ACHIEVEMENTS

A. Crop Improvement:

Rice varieties / hybrids released for farmers of Gujarat

Name of Variety	Year of release	Parents	Maturity days	Yield (kg/ha)
Transplanted Rice:				
NAUR-1	2008	GR-4 x Pusa 2-48-24	120-125	6000-6500
GNR-2	2009	GR-103 x Pokkali	125-130	4500-5500
GNR-3	2012	GR-4 x IR-28	115-120	5500-6500
GNR-4	2013	NAUR-1 x Lal kada	130-135	4000-5000
GNR-5	2015	Jaya x GR-6	125-130	5500-6000
GNR-6 (RFTP)	2015	IR 28 x NAUR 1	100-105	4000-4500
GNRH-1 (Hybrid)	2015	NVSR-MS1 x 12SP105	110-115	5000-5500
GNR-7	2016	GR-103 x GR-11	125-130	5500-6500
GR-15	2017	Bhura rata x NAUR-1	125-130	5500-6500
GRH-2 (Hybrid)	2017	NVSR-MS1A x 12KP10	120-125	6000-6500
GR-17 (Sardar)	2018	Gurjari x Jaya	110-115	5500-6000
GNR-8 (Aarti)	2019	IET-19347 x RP-4075-129-07-3	100-105	4000-5000
GR-18 (Devli Kolam)	2019	GAR-13 x JGL-3828	120-125	5000-5500
GR-19 (Auranga)	2019	Dandi x IET-15429.	125-120	5500-6000
Upland drilled:				
Name of Variety	**Year of release**	**Parents**	**Maturity days**	**Yield (kg/ha)**
PURNA	2014	Annada x RR 151-3	93-97	2500-3000
GR-16 (Tapi)	2018	GR-5 x Danteswari	100-105	3500-4000

RICE VARIETIES / HYBRIDS RELEASED BY NAVSARI AGRICULTURAL UNIVERSITY

NAME OF VARIETY	SALIENT FEATURES	
NAUR-1 (2008)	➢ Medium long slender grains with yield around 6000 kg/ha. Recommended for irrigated TP and aerobic cultivation under South Gujarat. The variety is moderately resistant against major diseases like BLB, Blast, Grain discoloration, sheath rot & insect pest like stem borer.	
GNR-2 (2009)	➢ Fine grain variety with yield around 5000 kg/ha. Recommended especially for salt affected areas as well as for normal irrigated transplanted areas of South Gujarat. The variety is resistance to BLB, False smut, stem borer and BPH and while moderately resistance reaction against grain discoloration and leaf folder.	
GNR-3 (2012)	➢ Coarse grain, medium duration variety with average yield of 6500 kg/ha which gave 19.4% yield advantage over Gurjari under irrigated TP condition and 29.3% yield advantage over GR-7 under rainfed TP condition . The culture is highly suitable for pohuva making (Beaten rice).	
GNR-4 (2013)	➢ Fine grain, red kernel bio fortified variety having high iron content (50 ppm) and dietary fibre (2.87 %) with yield potential of 4000 kg/ha. Recommended for irrigated transplanted areas of South Gujarat. ➢ It is resistance against BLB, False smut and moderately resistance against sheath rot, grain discoloration, stem borer, leaf folder and gundhy bug.	
PURNA (2014)	➢ Short bold grain variety especially suitable for rainfed drilled condition with average yield of 3000 kg/ha. It performs well with 22% grain yield advantage over GR 5 and 8.8 % over GR 9.	

GNR-5 (2015)	➢ Long slender grain variety with yield around 5500 kg/ha. It performed very well in whole Gujarat where it exhibited overall 13.1 % and 21.2 % grain yield superiority with easy threshability over the checks Dandi and NAUR-1, respectively. It is recommended for salt affected areas of Gujarat. ➢ The variety is moderately resistant against bacterial leaf blight, grain discoloration and sheath rot. Whereas, it showed tolerant to pest like BPH and moderate resistance against stem borer, leaf folder and sheath mite	
GNR-6 (2015)	➢ GNR-6 performed well in whole Gujarat where it exhibited overall 8.5 % grain yield superiority over the check IR-28. Recommended for rainfed transplanted condition with average yield of 5000 kg/ha. ➢ With respect to pest and diseases, it was found superior to checks.	
GNRH-1 (Hybrid) (2015)	➢ First public hybrid in Gujarat. Hybrid GNRH-1 performed very well in whole Gujarat under transplanted condition where it exhibited overall 10.1%, 11.9% and 17.1 % grain yield superiority over the checks *viz.*, GR 7, NAUR 1 and Suruchi 5629, respectively. ➢ With respect to disease, it is moderately resistant against bacterial leaf blight, and sheath rot. For pests, it was found to be tolerant to stem borer and sheath mite.	
GNR-7 (2016)	➢ The rice Variety GNR-7 (5740 kg/ha) performed very well in South Gujarat where it exhibited overall 13.0 %, 22.8% and 12.4 % grain yield superiority with easy threshability over the checks GNR-2, GR-11 and GAR-13, respectively. ➢ It has short slender grain, high productive tillers and number of grains per panicle with good quality characters. GNR-7 is moderately resistant against bacterial leaf blight, grain discoloration and sheath rot. It showed tolerant to pest like BPH and	

	moderate resistance against stem borer, leaf folder and sheath mite. ➢ Rice variety GNR-7 is recommended for normal rice growing areas of South Gujarat.	
GR-15 (2017)	➢ The biofortified rice variety GR-15 (5540 kg/ha) performed very well in Gujarat state and it exhibited overall 10.6 %, 19.9 % and 16.1 % grain yield superiority with easy threshability over the checks Dandi, NAUR-1 and GNR-3, respectively. ➢ It has long bold grain, long panicle, more productive tillers and more number of grains per panicle. It contains high zinc in grains (21.58 ppm) than check varieties along with other good quality characters. ➢ GR-15 is moderately resistant against bacterial leaf blight, grain discoloration and sheath rot. It is tolerant to brown plant hoppers and moderately resistant to stem borer, leaf folder and sheath mite. ➢ This variety recommended for transplanted rice growing areas of Gujarat.	
GRH-2 (Hybrid) (2017)	➢ Mid-late rice hybrid GRH-2 (6129 kg/ha) performed well in Gujarat state where it exhibited overall 7.1%, and 17.9% grain yield superiority over the best hybrid check US 312, and best variety GNR-3, respectively. ➢ Medium slender grain rice hybrid GRH-2 contains intermediate amylose and high head rice recovery. The GRH-2 is moderately resistant against bacterial leaf blight, leaf blast, grain discolouration and sheath rot. The proposed hybrid is tolerant to insect pest like BPH, WBPH, leaf folder and stem borer. ➢ Rice hybrid GRH-2 recommended for rice growing areas of Gujarat state as GRH-2.	
GR-16 (2018)	➢ Early maturing upland rice variety GR-16 recorded 2983 kg/ha mean grain yield in Gujarat. It exhibited overall 10.6 and 29.0 per cent grain yield superiority over the checks Purna and GR-5, respectively. ➢ Long bold variety GR-16 possesses good grain quality, intermediate amylose and high head rice	

	recovery. ➢ The proposed variety showed moderately resistant reaction against leaf blast. The proposed variety showed moderately resistant against insect pest like stem borer and sheath mite. ➢ The rice variety NVSR-2233 is recommended for upland rice growing areas of Gujarat as GR-16.	
GR-17 (2018)	➢ The average yield of early maturing rice variety GR-17 is 5566 kg/ha in Gujarat. It exhibited overall 15.4, 9.8 and 2.2 per cent grain yield superiority over the checks Jaya, Gurjari and GNR-3, respectively in addition to earliness by 8 days over GNR-3. ➢ Long bold grain rice culture GR-17 possesses good grain quality, intermediate amylose and high head rice recovery. ➢ The proposed variety is moderately resistant against bacterial leaf blight, leaf blast, grain discoloration and sheath rot. The proposed variety showed moderately resistant reaction against WBPH and leaf folder. ➢ Rice variety NVSR-2117 is recommended for transplanted rice growing areas of Gujarat as GR-17.	
GNR-8 (2019)	➢ The early maturing rice culture, GNR-8 (4700 kg/ha) performed very well in South Gujarat under aerobic condition and it exhibited overall 18.6 % and 13.9 % grain yield superiority with easy threshability over the checks NAUR-1 and GNR-3, respectively. ➢ It has long bold grain, more productive tillers and more number of grains per panicle. ➢ It contains good amount of amylose content (24.42%), protein content (6.52%) and high head rice recovery (64.2%). ➢ GNR-8 is moderately resistant against bacterial leaf blight, grain discoloration and sheath rot. It is tolerant to brown plant hoppers and moderately resistant to stem borer, leaf folder and sheath mite. ➢ This variety NVSR-396 (GNR-8) recommended for aerobic rice growing areas of Gujarat.	

