Centre:

1. Name of the officer - In charge (AICRP on Sorghum):	**Dr. N.K.Thakral** (Principal Scientist) (w.e.f. 22/09/2016)
2. Associated Scientists (AICRP-Sorghum) and their discipline:	1. Dr. Satpal (Asst. Agronomist) 2. Dr. Pummy Kumari (Asst. Sci.) (upto 14/11/2016) 3. Dr. Jayanti Tokas (Asst. Biochemist) (upto 04/04/2017)
2. Associated Scientists from state project:	1. Dr. Pummy Kumari (Asst. Sci.) (w.e.f. 15/11/2016) 2. Dr. Satyawan Arya (Asst. Eco. Bot.) 3. Dr. Jayanti Tokas (Asst. Biochemist) (w.e.f. 05/04/2017) 4. Dr. Harish Kumar (Asst. Sci. Entomology) 5. Dr. Sarita Devi (Asst. Sci. Plant physiology)
3. Annual budget:	**Rs. 62,34,360**
4. Any other financial support:	-

Staff changes during the year

Retired	–
Transferred	**Dr. S.K.Pahuja (upto 21/09/2016)**
New recruits	–

Major thrust at the centre

1. Development of high fodder yielding forage sorghum single cut and multicut hybrids/varieties resistant to stem borer with better nutritional quality
2. Development of dual purpose sorghum varieties
3. Improvement in nutritional quality, resistance to diseases and insect pests and tolerance to salinity
4. To work out the ideal agronomic practices for the cultivation of forage sorghum
5. To popularize the production technology of forage sorghum

Seasonal information

	Kharif	Rabi
Rainfall	475.4 mm (May- Nov, 2016)	–
Area covered	70, 000 ha	–
Total production	–	–

Trials conducted

Discipline	No. of AICRP-sorghum trials allocated	No. of station trials	No. of trials successfully conducted	Shortfall
Breeding	6	5	All	Nil
Agronomy	3	2	All	Nil
Quality	Samples of 6 Breeding trials & Samples from Udaipur, Coimbatore, Dessa, Pantnagar and Surat analyzed	3	All	Nil
Entomology	5	-	All	Nil

Major achievements during 2016-17

Discipline: Plant Breeding

Sl. No	Target	Achievement	Shortfall
1	IVHT (SC) Hisar (16+4)	SPH 1858 (395.0 q/ha; 137.9 q/ha), SPV 2444 (395.0 q/ha; 85.0 q/ha)	Nil
2	AVT (SC) – Hisar (14+4)	HJ 541 (LC), SPV 2317 (on par), SPV 2385 (on par), SPH 1822(on par)	Nil
3	IAVHT (MC) – Hisar (16+3)	SPH 1842(1073.17 q/ha; 11.83 %), SPH 1841 (1023.67 q/ha; 6.67 %) and SPH 1768 (970.0 q/ha; 1.08 %)	Nil
4	Seed Trial (11+3)	SPV 2389 (8.55 q/ha; 27.57%), SPV 2391 (7.81 q/ha; 16.52 % and SPV 2316 (7.33 q/ha; 9.34 %)	Nil
5	SML Trial	T10-2254-10-3 (495 q/ha; 9.3%), T5-2254-7- 8 (488 q/ha; 7.8%) and T2-2251-3-12 (488.0 q/ha; 7.7%)	Nil
6	IIFH Trial	IIHPAU-2 (780 q/ha; 96.9%). IIFH PAU 10 (759.2 q/ha; 91.6%) and IIFH PAU 7 (753 q/ha; 85.6%)	Nil

6	Station Hybrid Trial (117 +2)	SHH 1437(GFY: 1122.5 q/ha; 32.8%), SHH 1501(GFY: 1059.0 q/ha; 25.3%) & SHH 1649 ((GFY: 1051.5 q/ha; 21.7 %)	Nil
7	PRT (MC)	SH 1530 (GFY: 866.8 q/ha; 15.0), SH 1472 (GFY: 809.6 q/ha; 7.4%) and SH 1406 (GFY: 803.3 q/ha; 6.5%)	Nil
8	PRT (SC)	SH 1586 (GFY: 598.0 q/ha; 7.4%) SH 1568 (GFY: 589.7 q/ha; 5.9%) and SH 1514 (GFY: 577.3 q/ha; 3.7%)	Nil
9	SST (MC) SST (SC)	SH 1441 (GFY: 822.6 q/ha; 11.8 %) SH 1488 (GFY: 821.8 q/ha; 11.7%) SH 1567 (GFY: 588.0 q/ha; 12.6), SH 1501 (GFY: 575.7 q/ha; 10.3%)	Nil
10	LST (MC) LST (SC)	None was superior SH 1562 (GFY: 598.3 q/ha; 5.9), SH 1567 (GFY: 595.2 q/ha;5.3%)	Nil

