



मैहतान्सिज Mehtaensis



प्र० के.सी. मैहता के नाम पर जारी क्षेत्रीय केन्द्र के शोध का छमाही न्यूज़लेटर: संस्थापक: डा. सुब्रमण्यम. नागराजन
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अनुसंधान संस्थान, क्षेत्रीय
केन्द्र, फ्लावरडेल,
शिमला-171002 हि.प्र. भारत.

I.C.A.R.-Indian Institute of
Wheat and Barley Research,
Regional Station, Flowerdale,
Shimla 171 002 H.P. India

Compiled and Edited by

Hanif Khan, O.P. Gangwar,
Pramod Prasad and S.C. Bhardwaj

Technical Assistance:

S.B. Singh and Subodh Kumar

Email: dwrfdl@hotmail.com

Tel.: +91 177 2621978

Fax: +91 177 2620108



Prof. K.C. Mehta (1892-1950)
Founder of the Flowerdale station

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		सामग्री भी शामिल थी। एवीटी प्रथम व द्वितीय वर्ग की 150 लाईनें तीनों
		रतुआ के विभिन्न प्रभेदों द्वारा विश्लेषित की जा रही हैं। गेहूँ के

इस प्रकाशन में प्रकाशित की गई कोई भी जानकारी बिना अध्यक्ष, क्षेत्रीय केन्द्र की अनुमति के जारी न करें।

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विभिन्न रोगों की निगरानी तथा नये पैथोट्राईप की उत्पत्ति जांचने के लिए डब्ल्यू.डी.एम.एन. तथा सार्क डब्ल्यू.डी.एम.एन., पचास से अधिक स्थानों पर लगाये गये। पीला रतुआ का प्रकोप गेहूँ की प्रारम्भिक अवस्था पर दिसम्बर माह के द्वितीय पखवाड़े में पंजाब के रोपड़, आनन्दपुर साहिब व होशियारपुर में देखा गया। यूजी99 प्रतिरोधी जीन वाले गेहूँ के तीन आनुवांशिक स्टॉक एफएलडब्ल्यू 31, एफएलडब्ल्यू 32 व एफएलडब्ल्यू 33 विकसित किये गये हैं। ऑफ सीजन नर्सरी में गेहूँ की 325 लाईनें चयन व पीढ़ी अग्रसर हेतु लगाई गई। गेहूँ की किस्म एचएस 542 का अग्रिम प्रदर्शन सोलन जिले के अर्की तहसील के अंगिकृत गांवों के 12 किसानों के खेत में लगाया गया।

Executive Summery

During offseason 135 samples of three rusts of wheat were received from Himachal Pradesh, Punjab, Tamil Nadu and Uttarakhand. 49 samples of all three rusts of wheat were analyzed, some of which were spill over of main season. **Ug99 type of virulence was not identified anywhere in India.** In brown rust pathotype77-5 (121R63-1) of brown rust, 46S119 and 110S119 of yellow rust and 40A (62G29) of black rust were found most frequently among the analyzed samples. Nucleus inocula of three rusts were also supplied to 38 Scientists/Research centres to facilitate research work elsewhere in India. More than 2850 lines of wheat and barley were evaluated against the pathotypes of different rusts. The tested material included the breeding lines provided by breeders from various parts of India, exotic wheat lines from CIMMYT and ICARDA. In addition 150 lines of AVT I and II are being evaluated against different pathotypes to identify rust resistant wheat lines. For monitoring the occurrence/spread of different diseases of wheat, Wheat Disease Monitoring Nursery (WDMN) and SAARC-WDMN were planted at 50 and 28 locations, respectively. Early occurrence of yellow rust was reported from Ropar, Anandpur Sahib and Hoshiarpur district of Punjab. Three Ug99 resistant genetic stocks namely FLW31, FLW32 and FLW33 have been developed. FLW31 and FLW33 are completely resistant against black and brown rusts while FLW32 has resistance to black rust and adult plant resistance against yellow and brown rusts. Work on standardization of doubled haploid production in wheat using maize pollination induced chromosome elimination was initiated. Offseason nursery was used for selection and generation advancement of 325 wheat lines. Under frontline

demonstration of wheat variety, HS542 was planted in five adopted villages (12 farmers) of Tehsil Arki (Solan district of Himachal Pradesh).

