MAHATMA PHULE KRISHI VIDYAPEETH, RAHURI

All India Coordinated Research Project on Sorghum

1.	**Name & complete address of Research Centre**	All India Co ordinated Sorghum Improvement Project, Mahatma Phule Krishi vidyapeeth, Rahuri - 413 722
2.	**Year of establishment**	01-04-1973
3.	**Major objectives/ Mandate for establishment of Research Centre**	1. Develop superior varieties and hybrid combining high yield and acceptable quality of grain and fodder under adaptability and resistance to biotic and abiotic stresses. 2. To evolve appropriate crop management practices under receding soil moisture. 3. To develop superior *rabi* sorghum varieties for mechanical harvesting. 4. Conducting investigations on key/potential pests of rabi sorghum and identifying elite sources of resistance to develop suitable integrated plant protection strategies for increasing stability of production. 5. Develop processing technology for popping, hurda and papad. 6. Nucleus seed production and facilitating further seed increase. 7. Promoting improved production technologies and coverage under HYV's.
4.	**Historical background**	All India Coordinated Sorghum Improvement Project has been established in 1973 at M.P.K.V.,Rahuri located in the scarcity zone of Maharashtra. The variety M-35-1 is age old and ruling variety of rabi sorghum identified at Agril. Research station, Mohol dist. Solapur since 1938. The stability in *rabi* sorghum production demands different strategies based on soil variations in depth, structure and moisture status leading to variable yield potential of the same genotypes. There is 60-80% reduction in yield when same varieties are grown in shallow soil as compared to their yield in deep or medium soil. Therefore, maturity oriented approach i.e. genotype maturing in 120-125 days for deep soil, 110-115 days for medium soil and 100-105 days for shallow soil was conceived and implemented to bred a genotypes according to soil depth. Keeping all these facts in mind a systematic breeding programme was undertaken to develop a suitable genotype by crossing the donors available from local biodiversity. The

QRT of 1985-1987 stressed for research on *rabi* sorghum & a decision in Annual Group Meeting AICSIP, 1992 on this issue that is MPKV, Rahuri should concentrate mainly on *rabi* sorghum research only.

Accordingly this centre had been pursuing on active *rabi* sorghum breeding programme. In turn it had succeed in releasing the eleven *rabi* sorghum varities at state level (Swati, Sel-3, Phule Yashoda, Phule Maulee, Phule Chitra, Phule Vasudha, Phule Anuradha, Phule Revati, Phule Suchitra, Phule Purva and Phule Yashomati), four special purpose *rabi* sorghum varieties for hurda, popping and papad purpose (Phule Uttara, Phule Panchami, Phule Rohini and Phule Madhur). In addition to these, this centre has released two rabi sorghum varieties (CSV 216 & CSV 22), and two collaborative rabi sorghum hybrid (CSH 15 R and CSH 19R). This center has worked on sweet sorghum since 1984.In turn it had succeed in releasing two sweet sorghum varieties at National level (SSV 84 and CSV 19 SS), Two sweet sorghum hybrids viz. CSH 22 SS (Collaborative hybrid at national level) and Phule Vasundhara (RSSH 50) at State level has been recommended. In addition to this one forage sorghum variety Phule Amruta at state level and CSV 30F (Phule Godhan) at National level has been recommended for single cut forage purpose during *Kharif* season.

5. Details of the sanctioned posts :

a) ICAR Scheme – AICRP on Sorghum

Sr. No.	Sanction post	Filled	Vacant
1	I/c Sr. Sorghum Breeder	1	0
2	Sorghum Agronomist	0	1
3	Sorghum Entomologist	1	0
4	Sr. Cereal Food Tech.	0	1
5	Agricultural Assistant	4	0

6. **Significant/ innovative activities and programs implemented by the Research Centre**

1. DUS Testing of Sorghum.
2. Development of high yielding & nutritive rabi sorghum varieties suitable for mechanical harvesting.
3. Harnessing opportunities enhancement production of rabi sorghum (HOPE).
4. Revolving Fund of Sorghum
5. Identification of quantitative trait loci for drought related traits in post-rainy Sorghum.