Breeding material sown and selected during *kharif* 2016					
S.No.	**Generations**	**No. of crosses**	**No. of progenies grown**	**No. of single plants selected**	**No. of progenies bulked**
1	**Fresh crosses**	29	-	-	-
2	**BC_1F_1**	1	-	-	-
3	**F_1'S**	24	-	-	-
4	**F_2'S**	14	854	398	-
5	**BC_1F_2**	4	220	50	-
6	**F_3'S**	6	450	340	-
7	**F_4'S**	8	85	90	-
8	**F_5'S**	2	10	-	2
9	**F_6'S**	8	25	-	8
	Total	**94**	**1644**	**878**	**10**

Major achievements during 2016-17

Discipline: Germplasm

Sl. No	Target	Achievement	Shortfall
1	750 lines	All the lines were maintained as per its mating system and 200 lines were evaluated for various morphological traits	Nil
Identification of promising genotypes:			
2.	1) Plant height 2) Leaf length 3) Leaf breadth 4) Crude Protein %	SG 14, SG 123, SG 173, & SG 199 SG 51, SG 117, SG 150,SG 153, SG 194 & SG 199 SG 3, SG 100, SG 111, SG143 , SG 153 & SG 182 SG 125, SG 128, SG 132, SG 136 and SG 143	Nil

Major achievements during 2016-17

Discipline: Entomology

Sl. No	Target	Promising genotypes	Shoot Fly DH (%)	Stem Borer DH (%)	Stem tunneling %
1	IVHT- SC Trial	SPV 2445	7.92	11.36	4.76
		SPV 2444	17.22	12.44	13.21
		SPH 1858 (SC)	7.77	7.33	15.66
2	AVHT-SC Trial	CSV 21F	9.73	9.18	13.01
		SPH 1797	16.41	10.43	15.48
		SPV 2317	4.45	8.53	21.38
3	IAVHT- MC Trial	SPV 2422	7.94	9.41	4.27
		SPH 1768	11.83	6.17	12.13
		CSH 24MF	19.77	1.85	14.34
4	IAVHT-SS Trial	SPH 1798	15.23	13.45	10.3
		SPH 1858 (SS)	13.18	8.3	11.25
		SPH 1862	0.82	0	15.63
5	SPN KH 2016 Trial	SPV 2242	2.18	9.78	9.64
		IS 2205	1.15	1.19	12.91
		S 652	4.56	8.09	23.59
6	Evaluation of advanced breeding lines	IS 18551	0.45	2.08	9.41
7	Farmer's Survey	**Farmer's field survey during kharif 2016 was conducted for resistance against shoot fly and stem borer and forage sorghum varieties i.e. HJ 541, HJ 513, SSG 59-3 and HC 136 were found promising.**			

Major achievements during 2016-17

Discipline: Agronomy

AICRP Trials			
S. No	Target	Achievement	Shortfall
1	Response of pre-released single-cut forage sorghum genotypes to different fertility levels	Best Genotype – SPH 1752 (GFY 461 q/ha) Best fertilization practice – 125% RDF (366 q/ha) Highest B:C ratio (1.51)	Nil
2	Response of pre-released multi-cut forage sorghum genotypes to different fertility levels	Best Genotypes – SPH 1768 (725 q/ha), SSG 59-3 (675 q/ha) Best fertilization practice – 125% RDF (719 q/ha) Highest B:C ratio (1.89)	Nil

Major achievements during 2016-17

Discipline: Agronomy

3	**Effect of production inputs on the fodder yield and quality of single-cut forage sorghum.**	**T_1: Control (only improved genotype without any input)** **T_2: Full package of practice (FPP) i.e. seed treatment + weed control + fertilizer + irrigation + plant protection + improved genotype** **T_3: FPP minus fertilizer** **T_4: FPP minus Weed control** **T_5: FPP minus Plant protection** **T_6: FPP minus Seed treatment** **T_7: FPP minus Irrigation** **T_8: FPP minus Improved genotype (local cultivar Duggi was used)**	**Nil**

T_2 FPP: (GFY 631 q/ha)

T_1 Control: (GFY 355 q/ha)

- **The results indicate that the greatest reduction in green fodder yield (44%) was observed when all the management components were absent, followed by the absence of improved genotype (43%) and plant protection (26%).**

