Crop Production

For improved Agronomical practices total forty technologies has been developed and recommended for the sorghum growing farmers in the area of fertilizers, time and spacing of sowing, weed control, inter cropping, crop sequencing etc. as below

45	**Effect of nitrogen scheduling and cultivars on kharif grain sorghum (21st CJA 2025)**	**2025**
	Farmers of south Gujarat growing *kharif* sorghum crop are recommended to apply 80 kg/ha N in three splits *viz*.; 25% N as basal + 50% N at 30 DAS + 25% N at boot leaf stage (at 55-65 DAS) for achieving higher and profitable returns.	
44	**Effect of different age of seedling for transplanting of kharif grain sorghum (21st CJA 2025)**	**2025**
	The farmers of south Gujarat growing sorghum crop are recommended to grow sorghum with direct sowing by drilling at onset of monsoon but, in case of delayed onset of monsoon, nursery sowing during mid of June and transplanting in 1st week of July (21 days age of seedling) gives good production and net returns.	
43	**Integrated nitrogen management in *kharif* grain sorghum**	**2023**
	The farmers of South Gujarat growing Kharif sorghum are recommended to apply 20 kg N/ha through Neem cake (803 kg/ha) + 20 kg N/ha through Castor cake (463 kg/ha) well mixed with soil during land preparation along with recommended basal application of phosphorus (40 kg P_2O_5/ha) and top dressing of 40 kg N/ha through urea at 30 DAS to achieve higher yield and net return.	
42	**Studies on intercropping of grain legumes in sorghum**	**2022**
	The farmers of South Gujarat growing sorghum during kharif season are recommended to sow the sorghum + black gram in 2:1 proportion at 30 cm apart with plant to plant spacing of 15 cm for sorghum and 10 cm for black gram to achieve higher yield and net return on system basis as well as efficient use of land.	
41	**Weed management in *kharif* grain sorghum [Only scientific community]**	**2020**
	Application of atrazine 1.5 kg/ha as a pre-emergence fb one hand weeding at 40 DAS was found effective for weed control in kharif sorghum. Residue analysis of the herbicide was carried out and found below detectable level.	
40	**Weed management in *kharif* grain sorghum**	**2020**

	The farmers of South Gujarat Agro-climatic Zone growing kharif sorghum are recommended to carry out two hand weeding at 25 and 50 DAS and one inter culturing at 50 DAS for effective weed control and achieving higher yield and net return.	
39	**Refinement of sowing dates for *kharif* grain sorghum varieties/ promising lines under changing climate of South Gujarat**	**2016**
	The farmers of South Gujarat Agro-climatic Zone II (AES-II) growing *kharif* sorghum are advised to sow sorghum during onset of monsoon or within 15 days after onset of monsoon for getting higher grain yield, stover yield as well as net profit and to escape from shoot fly and stem borer attack. Late sowing of sorghum significantly reduces the grain yield, stover yield and net return.	
38	**Integrated weed management in *kharif* sorghum**	**2013**
	The farmers of south Gujarat agroclimatic zone-II growing kharif sorghum GJ-38 are advised to apply 0.75 kg/ha atrazine as pre emergence herbicide + one hand weeding at 50 DAS for getting higher yield and net profit.	
37	**Response of single cut fodder sorghum genotypes to different levels of NPK**	**2012**
	The farmers of south Gujarat agroclimatic zone-II growing kharif fodder sorghum are advised to grow genotype CSV-21F with the application of 120:60:00 kg NPK/ha (50%N and whole P as basal, while remaining 50% N as top dressing at 30 DAS) for higher fodder yield and net profit.	
36	**Response of forage sorghum to different seed rate and nitrogen levels for higher production**	**2004**
	The farmers of North Saurashtra agro climatic zone VI growing forage sorghum as a green fodder crop during *Kharif* season are advised to keep the seed rate of 50 kg/ha and the crop should be fertilized with 120 kg N/ha (60 kg as a basal dose and 60 kg as a top dressing at 30 days after sowing). Phosphorus @ 40 kg/ha should be applied as common dose.	
35	**Nitrogen and phosphorus requirement of sorghum varieties GJ 39 and GFS 4**	**2002**
	Farmers of North Saurashtra Agro climatic Zone-VI who are growing sorghum as a green fodder crop are advised to grow *Kharif* sorghum var. GJ 39 and fertilize it with 40 kg N/ha for getting maximum green fodder yield and return. Phosphorus application is not found beneficial.	
34	**Varietal response to fertilizer on fodder sorghum**	**2000**
	The farmers of North Gujarat (Agro climatic Zone-IV) growing fodder sorghum variety GFS-5 are advised to fertilize the crop with nitrogen and	