7. Major improved/ hybrid varieties, agriculture technologies developed at Research Centre

SL	Name of Variety /Hybrid	Year of Release	Yield Potential		Recommended for
			Grain yield (q/ha)	Fodder yield (t/ha)	
I	**Grain & Dry Fodder purpose**				
1	M-35-1	1938	15-18	5.0-6.0	Medium Soil
2	Swati	1984	24-28	5.0-6.0	Medium - Deep Soil
3	Selection -3	1994	5-6	1.5-1.8	Shallow Soil
4	Phule Yashoda	1998	25-30	7.0-7.8	Deep Soil
5	Phule Maulee	1999	15-18	4.5-5.0	Shallow-Medium Soil
6	CSV216	2000	25-30	7.0-8.0	Deep soil
7	Phule Chitra	2006	20--25	5.5-6.0	Medium Soil
8	Phule Vasudha	2007	25-28	5.5-6.0	Deep Soil
9	CSV 22	2007	24-28	6.5-7.0	Deep Soil
10	Phule Anuradha	2008	8-10	3.0-3.5	Shallow Soil
11	Phule Revati	2010	40-45	9.0-11	Deep Soil -Irrigated
12	Phule Suchitra	2012	24-28	6.5-7.0	Medium Soil
13	Phule Yashomati	2021	9-10	4.0-4.5	Shallow Soil
14	Phule Purva	2022	22-25	7.0-7.5	Deep Soil - Non lodging
II	**Fodder /Ethanol Purpose**				
1	SSV 84	1990	10-12	30-35	Medium to Deep Soil
2	CSV 19 SS	2004	8-10	35-40	Medium to Deep Soil
3	CSH-22SS	2005	15-17	40-45	Medium to Deep Soil
4	CSV 30 F	2013	15-20	50-60	Medium to Deep Soil
5	P. Vasundhara	2015	8-10	50-55	Medium to Deep Soil
6	Phule Amruta	2003	8-10	50-60	Medium to Deep Soil
7	CSH 47(Hy)	2021	-	65-70	Medium to Deep Soil
III	**Alternate use Purpose**				
1	Phule Uttara	2005	10-12	5.0-5.5	Hurda Purpose
2	Phule Panchami	2010	12-14	4.0-4.5	Popping Purpose
3	Phule Rohini	2015	18-20	4.5-5.0	Papad Purpose
4	Phule Madhur	2015	30-35	6.5-7.0	Hurda Purpose

8. Major agricultural technological recommendations released by Research Center

- The four genetic stocks viz, RSV 1098 (drought tolerant), RSSV 167 (High biomass), RPASV 3 (papad) and RSSGV 46 (hurda) lines are registered with NBPGR, New Delhi.
- "Phule Root Box structure" is recommended for root studies in rabi sorghum.
- Rabi sorghum genotype RSV 1098 is recommended for drought tolerance.
- Sweet sorghum genotype RSSV 313 is recommended as a donor parent for stay green rating , juice brix and high biomass.

- To obtain higher grain, fodder yield and monetary returns with water saving and efficient use of water, the sowing of rabi sorghum variety Phule Revati at 45 x 15 cm with 90 cm drip lateral spacing combined with irrigation at 90 % of crop evapotrispiration alternate day is recommended for Western Maharashtra.
- Rabi sorghum line RSV 1188 and RSV 1959 is recommended as a shootfly resistant source.
- Regression equation showing interrelationship between shoot fly incidence on sorghum and weather parameters is recommended for scarcity zone of Maharashtra.

SSF Incidence = 118.62+1.34 x Tmax +2.10 x T min-1.77 x RH-1-0.04 x RH-II+ 0.36 x RF

Where,

SSF= Sorghum shootfly population (in equation)

T max= Max. Temp. (Oc)

T min= Min. Temp. (Oc)

RH-I= Relative Humidity %(Morning)

RH-II=Relative Humidity %(Evening)

RF= Rainfall (mm)

The resulting –ve value in equation will indicates absence of shoot fly incidence and +ve value indicates possibility of occurrence of incidence.

- Green cane yield of sweet sorghum varieties and hybrids should be harvested at physiological maturity. At harvest TSS will be around 18-20 %. The harvesting of cane should be done after stripping the leaves, sheath and panicle.
- In kharif season harvesting of sweet sorghum green cane at 45 days after 50% flowering is recommended for obtaining maximum juice, sugar content and ethanol.
- Seed treatment to sorghum seeds with MPKV consortium (Azotobacter, phosphate solubilizing and potash mobilizing bacteria) @ 25 g / kg seed and application of 75 % recommended dose of N, P and K chemical fertilizers is recommended for higher grain yield and saving 25% of recommended dose of chemical fertilizers.
- To prepare good quality nutritional sorghum starch kurdai from 100 g sorghum starch, 2 g salt and 200-300 ml water with boiling up to gel formation is recommended.

9.	**Future road map of the research**	Development of high yielding & nutritive rabi sorghum varieties suitable for mechanical harvesting
10.	**Measures required for improvement/ strengthening of the**	1. The contingency grant for strengthening research farm *viz.*, farm tractor, and its implements, irrigation facility, rat proof godown, training hall for farmers and office building.

Research Center	2. Special grants for the publication of international papers will be given as cost of publication is too high. 3. Additional grants for maintenance breeding and quality breeder's seed production.

11. Photographs (jpeg) of historical and innovative activities of the Research Center-

High Biomass sweet Sorghum hybrid CSH-47 for ethanol purpose is dedicated to nation by Hon'ble Prime Minister on 28th September 2021.

Maharashtra Government awarded "Best Farmer Award" to Shri. Sahebrao Chikane Dist-Satara on occasion of Krishi Din 1st July 2021 for highest productivity of Sorghum variety Phule Revati @ 101 q ha-1.

The best performing rabi center award to Sorghum Improvement Project, MPKV, Rahuri for the year 2010-11 during 41st AGM held at UAS Dharwad from 15-17 April 2011 felicitated by Dr. Swapan Kumar Datta, DDG, Crop Science, ICAR, New Delhi.

"Outstanding partnership World Award-Asia 2014" in recognition of significant partnership achievements under Hope Project in South Asia on 12th December,2014 at ICRISAT, Hyderabad felicitated by Dr. William D. Dar, Director General, ICRISAT to Dr. R. S. Patil, Director of Research (Repetitive of MPKV, Rahuri) and Dr. S. R. Gadakh, Senior Sorghum Breeder, MPKV., Rahuri.