GR-18 (2019)	➢ Early maturing, non lodging culture NVSR-2528 showed 29.06 % and 8.38 % grain yield superiority over checks GR-4 and Mahisagar, respectively. ➢ The culture NVSR 2528 performed very well in South Gujarat where it exhibited overall 35.6 per cent grain yield superiority over check GR 4. ➢ The proposed culture NVSR 2528 contains intermediate amylose (22.96%) and high head rice recovery (64 %). ➢ With respect to disease, the proposed strain is moderately resistant against bacterial leaf blight, leaf blast and grain discoloration. The proposed culture showed moderately tolerant reaction against stem borer and sheath mite. ➢ Rice variety NVSR-2528 (GR-18) recommended for transplanted rice growing areas of Gujarat.	
GR-19 (2019)	➢ The salt tolerant rice culture, GR-19 (5305 kg/ha) performed very well in Gujarat where it exhibited overall 16.0 % and 12.1 % grain yield superiority with easy threshability over the checks Dandi and GNR-5, respectively. ➢ It has long bold grain, long panicle, more productive tillers and more number of grains per panicle. It contains good quality characters. ➢ GR-19 is moderately resistant against bacterial leaf blight, grain discoloration and sheath rot. It showed tolerant to BPH and moderate resistance against stem borer, leaf folder and sheath mite. ➢ Rice variety NVSR-6150 (GR-19) recommended for transplanted rice growing salt affected areas of Gujarat.	

➢ **Numbers of AICRIP trials were conducted at MRRC, Navsari centre are as follows.**

Trial indented and conducted	2011-12 (Allotted/ conducted)	2012-13 (Allotted/ conducted)	2013-14 (Allotted/ conducted)	2014-15 (Allotted/ conducted)	2015-16 (Allotted/ conducted)	2016-17 (Allotted/ conducted)	2017-18 (Allotted/ conducted)	2018-19 (Allotted/ conducted)	2018-19 (Allotted/ conducted)
Plant Breeding	12/12	12/10	14/14	16/16	20/20	26/26	30/30	37/36	14/14
Hybrid Rice	3/3	6/6	4/4	4/4	3/3	4/4	4/4	4/4	1/1
Agronomy	3/3	3/3	4/4	4/4	5/5	6/6	7/7	6/6	6/6
Plant pathology	5/5	7/7	8/6	8/8	9/9	11/11	12/12	10/10	13/13
Entomology	8/8	12/12	8/8	10/10	9/9	6/6	10/10	9/9	11/11
FLDs	-	-	-	5 ha	5 ha	10 ha	20 ha	30 ha	30 ha

Breeding material generated:

Particulars/ Breeding Objectives	No. of crosses made / year												
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Quality rice	37	45	41	46	47	63	45	60	135	80	62	55	64
Salt tolerance	5	5	5	5	54	40	40	45	30	5	4	23	22
RFTP ecosystem	6	45	-	-	40	72	-	24	5	15	20	8	24
Drilled ecosystem	-	40	6	21	16	53	58	60	40	20	27	60	36
Diseases resistance	-	-	7	21	54	15	12	18	40	14	20	18	43
Aerobic ecosystem	-	-	-	-	40	40	40	60	54	23	12	34	44

E. AICRP Nominations at National level:

Name of culture	Pedigree	Nominated Trial	IET Number	Year of nomination
NVSR-20	GR-4 x IET-1705	IVT-IME (TP)	IET-20115	*Kharif*-2006
NVSR-6029	GR-103 x Pokkali	NSASN	IET-21640	*Kharif*-2009
NVSR-6030	GR-103 x Pokkali	NSASN	IET-21641	*Kharif*-2009
NVSR-178	GR-4 x IR-28	IVT-IME (TP)	IET-22103	*Kharif*-2010
NVSR-304	NVSR-26 x Safed Kada	IVT-IME (TP)	IET-23307	*Kharif*-2012
NVSR-2031	IR-28 x NAUR-1	IVT-E (TP)	IET-23961	*Kharif*-2013
NVSR-2031	IR-28 x NAUR-1	IVT-VE (DS)	--	*Kharif*-2013
NVSR-303	NAUR-1 x Lal Kada	IVT-Biofort	IET-23815	*Kharif*-2013
NVSR-2058	Lal Kada x GR-103	IVT-E-DS	--	*Kharif*-2014
NVSR-2051	GR-12 x IET-20528	IVT-VE-TP	--	*Kharif*-2014
NVSR-2057	Lal Kada x GR-103	IVT-VE-TP	--	*Kharif*-2014
NVSR-6137	Jaya x GR-6	CSTVT	IET-25075	*Kharif*-2015
NVSR-6100	Dandi x GR-7	CSTVT	IET-25058	*Kharif*-2015
NVSR-6128	GR-103 x GR-11	CSTVT	IET-25093	*Kharif*-2015
NVSR-6127	GR-103 x GR-11	IVT-MS	IET-25500	*Kharif*-2015
NVSR-6121	Bhura-rata x NAUR-1	IVT-IM	IET-25336	*Kharif*-2015
NVSR-2086	IR-65912-90-1-6-3-2R x Gurjari	IVT-IM	IET-25341	*Kharif*-2015
NVSR-2091	IR-65912-90-1-6-3-2R x GR-3	IVT-E	IET-25599	*Kharif*-2015
NVSR-326	IET-19044 x GNR-3	IVT-IM	IET-26107	*Kharif*-2016
NVSR-328	IET-19384 X NVSR-171	IVT-IM	IET-26020	*Kharif*-2016
NVSR-338	IET-19384 x IET-19046	IVT-LATE	IET-25931	*Kharif*-2016
NVSR-2086	IR-28 x GR-3	IVT-E	IET-25341	*Kharif*-2016
NVSR-2090	IR-50 x GR-7	IVT-E	IET-26307	*Kharif*-2016
NVSR-2085	IR-65912-90-1-6-3-2R x Gurjari	IVT-E	IET-26290	*Kharif*-2016
NVSR-H-1003	NVSR-MS1A x 12SP-105	IHRT-E	IET-25734	*Kharif*-2016
NVSR- 389	IET-19384 x Pawana	IVT-Late	IET-26936	*Kharif*-2017
NVSR-331	IET-19384 x NVSR-177	IVT-Late	IET-26963	*Kharif*-2017

