28-33	-	100-105	Dual purpose variety with creamy white grains, moderately resistant to shoot fly & stem borer, resistant to downy mildew
K12	TNAU, Kovilpatti	S.O. 1379(E) 27.03.2018	Southern zone	31	72	95	Dual purpose variety
CO 32 (SPV 2369)	TNAU, Coimbatore	S.O. 3482(E) 7.10.2020	All areas	24-29	65-117	105-110	Dual purpose variety, high grain protein content, good stover quality with protein & IVDMD, moderately resistant to shoot fly, stem borer, downy mildew & grain mould

Table 8. Popular and recently released cultivars for Andhra Pradesh and Telangana

Name of cultivar	Name of AICRP Centre	Notification No. & Date of release	Area of adaptation	Grain yield (q/ha)	Fodder yield (q/ha)	Duration (days)	Salient features
PSV 56 (Srisaila)	PJTSAU, Palem	2013	Southern regions	40-42	75-80	110-115	Dual purpose variety with tolerance to grain mold
Palem Pacha Jonna 1 (PYPS 2)	PJTSAU, Palem	S.O. 3482(E) 7.10.2020	All areas	20 -23	50-55	95-105	Yellow pericarp variety
Palem Jonna 1 (PSV 512)	PJTSAU, Palem	S.O. 8(E) 24.12.2021	<i>Kharif</i> areas	27-30	115-120	100-104	<i>Kharif</i> dual purpose variety with moderate resistance

Table 8 (Concluded)

Name of cultivar	Name of AICRP Centre	Notification No. & Date of release	Area of adaptation	Grain yield (q/ha)	Fodder yield (q/ha)	Duration (days)	Salient features
Tandur Jonna 1 (SVT-68)	PJTSAU, Tandur	S.O. 8(E) 24.12.2021	Rabi areas	28-30	70-80	115-120	Rabi dual purpose variety
NTJ-4	ANGRAU, Nandyal	S.O. 72(E) 01.01.2008	All areas	30-35	-	105-110	Tolerant to shoot fly and charcoal rot
NTJ-5 (NJ 2647)	ANGRAU, Nandyal	S.O. 3220 (E) 05.09.2019	All areas	45-56	70-80	95-100	Non-lodging, semi dwarf & suitable for <i>maghi</i> & <i>Rabi</i>
Nandyala Pacha Jonna 15 (NJ 2446)	ANGRAU, Nandyal	S.O. 3220 (E) 05.9.2019	All areas	30-35	75-90	115-120	Yellow pericarp variety, suitable for <i>Maghi</i> & <i>Rabi</i>

SUMMARY

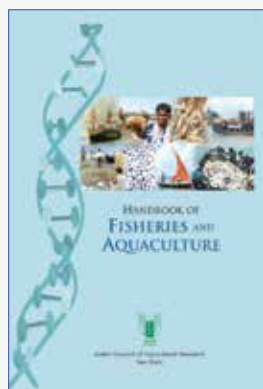
Area under sorghum in India has declined over the years by more than 70% after green revolution. However, the grain production could be sustained initially due to enhanced yield levels resulting from development of high-yielding cultivars. A number of high-yielding grain sorghum cultivars were released at national level as well as at different sorghum growing

states with regional adaptability for enhancing the productivity at the farmers' fields. The farmers have a wide choice of hybrids, mostly released at national level, and varieties with both high grain and fodder yield to enhance the profitability out of sorghum farming in the dryland production systems. With a number of cultivars developed by the respective State Agricultural Universities, the local

availability of quality seeds of these cultivars should not be a limitation to the farmers in adopting latest varietal technology to enhance their income. The renewed interest in millets and availability of latest high yielding cultivars will help in stabilizing the production of grain sorghum in the country.

*Corresponding author e-mail:
hari@millets.res.in

HANDBOOK OF FISHERIES AND AQUACULTURE



Fisheries is a sunrise sector with varied resources and potentials. The sector engages 14 million people at the primary level and is earning over ₹10,000 crore annually through exports. Fish consumption has shown a continuous increasing trend assuming greater importance in the context of 'Health Foods'. It is expected that the fish requirement by 2025 would be of the order of 16 million tonnes, of which at least 12 million tonnes would need to come from the inland sector and aquaculture is expected to provide over 10 million tonnes. The domestic market for fish and fishery products is also growing rapidly and necessary models and quality control protocols in this regard need to be developed.

In 2006, the Indian Council of Agricultural Research, brought out the First Edition of 'Handbook of Fisheries and Aquaculture'. The present revised edition comprises 42 updated and six new chapters, viz. Fish physiology; Aquaculture engineering, Fisheries development in India; Fisheries cooperatives; Demand and supply of fish; and Climate change – impact and mitigation. The Handbook would be of great value to students, researchers, planners, farmers, young entrepreneurs and all stakeholders in fisheries and aquaculture.

TECHNICAL SPECIFICATIONS

Size : Royal Octavo (16 cm × 24 cm) • No. of pages : i-x + 1116 • Price : ₹ 1500 • Postage : ₹ 100
ISBN No. : 978-81-7164-106-2

For obtaining copies:

Business Unit

Directorate of Knowledge Management in Agriculture
Indian Council of Agricultural Research
Krishi Anusandhan Bhavan-I,
Pusa, New Delhi 110 012
Tel : 011-25843657, Fax 09-11-25841282;
E-mail : bmicar@icar.org.in

SCAN QR Code to
Purchase Online