Major achievements during 2016-17

Discipline: Agronomy

State trials			
4	Effect of varying Phosphorus levels on fodder yield and quality of Forage Sorghum	P levels: 0, 15, 30, 45, 60, 90 kg P_2O_5/ha Most economic P fertilization practice – 30 kg P_2O_5/ha (517 q/ha); Maximum B:C ratio (1.94) at 30 kg P_2O_5/ha although GFY increases up to 90 kg P_2O_5/ha (541 q/ha)	Nil
5	Effect of varying potassium levels on fodder yield and quality of Forage Sorghum	K levels: 0, 20, 30, 40, 50, 60 kg K_2O/ha Highest GFY/ha: 40 Kg K_2O/ha and it was on a par with 30, 40 and 50 kg K_2O/ha Maximum B:C ratio (1.83) at 30 and 40 kg K_2O/ha	Nil

Major achievements during 2016-17

Crop physiology

3	**Trial 3K - Evaluation of sorghum elite lines (sweet sorghum) for salinity tolerance**	**Salinity Levels: Control, 8 dS m^{-1} and 10 dS m^{-1}** 18 entries (All AVHT advanced sweet and forage sorghums plus checks)+3 local checks	**Nil**

- **At 50% flowering stage, SPV 2457, SPV 2462, CSH 22SS, CSH 24SS and SSG 59-3, HJ 541 genotypes survived up to 10 d Sm^{-1} of salinity.**

- **At physiological maturity stage, SPH 1859, SPH 1861, SPV 2457, SPV 2461, SPV 2462 and HJ 541 survived up to 10 d Sm^{-1} of salinity.**

- **Only two genotypes SPV 2457 and CSH 22SS (c) set seeds at 10 d Sm-1 of salinity. and minimum sodium content and maximum K^+ content was also observed.**

- **Among all the genotypes, maximum Ca^{2+} content was estimated in SPV 2457 (0.32 mg/plant).**

Major achievements during 2016-17

Discipline: Extension including FLDs

FLD's conducted: 25 (0.4 ha each)			
Total area covered under FLD: 10 ha			
Single cut varieties			
S. No.	Sorghum cultivar	Green fodder yield (q/ha) FLDs	B:C ratio
1	HC 136	370.0	1.43
2	HC 171	363.8	1.40
3	HC 260	365.7	1.41
4	HC 308	393.3	1.51
5	HJ 513	415.5	1.60
6	HJ 541	437.5	1.68
	Mean (FLDs)	**391.0**	**1.51**
	Mean (Farmer Practices)	325.6	1.27
			20 % Increase over FPP
Multicut varieties			
7	SSG 59-3	490.0	1.57
8	COFS 29	500.0	1.60
	Mean (FLDs)	**495.0**	**1.59**
	Mean (FP)	483.0	1.54
			2.5% Increase over FPP

Constraints

Sl No	Constraint	Suggestions
1	Budget for contingency is not sufficient.	It should be increased because labour wages are high in state.

Publications from AICRP-Sorghum centre

Formal	Number
Journal Papers (International)	As 1st author: -1
	As co-author: -
Journal Papers (National)	As 1st author: 5
	As co-author: -
Review papers	As 1st author: -
	As co-author: -
Book Chapters	One
Oral presentations	Two
Popular articles	Five
Technical Bulletin	–
Field days organized/attended	One

Publications:

1. Pummy Kumari, Satyawan Arya, S.K. Pahuja, U.N. Joshi and S.K. Sharma. 2016. Evaluation of forage sorghum genotypes for chlorophyll content under salt stress. *International Journal of Science, Environment and Technology,* **5(3):** 1200–1207.
2. Pummy Kumari, S.K. Pahuja, Satyawan Arya and U.N. Joshi. 2016. Evaluation for Morphological and Biochemical Traits Related to Quality Biomass Production among MS Based Forage Sorghum Hybrids. *Ekin Journal of Crop Breeding and Genetics* ***2(2):***33-40.
3. Satpal, B. S. Duhan, S. Arya, Pummy Kumari and S. Devi. 2016. Performance of single cut forage sorghum genotypes to different fertility levels. *Forage Res.,* **42**(3): pp. 184-188.
4. Pummy Kumari, Satyawan Arya, S.K. Pahuja, R.S. Sheoran, Satpal, Ravish Panchta and S.P. Singh. 2017. Evaluation for biomass production related traits along with impact of weather parameters on insect-pest incidence in sweet sorghum genotypes. *Environment and Ecology***., 35 (2A).**
5. Pummy Kumari, S.K. Pahuja, Ravish Panchta, Satyawan Arya, Satpal, Jayanti Tokas and Aruna C. 2017. Evaluation of forage sorghum brown midrib lines for quality biomass production. *Global J of Biosciences and Biotechnology.***, 6(2).**
6. Pummy Kumari, S.K. Pahuja, R.S. Sheoran, Satyawan Arya and U.N.Joshi. 2017. Effect of varying levels of salinity on growth, yield and quality of forage sorghum genotypes. **(Submitted in Forage Research)**