NVSR-374	IET-19389 x Pawana	IVT-IM	IET-26854	*Kharif*-2017
NVSR-388	IET-19384 x Indrani	IVT-IM	IET-26863	*Kharif*-2017
NVSR-368	IET-19389 x Pusa Sugandha-5	IVT-IME	IET-26864	*Kharif*-2017
NVSR-351	GR-11 x IET-19046	IVT-Biofort	IET-27160	*Kharif*-2017
NVSR-386	IET-19384 x Acharmati	IVT-Biofort	IET-27172	*Kharif*-2017
NVSR-335	IET-19384 x NAUR-1	IVT-Biofort	IET-27167	*Kharif*-2017
NVSR-6150	Dandi x IET-15429	IVT-CSTVT	IET-27043	*Kharif*-2017
NVSR-6130	GR-103 x NAUR-1	IVT-CSTVT	IET-27030	*Kharif*-2017
NVSR-6134	GR-103 x Gurjari	IVT-CSTVT	IET-27053	*Kharif*-2017
NVSR-H-1011	NVSR MS1A x 12SP10	IHRT-ME	IET-26512	*Kharif*-2017
NVSR-2103	Gurjari x PAU 201	IVT-E	IET-26771	*Kharif*-2017
NVSR-2120	Gurjari x Jaya	IVT-E	IET-26787	*Kharif*-2017
NVSR-2153	IR-65912-90-1-6-3-2L x Gurjari	IVT-E	IET-26794	*Kharif*-2017
NVSR-2211	GR-5 x GR-4	IVT-E-DS	IET-26640	*Kharif*-2017
NVSR-2179	GR-5 x IR-28	IVT-VE-DS	IET-26619	*Kharif*-2017
NVSR-2230	GR-5 x Danteswari	IVT-VE-DS	IET-26629	*Kharif*-2017
NVSR-2233	GR-5 x Danteswari	IVT-VE-DS	IET-26646	*Kharif*-2017
NVSR-2115	Gurjari x PAU 201	IVT-IME	IET-26923	*Kharif*-2017
NVSR-2125	Gurjari x Jaya	IVT-IME	IET-26680	*Kharif*-2017
NVSR-2187	Gurjari x PAU 201	IVT-Aerobic	IET-27239	*Kharif*-2017
NVSR-2147	IR-65912-90-1-6-3-2L x Gurjari	IVT-Aerobic	IET-27236	*Kharif*-2017
NVSR- 405	IET-19347 x IRRI-AMT-119	IVT-IM	IET-27704	*Kharif*-2018
NVSR-406	IET-18347 x IRRI-AMT-301	IVT-ASG	IET- 27792	*Kharif*-2018
NVSR-407	IET-19347 x GAR-1	IVT-ASG	IET- 27797	*Kharif*-2018
NVSR-411	GNR-3 x PUSA-834	IVT-IME	-	*Kharif*-2018
NVSR-329	IET-19384 x NVSR-172	IVT-IME	IET-27774	*Kharif*-2018
NVSR-365	IET-19389 x Badshabhog	IVT-IM	IET-27675	*Kharif*-2018
NVSR-384	IET-19384 x Leelabati	IVT-IM		*Kharif*-2018
NVSR-399	NVSR-178 x IET-21682	IVT-Aerobic	IET-27946	*Kharif*-2018
NVSR-391	IET-19347 X IRR-AERO-1	IVT-Aerobic	IET-27953	*Kharif*-2018
NVSR-396	IET-19347 x RP-4015-129-07-03	IVT-Aerobic	IET-27941	*Kharif*-2018
NVSR- 395	IET-19347 x NAUR-1	IVT-Aerobic	IET-27967	*Kharif*-2018
NVSR-6146	Jaya x GR-11	IVT-CSTVT	IET-27830	*Kharif*-2018
NVSR-6147	GR-103 x SLR-51214	IVT-CSTVT	IET- 27834	*Kharif*-2018
NVSR-6109	SLR-51214 x NVSR-26	IVT-IME	-	*Kharif*-2018
NVSR-360	IET-19389 x Leelabati	IVT-CSTVT	IET-27864	*Kharif*-2018
NVSR-2265	Gurjari x GR-5	IVT-E-DS	IET-27519	*Kharif*-2018
NVSR-2227	GR-5 x Danteswari	IVT-E-DS	IET-27532	*Kharif*-2018
NVSR-2285	Jaya x Purna	IVT-Aerobic	IET-27945	*Kharif*-2018
NVSR-2309	Gurjari x IET-22057	IVT-Aerobic	-	*Kharif*-2018
NVSR-2117	Gurjari x Jaya	IVT-E-TP	IET-27876	*Kharif*-2018
NVSR-2393	GR-7 x IR-63883	IVT-E-TP	-	*Kharif*-2018

NVSR-2395	GR-7 x IR-68883	IVT-E-TP	IET-27916	*Kharif*-2018
NVSR-2251	Gurjari x (NAUR-1 x IET-22072)	IVT-IME	IET-27770	*Kharif*-2018
NVSR-2261	Gurjari x (NAUR-1 x IET-22072)	IVT-IME		*Kharif*-2018
NVSR-2112	Gurjari x PAU-201	IVT-Aerobic	IET-27973	*Kharif*-2018
NVSR-2526	GAR-13 x JGL-3826	IVT-IME	IET-27756	*Kharif*-2018
NVSR-2528	GAR-13 x JGL-3826	IVT-MS	IET-27419	*Kharif*-2018
NVSR-2435	GAR-13 x Jaya	IVT-MS	IET-27424	*Kharif*-2018
NVSR-403	Gurjari x GAR-1	IVT-ASG	-	*Kharif*-2019
NVSR-454	(Sampda x IRGC 30938) x Triguna	IVT- IME	-	*Kharif*-2019
NVSR-474	(RP-Bio-226 x IRGC 4059) x IET-8116	IVT-IME	-	*Kharif*-2019
NVSR-466	(RP-Bio-226 x IRGC 4059) x IET-8116	IVT-IME	-	*Kharif*-2019
NVSR-505	(CST-7-1 x IRGC 69861) x Pusa-44	IVT-E-TP	-	*Kharif*-2019
NVSR-6221	IR71907-3R-2-1-1 x IR 68652-3B-30-2	IVT-E-TP	-	*Kharif*-2019
NVSR-6228	NAUR-1 x IET-20036	IVT-E-TP	-	*Kharif*-2019
NVSR-438	(CSR-36 x IRGC 13496) x Pusa-1609	IVT-MS	-	*Kharif*-2019
NVSR-441	(RP-Bio-226 x IRGC 1819) x IET-22071	IVT-MS	-	*Kharif*-2019
NVSR-452	(Sampada x RGC 77840) x Triguna	IVT-MS	-	*Kharif*-2019
NVSR-439	(CSR-36 x IRGC 13496) x Pusa-1609	IVT-Aerobic	-	*Kharif*-2019
NVSR-392	IET-19347 x IRRI-AERO-1	IVT-Aerobic	-	*Kharif*-2019
NVSR-6231	NAUR-1 x IR7664-B-25-1-2-1-3-12-4-AJY1	IVT-Aerobic	-	*Kharif*-2019
NVSR-6214	IR71907-3R-2-1-1 x IET-18710	IVT-IM	-	*Kharif*-2019
NVSR-6217	IR71907-3R-2-1-1 x IR77664-B-25-1-2-1-3-12-4-AJY1	IVT-IM	-	*Kharif*-2019
NVSR-6158	Jaya x IR71829-3R-82-1-1	IVT-Biofort	-	*Kharif*-2019
NVSR-6161	NAUR-1 x IR 72049- B- R- 22- 3-1-1	IVT-CSTVT	-	*Kharif*-2019
NVSR-6156	Dandi x IR50184-18-2B-1	IVT-CSTVT	-	*Kharif*-2019
NVSR-6157	Jaya x IR 71829-3R-82-1-1	IVT-CSTVT	-	*Kharif*-2019
NVSR-6300	CSR-36 x IRGC 13496) x Pusa-1609	IVT- AL&ISTVT	-	*Kharif*-2019
NVSR-6331	(CST-7-1 x IRGC 50836) x MTU1010	IVT- AL&ISTVT	-	*Kharif*-2019
NVSR-6229	NAUR-1 x IET-18710	IVT- AL&ISTVT	-	*Kharif*-2019
NVSR-2287	Jaya x Purna	IVT-Aerobic	-	*Kharif*-2019
NVSR-2574	NAUR-1 x Danteshwari	IVT-Aerobic	-	*Kharif*-2019
NVSR-2098	Gurjari x PAU 201	IVT-Early	-	*Kharif*-2019
NVSR-2310	Gurjari x IET-22057	IVT-Early	-	*Kharif*-2019
NVSR-2246	Gurjari x (NAUR-1 x IET-22072)	IVT-Early	-	*Kharif*-2019
NVSR-2652	(Gurjari x IR-28) x IR-28	IVT-IME	-	*Kharif*-2019
NVSR-2718	IR 68888B X GAR-13	IVT-IME	-	*Kharif*-2019
NVSR-2715	IR-28 X GAR-13	IVT-MS	-	*Kharif*-2019
NVSR-2529	GAR-13 x TGL-3828	IVT-MS	-	*Kharif*-2019
NVSR-2701	GAR-13 X Pusa Sugandh-5	IVT-ASG	-	*Kharif*-2019
NVSR-2756	IR-28 x Lalkada	IVT-Biofort	-	*Kharif*-2019

SEED PRODUCTION PROGRAMMME:

Rice Seed Production at MRRC, NAU, Navsari:

Year	Variety / stage	Production (kg)
2007-2008	Gurjari (Certified seed)	6120
2008-2009	Gurjari (Certified seed)	3238
2009-2010	Gurjari (Uni. Seed)	910
	NAUR-1 (Uni. Seed)	610
2010-2011	NAUR-1 (Uni. Seed)	2380
	GNR-2 (Uni. Seed)	630
2011-2012	NAUR-1 (Uni. Seed)	1795
	GNR-2 (Uni. Seed)	1983
	GNR-3 (Uni. Seed)	1260
	GNR-3 (Breeder seed)	300
2012-2013	NAUR-1 (Uni. Seed)	1410
	GNR-2 (Uni. Seed)	840
	GNR-3 (Uni. Seed)	5200
2013-2014	NAUR-1 (Uni. Seed)	560
	GNR-3 (Uni. Seed)	3625
	NAUR-1 (Breeder seed)	700
	GNR-2 (Breeder seed)	640
	GNR-3 (Breeder seed)	740
	GNR-4 Breeder seed	320
2014-2015	NAUR-1 (Uni. Seed)	960
	GNR-3 (Uni. Seed)	6000
	NAUR-1 (Breeder seed)	620
	GNR-2 (Breeder seed)	480
	GNR-3 (Breeder seed)	2000
	GNR-4 (Breeder seed)	380
2015-16	NAUR-1 (Uni. Seed)	325
	GNR-2 (Uni. Seed)	425
	GNR-3 (Uni. Seed)	925
	NAUR-1 (Breeder seed)	825
	GNR-2 (Breeder seed)	950
	GNR-3 (Breeder seed)	1375
	GNR-4 (Breeder seed)	425