1. Occurrence of rusts on summer and regular crop of wheat and barley

The off season wheat crop (2015) witnessed occurrence of brown and black rusts of wheat at Wellington, Tamil Nadu. One hundred samples of yellow rust were received from different locations mainly, from Dalang Maidan, Lahaul & Spiti district. Yellow rust was also observed on some members of Gramineae family. These samples were collected and are being tested for its infection ability on wheat differentials. Two samples of wheat brown rust were also collected from offseason nursery at Dalang Maidan, Himachal Pradesh. Samples of brown and black rusts were received from Uttarakhand state during offseason. In regular season a few samples of brown and black rusts were received from Punjab. Barley yellow rust was not observed in any of the states including Dalang Maidan during the offseason. Brown rust was observed on many entries of wheat disease monitoring nursery, planted at regional station, ICAR-IIWBR, Shimla. Brown rust first appeared on 6th of October on Wheat Disease Monitoring Nursery (WDMN) at Shimla. Early occurrence of yellow rust was reported on the wheat crop in Anandpur Sahib Block of the Ropar district in Punjab. It was spotted at four places on December 18, 2015. During second fortnight of December, 2015, three more fields in different villages were found affected. Anandpur Sahib Block agriculture officer Avtar Singh reported that on December 18, 2015 yellow rust was seen in Nakkian, Bela Ramgarh and Behrampur Upper villages. Later on, it was detected at Raipur Patti and two spots at Dabkhera. The state department of agriculture officials ensured that the infected crop was sprayed with Propiconazole 25 EC (Tilt) or Tebuconazole 250 EC (Folicur) or Triademephon 25 WP (Bayleton) fungicides. Scientists from the Indian Institute of Wheat and Barley Research (IIWBR) visited yellow rust infected wheat crop in the Kandi belt of Punjab. Yellow rust was observed on wheat variety HD2967 in Hoshiarpur district of Punjab. Farmers were advised that yellow rust should be controlled immediately as it can spread quickly and cause severe losses in crop yield, if not checked in time.

2. Sample receipt of wheat and barley rusts

A total of 135 samples of wheat rusts were received during the period under report. Maximum number of samples for black rust were received from Uttarakhand state, yellow rust samples were in highest number from Lahaul & Spiti, Himachal Pradesh (**Table 1**).

Table- 1: Samples of wheat and barley rusts received up to 31.12.2015

S. No.	States	Total no. of samples received	Rusts			
			Black	Brown	Yellow	
					Wheat	Barley
1	Tamil Nadu		7	6	-	-
2	Punjab		-	1	2	-
3	Uttarakhand		12	5	-	-
4	Himachal Pradesh		-	2	100	-
	Total		19	14	102	-

3. Pathotype distribution of *Puccinia* species on wheat

Of the 135 samples of wheat rusts, 49 have been analyzed till 31.12.15, others are being processed. Twenty yellow rust samples received from Himachal Pradesh were analyzed and pathotype analyses showed the presence of 46S119 in eleven samples, 46S117 in one sample, 110S84 in two samples and 110S119 in six samples. Increasing frequency of pathotype 110S119 indicate the spread of this new race to more areas. Pathotype78S84 was not found in any of the recorded samples. In case of black rust pathotype 21 and 21A-2 pathotypes were observed in samples received from Uttarakhand state. Black rust samples received from Tamil Nadu were found to be 40A (62G29) and 40-3 (127G29). In brown rust, pathotype 77-5 (121R63-1) was recorded in three samples, pathotypes 77-9 (121R61) in two samples and 12-5 (29R45) and 107-1 (45R35) in one sample each. Pathotype77-5 and 77-9 were observed in samples from Tamil Nadu, whereas 12-5 and 107-1 from Himachal Pradesh (**Table 2**).

4. Seedling resistance test on wheat and barley against rust pathotypes

During the period more than 2850 lines of wheat and barley were evaluated for seedling resistance against different pathotypes of three rusts of wheat & barley. The lines evaluated include barley nursery from ICARDA, Wheat SSRN from CIMMYT, Advanced Varietal Trial (AVT-I &AVT-II), breeding lines from nine wheat breeders from different ICAR Institutes and State Agricultural universities. Besides this, fourteen lines of French bean were also evaluated against six isolates of bean rust. The details of the material studied for seedling resistance test is depicted in Table 3.