	phosphorus @ 80 kg and 20 kg/ha, respectively. Of the total fertilizer, 50 per cent of nitrogen and entire quantity of phosphorus should be applied as basal and remaining 50 per cent of nitrogen as top dressing at 30 days after sowing.	
33	**Response of sorghum (GJ 41) to various levels of fertilizer**	**2000**
	The farmers of North Gujarat (Agroclimatic Zone-IV) growing fodder sorghum var.GJ-41 are advised to fertilize the crop with nitrogen and phosphorus @ 80 kg and 40 kg/ha, respectively. Of the total fertilizer, 50 per cent of nitrogen and entire quantity of phosphorus should be applied as basal and remaining 50 per cent nitrogen as top dressing at 30 days after sowing.	
32	**Fertilizer management in sorghum based cropping system**	**1999**
	The farmers of South Gujarat zone (AES-II) adopting *kharif* sorghum (GJ 38) – cotton (Hy. 6) rotation are advised to apply 50% of recommended dose of fertilizer for sorghum (80:40) and 100% of recommended dose of fertilizer (320:00) to cotton.	
31	**Bio fertilizer of Sorghum Grain**	**1998**
	Farmers of South Gujarat Zone AES II are advised to coat sorghum seeds with PSM strain PBA 16 (Bacillus coagulans) having 108 CFU/ gram carrier @ 30 g culture/kg seeds (ICBR 1:382) before seeding to save 40 kg P_2O_5 /ha and to get higher grain and stover yield.	
30	**Zn and Fe requirement of sorghum**	**1998**
	Farmers of the AES-I of North Gujarat Ago-climatic Zone growing sorghum CV. GJ – 39 on Fe and Zn deficient light textured soils are advised to apply 3 sprays of $FeSO_4$ @ 0.5 per cent after 30 DAS at 10 days interval for getting higher grain yield (75 per cent). Spraying of $ZnSO_4$ @ 0.5 per cent also increased the yield by 44 per cent.	
29	**Fertilizer requirement of sorghum variety GJ 40**	**1997**
	The farmers of South Gujarat zone are advised to fertilize their sorghum crop (GJ 40) with 120 kg N and 40 kg P_2O_5 /ha to get about 25% more income than from the existing recommendation.	
28	**Fertilizer management in sorghum**	**1997**
	The sorghum (CSH – 5) growing farmers of AES-VI of North Saurashtra are advised to fertilize their crop with 60 kg N/ha (50% basal + 25% 30 DAS + 25% 45 DAS) to realize an ICBR of 1:10. Application of P was not found beneficial.	
27	**Seed rate and fertilizer requirement of sorghum**	**1997**
	The farmers of North Gujarat Zone growing sorghum variety GJ – 39 for fodder purpose should use a seed rate of 50 kg/ha (CBR – 1:4.4) and	