Year	Variety / stage	Production (kg)
2016-17	NAUR-1 (Breeder seed)	610
	GNR-2 (Breeder seed)	490
	GNR-3 (Breeder seed)	1190
	GNR-3 (Foundation)	6380
	GNR-4 (Breeder seed)	210
	GNR-5 (Breeder seed)	680
	GNR-3 (Uni. Seed)	3000
2017-18	NAUR-1 (Breeder seed)	900
	GNR-2 (Breeder seed)	530
	GNR-3 (Breeder seed)	2100
	GNR-3 (Foundation)	4480
	GNR-4 (Breeder seed)	390
	GNR-5 (Breeder seed)	585
	GNR-7 (Breeder seed)	305
	GNR-3 (Uni. Seed)	2800
2018-19	NAUR-1 (Breeder seed)	1000
	GNR-2 (Breeder seed)	1050
	GNR-3 (Breeder seed)	1500
	GNR-3 (Foundation)	7980
	GNR-4 (Breeder seed)	900
	GNR-5 (Breeder seed)	1000
	GNR-7 (Breeder seed)	350
	GNR-7 (Uni. Seed)	1400
	GR-15 (Breeder seed)	900
	GNR-3 (Uni. Seed)	3000
2019-20	NAUR-1 (Breeder seed)	550
	GNR-2 (Breeder seed)	210
	GNR-3 (Breeder seed)	1500
	GNR-3 (Foundation)	3920
	GNR-4 (Breeder seed)	530
	GNR-5 (Breeder seed)	116
	GNR-7 (Breeder seed)	468
	GNR-7 (Uni. Seed)	630
	GR-15 (Breeder seed)	140
	GNR-3 (Uni. Seed)	4000

B. Crop Production :

The following agro technologies for rice have been recommended for the farmers of South Gujarat.

Year:1985-86	
1	It is recommended to the farmers of south Gujarat when they grow either RP 4-14 or Masuri they should apply 10 kg P_2O_5/ ha in the form of DAP slurry for getting higher-economics yield during kharif.
2	It is recommended to the farmers of south Gujarat that for getting higher yield of either Masuri or GR-3 or CR-138-928 they should adopt the practice of green manuring with sun hemp or Dhaincha or Cow pea and seeded the seeds of green manure crop between 15th to 31st May in Kyari land.
Year: 1988-89	
1	The farmers of south Gujarat are requested to follow irrigation schedule of 5.0 to 7.5 cm of submergence to saturation (1 day after disappearance of water) for both of the varieties Masuri and IR-22 grown in kharif season. Higher depth of submergence is not more beneficial.
2	It is recommended to apply in drilled paddy 75 kg N/ha + 25 kg P_2O_5/ha sown at 30 cm spacing between two rows given highest yield economical return in rice cultivation as is gives net ICBR at 75 kg N/ha 2.79 and 2.61 at S_1-30 cm.
3	It is recommended that the farmers of heavy rainfall zone of south Gujarat instead of apply 100 Kg N/ha. In the form of Urea they should apply only 60 Kg N/ha in form of Urea and incorporate one crop of Azolla. The green Azolla culture should be applied immediately after transplanting @ 300g/m and should be trampled in the soil after a couple of days after it covers the field completed. This takes about 20-25 days after the addition of the culture. The net profit by this method is about 400 Rs. More than obtained in the recommended treatment of 100 Kg N/ha in the form of Urea. This is also gives CBR of 1: 2.35.
Year:1989-90	
1	It is recommended that farmers of south Gujarat heavy rainfall zone who are at present adopting paddy-paddy system should take up paddy- onion or paddy- Lucerne rotation to get more than double the profit they get at present. Paddy- garlic and paddy- groundnut system also can increase their present income by 1.5 times.
2	The farmers of Agro-Ecological situation III of south Gujarat heavy rainfall zone growing drilled paddy are advised to used Butachlor @ 1.5 kg / ha as pre emergence and do one hand weeding at 30 DAS . The pre- emergence weedicide should be applied within 2-3 days after sowing. The benefit cost ratio of the above treatment is 1:1.37% The mean reduction in weed incidence was to the tune of 69.26 % with a weed index of 8.03 %.

Year: 1992-93	
1	The farmers of Vyara area (AES-III) of south Gujarat heavy rainfall zone cultivating drilled paddy are advised to adopt an inter row spacing of 30 or 45 cm and fertilize their crop with 100 kg N/ha for Sathi 34-36 or GR-5 or VRA-55. At this N level they will get an ICBR 1:3.47. The nitrogen may be applied in two splits *viz.,* 50% basal and 50% one month after sowing.
2	The farmers of Navsari area (AES-III) of south Gujarat heavy rainfall zone growing summer paddy should fallow the recommended depth of irrigation (5cm) and re irregate the crop 2 days after dis appearance of water.
Year: 1993-94	
1	The farmers of AES-III of south Gujarat heavy rainfall zone adopting Paddy-Groundnut (*Summer*) sequence are advised to apply 100 % of the recommended dose of fertilizer to both the crops.(120-60-0and 25-50-0Kg N and P_2O_5/ha).
2	The farmers cultivating rainfed transplanted paddy in the south Gujarat heavy rainfall zone (AES-III) with Short duration paddy variety GR-4 are advised to apply 100Kg N/ha.(CBR of 1: 1.74). They are also advised to apply this nitrogen through N.C.U. instead of urea to get about 15 per cent more yield and 25 per cent more net return. Alternatively they can use Ammonium sulphate to get about 11 per cent more yield 18 per cent more income than urea (CBR of 1: 1.73). The nitrogen should be applied as 50% basal and 50% after one month.
3	The paddy growing farmers of south Gujarat heavy rainfall zone -Agro climatic zone (AES- III) are advised to apply Pressmud @ 20Kg/bed size of $10m^2$ Along with broadcasting of N and P 60&30 g/bed respectively (CBR 1:2:12) Alternatively in case of non availability of Pressmud they should apply N and P @120-60 g/bed of 10 m2 (CBR of 1: 2.02).
4	The Farmers of growing transplanted paddy variety GR-11 during *kharif* in the south Gujarat heavy rain fall Agro climatic zone (AES III) are advised to apply 50% based and remaining 50% at flowering stage to get maximum return per rupee invested (CBR-2.18).
5	The farmers of AES III of south Gujarat heavy rainfall zone, following green manuring (Dhaincha) before paddy in medium available phosphorus soils are advised to apply 25 kg P2O5 to green manure crop instead of the presently recommended 50 kg P2O5/ha for paddy crop.