Table- 2: Pathotype distribution of Wheat rust pathogen up to 31.12.2015

S.N o.	State	Black Rust					Yellow rust					Brown rust				
		No. of Isolates analyzed	Pathotypes*				No. of Isolates analyzed	Pathotypes*				No. of Isolates analyzed	Pathotypes*			
			21 -1	21 A-2	40 A	40- 3		46S 119	46S 117	110S 84	110S 119		12-5	77-5	77-9	107-1
1	Himachal Pradesh	-	-	-		-	20	11	1	2	6	6	1	-	-	1
2	Tamil Nadu	3	-	-	2	1	-	-	-	-	-	10	-	3	2	-
3	Uttarakhand	10	4	6	-	-	-	-	-	-	-	-	-	-	-	-
4	Jammu & Kashmir	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	Punjab	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total		13	4	6	2	1	20	11	1	2	6	16	1	3	2	1
Grand Total		49														
* Black/stem rust:21-1 (24G5)=CKMCC, 21A-2 (75G5)=CHTSC, 40A (62G29)=PTHSC, 40-3 (127G29)=HRHSC, Brown/leaf rust: 12-5 (29R45)=FHTPM, 77-5 (121R63-1)=THTTM, 77-9 (121R60-1)=MHTKL, 107-1(45R35)=JCGPL																

Table-3: Details of material for seedling rust resistance up to 31.12.2015

Sr. No.	Details of Lines	No. of Lines	Pathotypes		
			Black rust	Brown rust	Yellow rust
1	ICARDA, Barley Nursery	336	Mix	Mix	M, 24, 57, G, Q, 7S0
2	CIMMYT, IX SSRN	250	Mix	Mix	110S247 and Mix
3	Satish Kumar, IIWBR, Karnal	77	11, 34, 40A, 117-6, 295	12-5, 77-2, 77-5, 77-10 and 104-2	46S119, 78S78, P, 110S119, 110S247
4	J.P.Jaiswal,GBPUA&T	212	-	77-9, 77-5, 104-2	46S119, 78S84, 110S84, 284S119
5	Hanif Khan, IIWBR, Shimla	743	Multiple pathotypes	Multiple pathotypes	Multiple pathotypes
6	K.Kaushal IARI, Indore	48	-	77-5 and 104-2	-
7	AVT I & II	150	Multiple pathotypes	Multiple pathotypes	Multiple pathotypes
8	Ramesh Kumar,	55	Mix	Mix	Mix
9	Barley Int. differentials	28	Selected	Selected	Selected
10	Lr Lines	72	-	Multiple pathotypes	-
10	PAU, Ludhiana	325	-	77-5, 104-2	46S119, 110S119, 78S84
11	H S Balyan, Meerut	25	Multiple pathotypes	Multiple pathotypes	Multiple pathotypes
12	Rekha Malik, IIWBR, Karnal	527	40A	-	-
13	YSP, UH&F, Nauni, Solan	16	Six isolates of bean rust		
Total		2864			

Table 4: Seedling resistance test and adult plant resistance of genetic stocks with virulent pathotypes of brown, black and yellow rusts

Genetic stock	Black Rust						Brown rust				Yellow rust			
	SRT					APR at Kenya 2013	SRT			APR at Shimla 2014-15	SRT			APR at Shimla 2014-15
	40A	40-1	117-1	117-6	Pgt mix	Ug99	77-5	104-2	Ptr mix	Ptr mix	78S84	46S103	46S119	Pst mix
FLW31	0;	0;	0;	0;	0;	R	;1	;1	;1	R	3+	3+	3+	30MS
FLW32	0;	0;	;	;	;	R	3+	;12	3+	20MR-MS	3+	3c	3c	20MR-MS
FLW33	0;	0;	0;	0;	;	R	;1	;1	;1	R	3+	3+	3+	30MS

5. Genetic studies and development of rust resistant genetic stocks

i. Screening of germplasm and advance generation material at seedling stage:

More than 700 lines were screened using most virulent pathotypes of the three rusts. Besides this, studies on resistance pattern were performed and gene postulations based on Multipathotype data were done. More than forty parents were identified for genetic studies and gene pyramiding.

ii. Genetics of rust resistance in wheat material:

Fifteen crosses were analyzed for genetic analysis of rust resistance. Lok-1 was found to carry one unknown dominant brown rust resistance gene in addition to *Lr13*. Cross of Agra local and HI 1077 was analyzed and it showed presence of one black rust resistance gene in addition to *Sr2*, *Sr9b* and *Sr11*. F₃ analysis of cross between Agra local and NI 5439 revealed one dominant gene imparting black rust resistance in addition to *Sr11*. The F₃ family segregation analysis of cross between LWH and NIAW 34 showed presence of adult plant resistance gene different from *Lr34*, *Lr46* and *Lr67*. Molecular marker analysis using known gene marker for *Lr34*, *Lr46* and *Lr67* confirmed that APR gene for brown rust resistance is different. Test cross analysis of F₂ and F₃ generation of FLW 14 and Cappelle Deprez (CD) showed that the gene conferring yellow rust resistance in the two genotypes is same.

iii. Development of rust resistant genetic stocks.