	fertilizer with N and P @ 80:40 kg/ha (CBR-1:3.30).	
26	**Seed rate and spacing for sorghum GJ 37**	**1997**
	The farmers of North Saurashtra are advised to sow sorghum variety GJ – 37 with a seed rate of 40 kg/ha and inter row spacing of 30 cm.	
25	**Time of sowing for sorghum**	**1997**
	In North Gujarat agro climatic conditions, sorghum variety GJ – 39 should be sown at the onset of monsoon.	
24	**Seeding technique in *rabi* sorghum / sowing depth in *rabi* sorghum**	**1996**
	The farmers of South Gujarat agro climatic Zone (AES V) growing *rabi* sorghum should sow the seed in the moist zone.	
23	**Crop geometry in sorghum**	**1996**
	The farmers of South Gujarat Agroclimatic Zone (AES-V) are advised to grow *rabi* sorghum GJ 36 keeping 60 cm distance between rows and 10-12 cm distance between two plants.	
22	**Fertilizer management in *Rabi* sorghum**	**1996**
	The farmers of South Gujarat Agroclimatic Zone (AES-V) are advised to grow *rabi* sorghum GJ 36 by fertilizing the crop with 80 kg N/ha. Though, application of P_2O_5 @ 20 kg/ha increased the yield, it was not economical.	
21	**Nitrogen and phosphorus for sorghum**	**1994**
	The farmers of North Gujarat (AES IV) growing sorghum (GJ 39) are advised to fertilize the crop with 120 kg N/ha (NICBR 1:19) and 40 kg P_2O_5 /ha(NICBR 1:4.5). Half of the nitrogen dose and all of the P dose are to be given as basal and 50% of the nitrogen to be topdressed 30 days after sowing.	
20	**Nitrogen and phosphorus for sorghum**	**1994**
	The farmers of South Gujarat (zone-II) are advised to grow sorghum GJ – 38 by fertilizing the crop by 160 kg N/ha (ICBR 1:13.4) and 60 kg P_2O_5 /ha (NICBR 1:5.3). Half of the nitrogen dose and all of the P dose are to be applied as basal and remaining half of nitrogen is to be top dressed 30 days after sowing.	
19	**Time of sowing for sorghum**	**1994**
	The farmers of South Gujarat (zone-II) are advised to sow GJ-36 between 20th July and 5th August and GJ – 39 in the first week of July for getting maximum yield.	
18	**Spacing requirement of sorghum**	**1994**
	The farmers of South Gujarat Agro climatic Zone II growing sorghum GSH-1, GJ-35-15-15 and GJ – 38 are advised to drill the crop at a distance of 45 x 12 or 60 x 9 cm for getting maximum yield. (The distance between plant to	

	plant in a row is to be adjusted at the time of thinning)	
17	**Bio fertilizer in sorghum**	**1993**
	For obtaining higher sorghum grain and fodder yield, seed inoculation either with Azospirillum ASA 1 (ICBR 1:10.0) or Azotobactor ABA 1 (ICBR 1:9.46) each having 108 viable cell/g (200 g culture/10 kg seeds) alongwith the recommended dose of 40 kg N/ha is recommended for marginal farmers of South Gujarat.	
16	**Weed management in sorghum for North Gujarat**	**1993**
	The farmers of North Gujarat (zone IV) advised to control the weed by application of Atrazine (Pre-emergence) @ 1.5 kg/ha with one hand weeding and one interculturing for highest economical return in sorghum.	
15	**Weed management in Sorghum**	**1993**
	The farmers of South Gujarat Agro climatic (Zone I,II) are advised to follow weed management involving application of Atrazine as pre emergence @ 1.5 kg/ha in 600 lit. of water for getting higher economic return (C BR – 1 : 12)	
14	**Fertilizer management in Sorghum – Isabgul**	**1993**
	The farmers of North Gujarat Zone are advised to grow the crop of sorghum with 100% recommended dose (*i.e.* 80-40-00 NPK kg/ha) in *kharif* and the succeeding Isabgul crop should be fertilized with the 50% recommended dose (*i.e.* 25-50-00 NPK kg/ha) to get maximum economic return.	
13	**Seed rate and N requirement for fodder sorghum**	**1993**
	The farmers of Dhari area of South Saurashtra zone growing sorghum variety GFS 4 are advised to plant the crop with the seed rate of 80 kg/ha and apply nitrogen @ 40 kg/ha to get economic return of green fodder yield. Of the total fertilizer, 50% nitrogen should be applied as basal dressing and remaining 50% of nitrogen should be given as top dressing 25 days after sowing.	
12	**Fertilizer Requirement of Fodder Sorghum GFS – 4**	**1992**
	The farmers of South Gujarat (Agroclimatic zone-I and II) growing sorghum fodder variety GFS- 4 are advised to fertilizer the crop with 80 kg N/ha for getting higher economic return. Of the total 80 kg nitrogen, 40 kg N/ha should be applied as basal dose, 20 kg N/ha after 1st cut immediately and remaining 20 kg N/ha at 15 days after 1st cut.	
11	**Seed Rate and Fertilizer Dose for Fodder Sorghum GFS – 4**	**1992**
	The farmers of South Gujarat agro climatic zone (I & II) growing sorghum variety GFS – 4 are advised to sow the crop with seed rate of 80 kg/ha and apply nitrogen and phosphorus @ 80 kg and 40 kg/ha, respectively. Of the total fertilizer, 50% nitrogen and whole quantity of P_2O_5 should be applied as	