Year: 1995-96	
1	The Farmers of AES III of south Gujarat heavy rainfall zone Growing *summer* paddy variety IR-22 are advised to follow the practices of incorporation of fresh Azolla (Applied one week after T.P @ 1 ton/ha) during the first weeding to get about 26% more income. In case of non availability of fresh Azolla they should broadcast BGA @ 10 kg/ha before transplanting to get about 15% more income over no-bio fertilizer application.
Year :1997-98	
1	The farmers of AES III of south Gujarat heavy rainfall zone growing *summer* paddy are advised it apply 160 kg N/ha in the form of lac coated urea (10 ml Liquid lac to be mixed with 1kg of urea) to variety IR-66. The N is to be applied in there splits i.e. 40 per cent basal, 40 percent at tillering and remaining 20% at panicle initiation.
2	The Farmers of AES III of south Gujarat heavy rainfall zone growing paddy GR-6 are advised to apply 125 kg N/ha instead of present recommended dose of 100 kg N/ha. In addition to either green manuring with Dhaincha or application of 5 t/ha of Pressmud.
3	In AES-III of south Gujarat heavy rainfall zone for medium duration paddy in addition to recommended dose of inorganic fertilizer green manuring with S*esbania rostata* is recommended.
4	The Farmers of south Gujarat heavy rainfall zone (AES III) are advised to apply sulphur @ 20 Kg/ha as gypsum at the time of sowing to only oilseed crop or all the crops grown on soils of low to medium available S in two crops sequence viz *kharif* paddy - fallow - *summer* groundnut or to all the crops in three crops sequence involving kharif paddy - *rabi* Sesamum - *summer* green gram or *kharif* paddy - *Rabi* mustard - *Summer* green gram to get higher yield as well as net return.
5	The farmers of South Gujarat heavy rainfall zones (AES-I) growing drilled paddy (GR-8) are advised to apply 65 kg Urea + 300 kg Neem cake + 65kg soil as basal and 65kg Urea /ha as top dressing at 30 DAS to get income (85%). Income of unavailability of neem cake, farmers can use FYM instead of neem cake with 65Kg Urea/ha as top dressing at 30 DAS for getting 62 percent higher net income as compare to existing recommendation. The mixture should be prepared one day before its application.
6	The farmers of South Gujarat heavy rainfall agro climatic zone AES-III growing transplanting *summer* paddy (Jaya) are advised to sow the nursery during 1 week of November. Under the circum stances of late sowing of nursery they are advised to use UV stabilized polythene dome to get transplantable seeding within 30 to 35 days.

Year:2006-2007	
1.	The farmers of AES-I of south Gujarat heavy rainfall zone are advised to sow pigeon pea as intercrop after every six rows of drilled paddy (GR-5) sown at a row spacing of 30 cm. They are recommended to apply N@75 per cent of R.D. of paddy (56 Kg N/ha) for realizing 39 per cent higher net profit with a saving of fertilizer N to the extent of 25%.

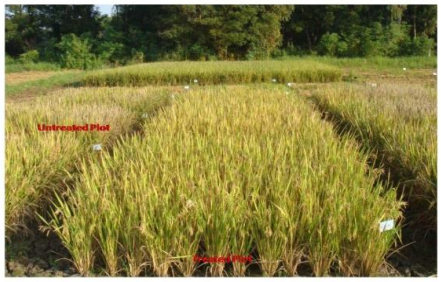
Year: 2007-2008		
1.	The farmers of south Gujarat heavy rainfall zone (AES-III) growing *summer* paddy are advised to adopt puddling with power tiller and re irrigate the crop 3 to 5 days after disappearance of water.	
Year : 2008-2009		
1.	The farmers of south Gujarat heavy rainfall zone (AES-III) growing *kharif* paddy are advised to transplanting 20 days old seedling at space of 20X25 cm for securing higher yield and net profit.	
Year : 2009-2010		
1.	The farmers of AES-III of south Gujarat agro climatic zone -I following paddy(*Kharif*) - gram(*Rabi)* sequence are advised to adopt earlier recommended practices for transplanted paddy cultivation (puddling, transplanting of 25-30 days old 2-3 seedlings per hill at a spacing of 20*15) to realize higher net profit (22%) on sequence basis as compared to farmers practice. This is confirmation of earlier recommendation of paddy cultivation.	

2.	The farmers of south Gujarat heavy rainfall zone (AES-III) growing paddy(*Kharif*)-caster(*Rabi*) sequence are advised to grow dhaincha as green manure crop prior to *Kharif* paddy and apply recommended dose to paddy (100-30NP Kg/ha) and castor (80-40NP Kg/ha) crops for realizing higher net profit (34822Rs./ha) with BCR of 1:1.84. This practice of nutrient management in paddy (*Kharif*) -castor (*Rabi*) sequence also sustains soil fertility.	
Year : 2011-2012		
1.	The farmers of south Gujarat heavy rainfall zone (AES-III) growing paddy are advised to adopt SRI method (10-12 days old single seedling per hill at 25cm x 25cm spacing) to realize higher net income(42,383 Rs/ha) with CBR of 1:2.47. Alternatively from water saving (40%) point of view , they are advised to adopt aerobic sowing (irrigated drilled) of rice at a row spacing of 30 cm to get higher cost : benefit ratio (1:2.36) as compare to conventional paddy cultivation.	
Year : 2012-2013		
1	The farmers of South Gujarat heavy rainfall zone (AES III) growing irrigated drilled paddy(aerobic rice) are advised to apply pendimethalein @ 1.0 kg a.i./ha as pre emergence for effective weed control or hand weeding followed by inter cultureing at 20 and 40 DAS or Bispyribac sodium10% *sc* 10ml/1it water as post emergence at20 DAS for effective weed control and realizing higher net income	
2	The farmers of south Gujarat heavy rainfall zone (AES-III) intended to follow aerobic rice cultivation are advised to prefer NAUR-1 variety. They are further advised to use 40 kg/ha seed rate and sow their crop at 30 cm row spacing. By adopting these practices, they can get higher yield and net return.	

Year : 2016-17	
3	The rice growing farmers of South Gujarat heavy rainfall zone (AES-III) are advised to adopt transplanted method for variety GNR-3 or NAUR-1. They also advised to grow green gram (CO-4) in *rabi* season for getting higher net returns in rice based crop sequence.  
4	The transplanted rice growing farmers of South Gujarat heavy rainfall zone (AES-III) are advised to grow iron rich variety GNR-4, which gives higher net returns. Further for iron bio fortification in rice varieties GNR-4 or GAR-13, they are advised to spray 1% banana pseudostem enriched sap at tillering and panicle initiation stages for increasing iron content in rice grain. 
5	The SRI method of crop establishment along with 100% RDN remarkably reduced the CH_4 emission and increased rice productivity but considerably increased the emission of N_2O. Application of organics alone or in combination with inorganic fertilizers improved the rice yield and soil properties but more pronounced to emit CH4 from the rice field. Therefore, there is need to develop efficient nutrient management practices in context of future global warming.
Year : 2017	
6	The farmer of South Gujarat heavy rainfall zone growing rice prefer hybrids during *kharif* season are advised to fertilized the crop @ 125:37.5:00 NPK kg + 10 t FYM/ ha for getting higher yield and net returns. 
7	The *kharif* rice growing farmers of South Gujarat heavy rainfall zone are advised to grow rice hybrid by using 18 days old seedlings transplanted at 25 x 25 cm spacing and fertilized the crop with 10 t /ha FYM + brickets (60 Urea: 40 DAP) for getting higher yield and net returns. 

C. Crop Protection:

The following control measures of paddy for pests and diseases have been recommended for the farmers of South Gujarat.

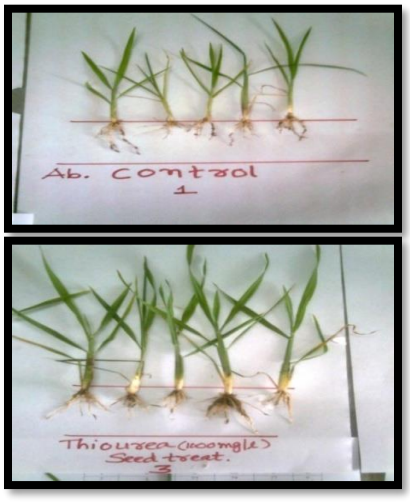
	Year: 2007-2008	
1	The farmers sowing rice variety susceptible to bacterial blight are advised to spray streptocycline (1g) + Copper oxychloride (10g/20 lit) (CBR1:3.80) or copper hydroxide (kocide 50 g/20 lit) (CBR1:1.64) to manage bacterial blight effectively and to get more yield and income in endemic area of bacterial blight.	
2	The paddy growers of South Gujarat are advised to apply IPDM practices as under to get more yield (5363 and 6500 : grain and straw kg/ha) and net profit with higher CBR (1:25.75) than farmers practices (4550 and 5570 grain and straw yield kg/ha with CBR 1: 7.69) **The IPDM includes:** 1. Dead heart of stem borer should be removed before transplanting 2. Seedling roots should be deepened in *Azospirillium* biofertilizer for 15 minutes before planting so as to meet 30 kg N requirement out of 100 kg N/ha., recommended for paddy. 3. Pest should be monitored at weekly interval. 4. Bunds should be cleaned and alternate host should be removed before planting 5. Paddy straw should be broadcasted in field and certain heaps of paddy straw should be made around the field to conserve the spiders. 6. Nursery should be treated with 10 kg Carbofuran 3G@1000 m^2 at 15 DAS than spray Monocrotophos 0.036 % (15 and 40 DAT) and Imidacloprid 0.005% at 65 DAT. 7. One spray of mancozeb-45 0.3 % should be applied at panicle emergence to control grain discoloration.	 