Book chapter:

1. **Kumari P, Pahuja SK, Arya S** and Patil JV. 2016. Chapter 7. Sorghum, In: Crossing the genetic base of grain cereals (Eds Mohar Singh & Sandeep Kumar) Springer. DOI 10.1007/978-81-322-3613-9.

Paper presentation:

Dr. S.K. Pahuja had presented a paper entitled "Combining ability and heterosis studies in forage sorghum hybrids for yield, quality and their related traits" in **7th International Seminar, on Sustainable Res. Management towards Food, Energy, Environment and Livelihood**. Nov, 27-29, 2016, Gottingen, **Germany**.

Dr. Pummy Kumari had presented a paper entitled " Evaluation of forage sorghum brown midrib lines for quality biomass production" in **International Conference on Science, Technology, Women Studies, Business & Social Sciences, November 03-05, 2016; Pajifond, Margao, Goa, India**

Popular Article:

1. **Pummy Kumari**, **Pahuja S K and Arya S.** (2016). *Jowar ki unnat kismaae*. Haryana Kheti: 49(5) 27-28.
2. Arya R.K., **Satpal** and Panchta Ravish (2016). *Kharif chara faslon ki beej utpadan sambandhi jaankaari*. Haryana kheti **49**(5) pp; 2-3.
3. **Satpal**, **Pahuja S.K**. and Sheoran R.S. (2016). *Garmiyon va kharif me hara chara utpadan. Haryana kheti* **49**(5) pp; 4-6.
4. **Satpal**, **Pahuja S.K. and Arya Satyawan** (2016). *Hare chare ke liye jawar ki unnat sasya kriyayen. Haryana kheti* **49**(5) pp; 9-10.
5. **Tokas Jayanti,** Joshi U.N. and **Satpal** (2016). *Chara faslon ki gunvatta. Haryana kheti* **49**(5) pp; 25 - 26.

Abstracts:

1. Kumari P, Pahuja S.K., Arya S and Tokas P. 2016. Evaluation of forage sorghum brown midrib lines for quality biomass production" in Proceeding of IMRF'S 43rd Int Conf., Pajifond, Margao, Goa, India.

2. Pahuja S.K., Kumari P, Arya S and Joshi U.N. 2016. Combining ability and heterosis studies in forage sorghum hybrids for yield, quality and their related traits.7th International Seminar, Nov, 27-29, 2016, Gottingen, Germany.

3. Dahiya O.S, Mor V.S, Kumari P, Bhuker A and Punia R.C. 2017. Effect of panicle shape on the seed quality of forage sorghum. ISST XIV National Seed Seminar 2017, ICAR-IARI, New Delhi.

Other activities rendered by all scientists

Sl. No	Activities	Number	% time spent
1	Trainings organized by centre	20	6%
2	Trainings attended by scientists	Four	6%
3	Guiding students	Six	10%
4	Institutional activities	➢Teaching One to two courses per semester ➢Involved in university exams and entrance exams ➢Extension activities farmers interaction ➢Kisan melas	10%
5	Recognitions	Nil	-

Monitoring Team Visit at Hisar

Trainings organized under RKVY project on "Quality Seed Production of Forage Crops"

Cont..

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चारा फसलों का वैज्ञानिक विधि द्वारा
किसान प्रशिक्षण
दिनांक : 13.10.2016

चौधरी चरण सिंह हरियाणा कृषि विश्वविद्यालय, हिसार

विश्वविद्यालय, हिसार

चौ. चरण सिंह हरियाणा कृषि विश्ववि
कृषि विज्ञान केन्द्र, फतेह
आपका हार्दिक स्वागत क

Major activities/objectives for 2016-17

Discipline	Major activities envisaged
Breeding	Development of high fodder yielding forage sorghum single cut and multicut hybrids/varieties resistant to stem borer with better nutritional quality. Use of diverse germplasm lines in crossing programme
Agronomy	To work out the ideal agronomic practices for the cultivation of forage sorghum.
Quality	To conduct quality analysis of breeding and agronomy trials of different stations as per decision at AGM 17 To conduct quality analysis in the state trials finalized in state technical programme at CCS HAU, Hisar

Thanks
HJ 541