	basal dose and remaining 50% of nitrogen should be given as topdressing 30 days after sowing. Marginal farmers should adopt 60 kg seed rate and 40 kg N and 40 kg P_2O_5 /ha with similar method of application as above.	
10	**Seed Rate and Fertilizer Requirement of Fodder Sorghum**	**1992**
	The farmers of North Gujarat growing variety GFS-4, are advised to sow the crop with the seed rate of 80 kg/ha and fertilize it with the application of 40 kg N/ha and 60 kg P_2O_5 /ha to get economic return of green fodder yield. Of the total fertilizer, 50% nitrogen and whole quantity of P_2O_5 should be applied as basal dressing and remaining 50% of nitrogen should be given as top dressing 30 days after sowing.	
9	**N and P requirement of Sorghum GJ – 35 and GSH – 1**	**1992**
	The farmers of North Gujarat region growing sorghum varieties GSH-1 and GJ- 35 are advised to fertilize the crop with nitrogen and phosphorus @ 120 kg and 40 kg/ha, respectively. Of the total fertilizer, 50% nitrogen and whole quantity of P_2O_5 should be applied as basal dressing and remaining 50% of nitrogen should be given as top dressing 30 days after sowing. For marginal farmers, it should be apply 80 kg N and 40 kg P_2O_5 per hectare with similar method of application as above.	
8	**Fertilizer Management in Sorghum GJ – 37**	**1992**
	The farmers of North Gujarat zone are advised to apply 80 kg N/ha (ICBR 1:10.9) and 40 kg P_2O_5 /ha (ICBR 1:2.84) to sorghum variety GJ-37 to get economic return of grain and stover yield.	
7	**Seed rate and spacing for sorghum GJ 37**	**1992**
	The farmers of North Gujarat growing sorghum variety GJ 37 for dual purpose are advised to sow at a distance of 30 cm between rows using 20 kg seed rate per hectare.	
6	**Time of sowing for SORGHUM var. GJ 36**	**1991**
	The farmers of South Gujarat Agro-climatic zone-II are advised to sow var. GJ 36 of Sorghum up to 20th August. Later sowing resulted in reduction in yield.	
5	**Fertilizer management in Forage Sorghum**	**1989**
	Farmers of North Saurashtra zone are advised to fertilize their forage sorghum crop (Gundri or SSG-59-3) with 60 kg N (additional net return of Rs. 1660 /ha) and 20 kg P2O5 /ha (additional net return of Rs.300/ha). The marginal farmers may apply 20 kg N (additional net return of Rs. 810 /ha) and 10 kg P2O5 (additional net return of Rs. 145/ha).	

4	**Date of sowing for Sorghum + Tur intercropping**	**1989**
	Farmers of South Gujarat growing sorghum – CSH 6 with pigeon pea in the ratio of 2 (Sorghum): 1 (pigeon pea) rows are advised to carryout sowing with the onset of monsoon. They are also advised to take recommended plant protection measures for the control of stem borer.	
3	**Fertilizer Management for grain sorghum**	**1989**
	• Farmers of South Gujarat growing sorghum GJ-36 and GJ-39 are advised to fertilize the crop at the rate of 80 kg N/ha and 40 kg P_2O_5 /ha. • Of the total fertilizer, 50 per cent N + whole quantity of P_2O_5 should be applied at the time of sowing and remaining 50 per cent of N should be given as top dress, one month after sowing. • The farmers who cannot afford to apply this quantity of fertilizers are advised to apply 40 kg N/ha and 40 kg P_2O_5 /ha. The method application of fertilizers will remain the same.	
2	**Transplanting of sorghum**	**1989**
	In the heavy rainfall areas of South Gujarat, when the field conditions do not permit direct sowing, the farmers can transplant the crop. The transplanting should be in the first week of August with 24 days old seedlings.	
1	**Sowing time x fertility level interaction in sorghum variety GJ 35**	**1986**
	In South Gujarat, sorghum variety GJ 35 for grain purpose should be sown during the first fortnight of August with the basal dose of 80 kg N and 40 kg P_2O_5 per ha.	