Year : 2009-10	
3	The paddy growers of South Gujarat Agro-climate zone are advised to apply three sprays of Carbendazim 12 WP + Mancozeb 63 WP (15/10lit) or Hexaconazole 5 EC 0.01 % (20ml/10 lit) for effective control of grain discoloration and to harvest higher healthy grain and straw yield. The first spray should be given at boot leaf stage and the remaining two sprays thereafter at 10 days interval.
Year : 2010-11	
4	The paddy growing farmers of South Gujarat are recommended to apply any one the following insecticides *viz.* Spinosad (CBR 1: 14.31), Profenophos (CBR 1: 12.32), and DDVP (CBR 1 :11.74), following economic threshold level as 2 damaged leaves per hills for the control of rice leaf folder.
Year : 2011-12	
5	Paddy growing farmers of South Gujarat AES - III are recommended to spray Ethion 50 EC, 0.05 % + Mancozeb 75 WP, 0.25 % (10 ml Ethion + 33 g Mancozeb in 10 lit water) on initiation of sheath mite for effective control of sheath mite as well as grain discoloration and to get higher grain yield and net profit. The waiting period of Ethion 50 EC, 0.05 % + Mancozeb 75 WP, 0.25 % should be maintained 42 days after last application.
Year: 2013-14	
6	The farmers of AES III of South Gujarat zone growing transplanted rice during summer are advised to treat the seed with thiourea @ 1000 mg/lit,12 hours before sowing and also spray thiourea solution of 1000 ppm (1 gm/litre) at second leaf stage of rice nursery for obtaining higher grain yield and more net profit.
Year: 2015-16	
7	The paddy growers of South Gujarat agro-climate zone I (AES III) are advised to apply three sprays of propiconazole 25 EC, 0.025 % (10 ml/10 l.) or trifloxystrobin 25% + tebuconazole 50%,(75 WG) 0.03 % (4 gm/10 l.) for effective control of grain discoloration and to harvest higher healthy grain and straw yield. The first spray should be given at boot leaf stage and the remaining two sprays thereafter at 10 days interval. 
8	Rice genotypes *viz*., IR-BB2, IR-BB11, IR-BB50, IR-BB62 and IR 11A334 were found to have multiple resistant reaction against Bacterial blight and Sheath rot diseases under artificial inoculation and high disease pressure conditions in the field and Grain discoloration by natural field condition. 
9	Rice genotypes *viz.*, CB 602, CB09-516, HKR 06-47, IRBB-2, IRBB-50, IR 77498-47-2-6 2-3, NVSR-6137 and NVSR-H-1001 were found to have multiple resistant reaction against stem borer, leaf folder and brown plant hopper under natural field conditions. These entries should be used as a variety or as a source of resistant donor in resistant breeding programme.

Year: 2016-17	
10	Rice varieties Dandi and Masuri were found to have resistance reaction against rice stem borer and varieties like NAUR-1, GNR-2, 3, Gurjari and GR-5, 7, 8, 10, 104 and Narmada were found to have moderately resistance reaction against rice stem borer under natural field conditions. Whereas varieties GNR-4, GR-4, 6, 9 and 103 have moderately susceptible reactions against stem borer under natural field conditions.
11	Spray emamectin benzoate 5 WSG 0.015 % or imidacloprid 17.8 SL 0.005 % twice, first at the appearance of pest and second at 15 days after the first application is suggested for the effective control of rice gundhi bug**.**
12	The paddy growers of south Gujarat are advised to apply two sprays of fenpyroximate 5 SC @ 0.005% (10 ml/10 litre of water) or difenthiuron 50 WP @ 0.05% (10 g/10 litre of water) or chlorfenapyr 10 SC @ 0.015% (15 ml/10 litre of water) for the effective control of rice sheath mite. The first spray should be given at appearance of sheath mite (at flag leaf stage) and the second spray at 15 days after first spray.
13	The paddy growers of south Gujarat are advised to apply two sprays of flubendiamide 20 WG @ 0.005% (2.5 gm/10 litre) or chlorantraniliprole 18.5 SC @ 0.006% (3 ml/10 litre) first at the apparence of pest and second at 15 days after the first application for effective control of rice stem borer.
Year: 2017-18	
14	The rice growers of South Gujarat Agro-climate zone I (AES-I) are recommended to apply two sprays of *P. fluorescens* Waghai or *P. fluorescens* Navsari isolate @ 6 ml/l. foliar spray (10^8 cfu/ml) for effective management of leaf and neck blast and to get higher grain and straw yields. The first spray should be given at initiation of disease and second spray at the time of panicle emergence. 
15	Rice genotypes *viz*., IET-23832, IET-22015, NVSR-6100 and NVSR-6137 were found multiple resistant against bacterial blight and sheath rot diseases under artificial inoculation and high disease pressure in the field and grain discoloration in normal field condition. 
16	Rice genotypes *viz*., NVSR-348, NVSR-351, IET-18710 and NVSR-6121 were found multiple resistant against bacterial blight disease by artificial inoculation under field condition.
17	Rice genotypes *viz.*, NWGR-7011, NWGR-9088, IET-23189 and IET-22629 are showed multi-resistant reactions against rice stem borer and sheath mite. These entries should be used as a variety or as a source of resistant donor in resistant breeding programme.

Year: 2018-19	
18	Rice genotypes *viz*., IET-23832, IET-22015, NVSR-6100 and NVSR-6137 were found to multiple resistant reaction against bacterial blight and sheath rot diseases under artificial inoculation and high disease pressure conditions in the field and grain discoloration by natural field condition.
19	Rice varieties *viz.,* Dandi, Masuri, Jaya, were found to have resistance reaction against stem borer whereas varieties like NAUR-1, GNR-2, GNR-3, Gurjari, GR-5, GR-7, GR-8, GR-10, GR-104 and Narmada were found to have moderately resistance reaction against stem borer under natural field conditions. But varieties GNR-4, GR-4, GR-6, GR-9 and GR-103 have moderately susceptible reaction against stem borer under natural field conditions.
20	Spray emamectin benzoate 5 WSG 0.015 % or imidacloprid 17.8 SL 0.005 % twice, first at the appearance of pest and second at 15 days after the first application is suggested for the effective control of rice gundhi bug**.**
Year: 2019-20	
21	The Paddy growers of South Gujarat Agro-climate zone I (AES-I) are advised to apply two sprays of trifloxystrobin 25 + tebuconazole 50 (75 WG) 0.03 per cent (4 gm/10 l.) or propiconazole 25 EC, 0.025 per cent (10 ml/10 l.) for effective control of false smut and to harvest higher grain and straw yield. The first spray should be given at boot leaf stage and the second spray at milking stage.
22	Rice genotypes *viz.*, NVSR-329, NVSR-355 and NVSR-384 were found to have multiple resistant reaction against rice yellow stem borer, *Scirpophaga incertulas* Walker, rice leaf folder, *Cnaphalocrocis medinalis* Guenee and rice sheath mite, *Steneotarsonemus spinki* Smiley under natural field conditions. They can be used in breeding programme for developing resistant varieties against rice pests.

D. Crop physiology :

Year: 2013-14		
1.	The farmers of AES III of South Gujarat zone growing transplanted rice during summer are advised to treat the seed with thiourea @ 1000 mg/lit,12 hours before sowing and also spray thiourea solution of 1000 ppm (1 gm/litre) at second leaf stage of rice nursery for obtaining higher grain yield and more net profit.	

Success story

Popular coarse grain rice variety GNR-3 for beaten rice (*Pohuva*)

Navsari, Gujarat is also known as "*pohuva* capital" of the country because of the dense cluster of *pohuva* (beaten rice) processing mills. More than 70 units, comprising 47 per cent mills of the Gujarat are situated in Navsari. Gujarat has 3% of *pohuva* mills of the country. Navsari district alone is transporting 550 tonnes of *pohuva* daily to the other parts of the country.

Coarse grain rice variety with test weight around 30-35g is preferred for the processing and *pohuva* manufacturing. Therefore, demand of coarse grain type rice variety in the south Gujarat which has 2.5 lakhs hectares rice belt is high. Jaya, a variety of rice was most suitable for the *pohuva* manufacturing and was being grown since 1970. This was partially replaced by variety, Gurjari released in 1997 by then Gujarat Agricultural University, Nawagam with the technical support of Navsari centre. Looking at the demand of local farmers, GNR-3 a coarse grain rice variety was breed and released in 2012 by the Main Rice Research Station, Navsari. The variety become popular in the same year of release, as it has 20% higher grain yield (average 6500 kg/ha) as compared to existing varieties and is moderately resistant to major pest and diseases. There was an anticipation of exponential increase in the demand of the quality seed of the variety.

To meet out the upcoming demand and provide quality seed to the farmer, Main Rice research Centre, NAU, Navsari had made MoU with Co-Operative Sector (Navsari Taluka Kharid Vechan Sangh, Navsari) for the seed production. Initially the seed produced and supplied was 1.2 lakh kg in the year 2012 which was jumped to the 8.0 lakh kg merely in five years (year 2016) and the same trend is going to be observed in the future too. The rice variety GNR-3 had expanded to the one fourth (26 thousand ha) rice growing area of the south Gujarat and has been ranked among the list of varieties with rapid replacement rate in the country.

List of publications :

1. Patil P. P., Vashi R. D., Lodam V. A., Patil S. R. and Patil S. S. (2012). Combining ability for yield component characters in rice. *J. Agric. Res. Technol.* **37** (1):41-45.
2. H. Abbas, R.M. Patel, V. B. Parekh, A. D. Gauswami, P. Prajapat and P. B. Patel (2017). Isolation and characterization of plant growth promoting bacterial endophytes and their beneficial effects on rice (*Oryza sativa* L.). *Multilogic in Science,* Vol. VI, issue XIX.
3. Rita R.Patel and P. B. Patel (2016). Combining ability studies in rice (*Oryza sativa* L.) for yield and its component characters. *Green Farming.* Vol. 7 (4) : 779-782.
4. B. A. Chaudhari, S. R. Patel, P.B. Patel, R. R. makwana and S.S. Patil. (2016). Heterosis Studies for Yield and Yield Attributing Characters in Aerobic Rice (*Oryza sativa* L.). *Advances in Life Sciences,* 5(17), 6666-6676.
5. Patel Unnati, Patel Pathik B., Mahatma Lalit and Bhimshinh Bilwal (2017). Stability analysis for grain yield and its attributing traits of rice across locations. *Int. J. Curr. Microbiol. App. Sci*., 6(11): 2102-2111.
6. Patel Unnati, Patel Pathik and Rathava Kalpana (2017). Stability and genotype x environment interaction for qualitative traits of biofortified rice (*Oryza sativa* L.) across locations. *Trends in Biosciences.* 10 (30), 6274-6284.
7. P. M. Mistry and P. B. Patel (2014). Bio-fortified Rice Variety Gujarat Navsari Rice – 4 (GNR-4). *Ind. J. Sci. Res. and Tech.* 2(3):56-59.
8. P. M. Mistry; P. B. Patel and R. D. Vashi (2014). Performance of paddy variety GNR-3. *Bioinfolet* 11(2A): 306-307.
9. P. M. Mistry and P. B. Patel (2014). Gujarat Navsari Rice-4 (GNR-4)- A bio-fortified rice variety. *Bioinfolet* 11(2A): 344.
10. M. B. Prajapti and P. M. Mistry (2014). Line x Tester analysis in rice (*Oryza sativa* L). *Bioinfolet* 11(2C): 677-687.
11. M. H. Chaudhari, P. M. Mistry and V. J. Patel (2014. Heterosis for grain yield and yield attributing traits in rice. *Crop Improv. (2014)* 41(1): 97-101.
12. P. M. Mistry, M. H. Chaudhari and V. J. Patel (2014). Combining ability analysis for grain yield and yield contributing characters in rice. *Crop Improv. (2014)* 41(2):185-89
13. P. M. Mistry, V. J. Patel, N. M. Desai and M. H. Chaudhari (2015). Relative Heterosis and Heterobeltiosis for grain yield and yield attributing traits in rice (*Oryza sativa* L.). *Trends in Biosciences* 8(1): 74-81.
14. V. J. Patel, P. M. Mistry, M. H. Chaudhari and V. D. Dave (2015). Combining ability analysis in rice (*Oryza sativa* L.). *Trends in Biosciences* 8(1): 82-87.
15. P. M. Mistry, M. B. Prajapati and P. S. Belhekar (2016). Heterosis for grain yield and yield attributing traits in rice (*Oryza sativa* L.). *J. Agric. Res. Technol.,* 41(2): 205-213.
16. P. M. Mistry, M. H. Chaudhari and P. S. Belhekar (2016). Combining ability analysis for yield and yield contributing characters in rice (*Oryza sativa* L.). *J. Agric. Res. Technol.,* 41(2): 254-260.
17. P. M. Mistry, P. B. Patel and R. D. Vashi (2016). A paddy variety GNR-3 suitable for value addition. *Oryza* 53(2): 337-340.

18. B. A. Choudhari, Patel S. R. Patel P. B., Mistry P. M., Makwana R. R. and Patil S. S. (2017). Genetic analysis for quantitative traits using Line x Tester mating design in rice (*Oryza sativa* L.). *AGRES an International e-journal* 6(1): 16-27.
19. A. J. Rathod, P. M. Mistry, A. G. Pampaniya and R. S. Ganvit (2017). Genetic variability, heritability and genetic advance for grain yield and quality characters in rice (*Oryza sativa* L). *Trends in Biosciences* 10(17): 3201-05.
20. A. J. Rathod, Mistry P.M., Pampaniya A. G., Patel H. R. and Chetariya C. P.(2017). D^2 Statistics for grain yield and quality traits in rice (*Oryza sativa* L.), *Int. J. Pure App. Biosci.* 5(4): 54-58.
21. P. S. Belhekar, H. D. Mehta, P. M. Mistry and T. J. Bhor (2017). Identification of restorers and maintainers for different CMS lines of Aromatic rice (*Oryza sativa* L.). *International Jr. Tropical Agri.* 35(4): 1-6.
22. Published book in vernacular language Gujarati "Daxin Gujarat ma Dangar" by Main Rice Research Centre, NAU, Navsari in 2014.
23. Bulletins/pamphlets are being published at regular interval for scientific cultivation of paddy in South Gujarat in vernacular language.
24. Abhishek Shukla, P. D. Ghoghari, G. G. Radadia and G. D. Hadiya (2017). Efficacy of some pesticides against rice sheath mite, *Steneotarsonemus spinki* Smiley (Acari: Tarsonemidae). *Journal of Entomology and Zoology Studies*, 5(5): 1304-1309.
25. S. D. Chaudhari, M. B. Lakum and P. D. Ghoghari (2017) Laboratory bioassay of entomopathogenic fungi, *Metarhizium anisopliae a*gainst rice sheath mite, *Steneotarsonemus spinki* Smiley. *Trends in Biosciences*,10(24):5075-5078.
26. M. B. Lakum, P. D. Ghoghari, H. D. Zinzuvadiya and Abhishek Shukla (2017) Population Dynamics of Rice Sheath Mite, *Steneotarsonemus spinki* Smilely and its correlation with abiotic factors. *Trends in Biosciences*, 10(29): 6201-6203.
27. S. D. Chaudhari and P. D. Ghoghari (2017). Biological attributes of rice sheath mite, *Steneotarsonemus spinki* Smiley on alternate hosts of rice. *Int. J. Curr. Microbiol. App. Sci. 7*(2): 1596-1601.
28. H. Abbas, R.M. Patel, V. B. Parekh, A. D. Gauswami, P. Prajapat and P. B. Patel (2017). Isolation and characterization of plant growth promoting bacterial endophytes and their beneficial effects on rice (*Oryza sativa* L.). *Multilogic in Science,* Vol. VI, issue XIX., 159-162.
29. Patel Unnati, Patel Pathik B., Mahatma Lalit and Bhimshinh Bilwal (2017). Stability analysis for grain yield and its attributing traits of rice across locations. *Int. J. Curr. Microbiol. App. Sci*., 6(11): 2102-2111.
30. Patel Unnati, Patel Pathik and Rathava Kalpana (2017). Stability and genotype x environment interaction for qualitative traits of biofortified rice (*Oryza sativa* L.) across locations. *Trends in Biosciences.* 10 (30), 6274-6284.
31. B. A. Chaudhari, Patel S. R. Patel P. B., Mistry P. M., Makwana R. R. and Patil S. S. (2017). Genetic analysis for quantitative traits using Line x Tester mating design in rice (*Oryza sativa* L.). *AGRES an International e-journal* 6(1): 16-27.
32. A. J. Rathod, P. M. Mistry, A. G. Pampaniya and R. S. Ganvit (2017). Genetic variability, heritability and genetic advance for grain yield and quality characters in rice (*Oryza sativa* L). *Trends in Biosciences* 10(17): 3201-05.

33. A. J. Rathod, Mistry P.M., Pampaniya A. G., Patel H. R. and Chetariya C. P.(2017). D^2 Statistics for grain yield and quality traits in rice (*Oryza sativa* L.), *Int. J. Pure App. Biosci.* 5(4): 54-58.
34. P. S. Belhekar, H. D. Mehta, P. M. Mistry and T. J. Bhor (2017). Identification of restorers and maintainers for different CMS lines of Aromatic rice (*Oryza sativa* L.). *International Jr. Tropical Agri.* 35(4): 1-6.
35. Abhishek Shukla, P. D. Ghoghari, G. G. Radadia and G. D. Hadiya (2017). Efficacy of some pesticides against rice sheath mite, *Steneotarsonemus spinki* Smiley (Acari: Tarsonemidae). *Journal of Entomology and Zoology Studies*, 5(5): 1304-1309.
36. S. D. Chaudhari, M. B. Lakum and P. D. Ghoghari (2017) Laboratory bioassay of entomopathogenic fungi, *Metarhizium anisopliae a*gainst rice sheath mite, *Steneotarsonemus spinki* Smiley. *Trends in Biosciences*,10(24):5075-5078.
37. M. B. Lakum, P. D. Ghoghari, H. D. Zinzuvadiya and Abhishek Shukla (2017) Population Dynamics of Rice Sheath Mite, *Steneotarsonemus spinki* Smilely and its correlation with abiotic factors. *Trends in Biosciences*, 10(29): 6201-6203.
38. S. D. Chaudhari and P. D. Ghoghari (2017). Biological attributes of rice sheath mite, *Steneotarsonemus spinki* Smiley on alternate hosts of rice. *Int. J. Curr. Microbiol. App. Sci. 7*(2): 1596-1601.
39. Anita C Solanke, Pathik B. Patel and Pooja K. Patel (2018). Study of heterosis and inbreeding depression in F_2 generation of aromatic rice. *The Pharma Innovation Journal*; 8(8): 10-15.
40. Anita C. Solanke, Pathik B. Patel and Pooja K. Patel (2018). Generation mean analysis for yield and it's contributing traits in aromatic rice (*Oryza sativa* L.*). The Pharma Innovation Journal*. 2019; 8(8): 05-09.
41. Ashok Jaiswal and P.B. Patel (2018). Study of heterosis in rice (*Oryza sativa* L.) in relation to yield and its contributing characters under coastal salt affected soil. *Journal of Pharmacognosy and Phytochemistry*; 7(2): 3191-3195.
42. Ashok Jaiswal and P.B. Patel (2018). Study of combining ability analysis in rice (*Oryza sativa* L.) under coastal salt affected soil. *Journal of Pharmacognosy and Phytochemistry* ; 7(2): 3187-3190.
43. H. R. Patel, V. P. Patel, P. B. Patel and U. V. Patel (2018). Genetic Variability Studies in Segregating Generation for Yield and Component Traits in Rice (*Oryza sativa* L.). *Int. J. Pure App. Biosci.,* 6 (5): 863-871
44. H.R. Patel, V.P. Patel, P.B. Patel, A.J. Rathod and A.G. Pampaniya (2018). Genetic variability, correlation and path analysis for grain yield and component traits in f3 segregating population of rice (*Oryza sativa* L); 6(2): 2327-2331.
45. Anjalkumar Patel, Kalpana Rathava, P. D. Gajjar, C. G. Intwala and Pathik Patel (2018). Study of Heterosis for Grain Yield and Its Components in Aerobic Rice (*Oryza Sativa* L.*). Int. J. Pure App. Biosci.,* 6 (6): 358-368.
46. Kishan Kumar Sharma, Vijay A. Patil, Jitendar Kumar Sharma and Akhilesh Kumar Kulmitra (2018). *In vitro* Evaluation of Botanicals against *R. solani* Causing Sheath Blight of Paddy. *International Journal of Current Microbiology and Applied Sciences* Special Issue-7 pp. 3316-3322. (NASS: 5.38)

47. P.K. Patel , P.B. Patel and A.C. Solanke (2019). Gene action and combining ability analysis for yield and its components in rice (*Oryza sativa* L.). *Green Farming*, Vol. 10 (3) : 319-322.
48. Vivek N. Zinzala, Ajay V. Narwade, Nilima Karmakar and P. B. Patel(2019). Influence of Zinc Applications on Photosynthesis, Transpiration and Stomatal Conductance in *Kharif* Rice (*Oryza sativa* L.) Genotypes. *Int. J. Curr. Microbiol. App. Sci.*, 8(10): 150-168.
49. M. B. Lakum, P. D. Ghoghari and S. D. Chaudhary (2019) Efficacy of different acaricides against rice sheath mite, *Steneotarsonemus spinki* Smiley on rice crop. *Journal of Entomology and Zoology Studies (*2019), 7(4): 111 - 115.
50. Dr. P. D. Ghoghari, R. L. Chavadhari, Dr. V. A. Patil and N. K. Kavad (2019) Bio - efficacy of insecticides against rice stem borer, *Scirpophaga spp. International Journal of Entomology Research (*2019), 4(4): 59 - 65.
51. Dr. P. D. Ghoghari, N. K. Kavad and Dr. V. A. Patil (2019) Evaluation of insecticides against rice gundhi bug, *Leptocorisa acuta* (Thunberg) in South Gujarat. *Journal of Entomology and Zoology Studies* (2019), 7(4): 1411 -1417.
52. Kishan Kumar Sharma, Vijay Patil, DikshaNayak and Satyendra Kumar Gupta (2019). Evaluation of efficiency of bio-control agents against *Rhizoctonia solani* Kuhn, an incitant of sheath blight of rice. *Journal of Pharmacognosy and Phytochemistry* 2019; 8(6): 1365-1368. (Published in 09-10-2019) NASS rating- 5.17
53. Patil , V. A., Mehta, B. P. and Deshmukh , A. J. (2019). Biological Management of Grey Leaf Blight (*Pestalotia anacardii*) of Mango (*Mangifera indica*). *International Journal of Economic Plants* 2019, 6(2):082-084.
54. Patil, V. A., Deshmukh, A. J., Mehta, B. P., Kavad, N. K. and Bacalgave, V. G. (2019). Bio-effectors for management of grey leaf blight disease on mango. *Journal of Pharmacognosy and Phytochemistry*, 8(4): 769-771.
55. Patel, D. A., Patel, P. B., Naik, V. R. and Usdadia, V. P. (2019). Agronomic Biofortification of Rice with Iron micronutrient. Paper presented at National Seminar on Biochemical and Molecular Biology Intervention for Nutritional Security and Food Safety, 12-13 December, 2019 held at N. M. College of Agriculture, Navsari Agricultural University, Navsari 396450, Gujarat.
56. V. A. Patil, V. P. Prajapati, K. V. Makwana and P. B. Patel. (2019). Biological control of leaf and neck blast on rice. “National symposium on sustainable management of pests and diseases in augmenting food & nutritional security” held at ACHF, NAU, Navsari (Gujarat). January, 22-24. Pp. 382-383.

Awards if any:-

- **Sadvichar Pariwar Award** for the year 2016 for **"Development of Rice varieties [GNR-3, GNR-4, GNR-5, Purna, GNR-6 and Hybrid (GNRH-1)]** for different situations in Gujarat" awarded by **"The Gujarat Association for Agricultural Sciences, Ahmedabad, Gujarat".**
- **Best oral presentation award** to Dr. P.B. Patel, Associate Research Scientist, SWMRU, NAU Navsari for **"Biofortified rice variety Gujarat Rice-15 (GR-15)"** presented in **National seminar** on "Biochemical and Molecular Biology Intervention for Nutritional Security and Food Safety" from 12th -13th December, 2019 organized by Department of Soil Science & Agricultural Chemistry, NMCA, NAU, Navsari, Gujarat.

Extension activities :

Sr.No.	Extension Activity	Year							
		2012	2013	2014	2015	2016	2017	2018	2019
1.	FLD conducted (AICRIP)	-	-	5 ha	5 ha	10 ha	20 ha	30 ha	30 ha
2.	FLD conducted (State)	75 ha	25 ha	34 ha	40 ha	30 ha	85 ha	35 ha	40 ha
3.	Training programmes attended by the scientists	21	14	18	27	34	18	21	15
4.	Number of Publications in NAAS Rated Journals	1	2	7	2	5	11	8	10
5.	TSP program implemented	-	-	168 ha	-	-	-	-	-

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