Three rust resistant genetic stocks, namely FLW31, FLW32 and FLW33 carrying *Sr43*, *Sr26* and *Sr32*, respectively were developed. These provide complete resistance against black rust pathotypes of Indian sub-continent (Table 4). These three genotypes also showed good resistance against Ug99 and its variants when evaluated in Kenya during 2013. The major characteristics of these genetic stocks (Table 5) are summarized below.

FLW31 is derived from the cross between HI1500 and exotic line *Sr43*. This genotype is completely resistant to black and brown rusts. FLW31 carries *Sr24/Lr24* and *Sr43*. This genotype has an average plant height of 105 cm and matures in 155 days under Shimla conditions. Its grains are amber coloured and thousand

grain weight is 41.6 g. Yield per meter row is 124 g which is at par with the parent variety HI1500.

FLW32 has been developed from cross Raj3765/Eagle. Eagle is a source of *Sr26* derived translocation on 6A from an alien segment from *Agropyron elongatum*. Two backcrosses followed by pedigree selection for resistance and yield attributes were done to develop this stock. The developed stock provides complete resistance against stem rust pathotypes and adult plant resistance against yellow and brown rusts. It also showed resistance against Ug99 and its variants when tested in Kenya in 2013. FLW 32 carries *Lr10*, *Lr13*, *Sr2*, *Sr26*, and *Yr2Ks* and *Yr5*. This genotype has an average plant height of 99cm and takes 152 days to mature under Shimla conditions. The grains are amber and on an average weigh 42.1 g per 1000 grains. The yield of FLW32 is 131g per meter row length which is at par with the recipient parent Raj3765.

FLW33 has been developed to enrich Ug99 resistant sources available to the Indian wheat breeders, particularly in Central Zone (CZ) and Peninsular Zone (PZ). This genotype is a derivative of cross between HI1500 and donor line *Sr32* through pedigree selection method. It is completely resistant to black and brown rusts and partially resistant to yellow rust of wheat. Its yield is slightly less than HI1500. Average plant height is 93 cm and maturity duration is 145 days under Shimla conditions. FLW33 possesses rust resistance genes *Sr24/Lr24* and *Sr32*.

Table 5: Characteristics of three Ug99 resistant genetic stocks

Genetic stock	Pedigree	Rust resistance genes present	Plant Height (cm)	Days to maturity	1000 grain wt	Yield/M row (g)	Grain Colour
FLW31	HI1500/ <i>Sr43</i>	<i>Lr24</i> , <i>Sr24</i> , <i>Sr43</i>	105	155	41.6	124	Reddish-amber
FLW32	Raj3765/Eagle (<i>Sr26</i>)	<i>Yr2ks</i> , <i>Lr10</i> , <i>Lr13</i> , <i>Sr2</i> , <i>Sr26</i>	99	152	42.1	131	Amber
FLW33	HI1500/ <i>Sr32</i>	<i>Lr24</i> , <i>Sr24</i> , <i>Sr32</i>	94.3	145	41.4	122	Reddish-amber

iv. Standardization of doubled haploid production technique in wheat:

F₂ population of cross VL907/FLW21 was used to get haploid embryos using maize pollen induced chromosome elimination. Maximum caryopses were harvested in the month of August, 2015 under Polyhouse conditions with temperature range of 20-30 °C. 2,4D was applied in four concentrations (100, 125, 150 and 200 ppm) in stem as well as on florets 24 hours after pollination. The best results were found with 125 ppm 2, 4 D application 24 hours after pollination. Haploid embryos were successfully rescued in MS Media supplemented with Kinetin 100 ppm after 18-20 days of pollination. Average regeneration of haploid embryos was 45 percent.

v. Generation advancement of experimental wheat material in offseason nursery

A total of 325 lines of wheat were planted at the offseason nursery at Dalang Maidan, in Lahaul & Spiti, Himachal Pradesh between May and September 2015. Scoring for yellow rust and selection of individual plants was done in the segregating wheat material. Three populations namely LWH/NIAW34 (F₆), LWH/Lok-1 (F₆) and Agra Local/HD2922 (F₅) were grown in polyhouse between July-November, 2015. LWH/NIAW34 (F₆) showed presence of two adult plant resistance genes for brown rust.

6. Maintenance and supply of nucleus inocula of wheat and barley rusts

A collection of 127 pathotypes of different rust pathogens of wheat, barley, oat and linseed was maintained in live culture as well as cryo-preserved. During the period nucleus/bulk inocula of different rusts of wheat and barley were supplied to 39 centres/Scientists working under public and private sector across India (Table 6) for the smooth conduct of rust research elsewhere in India.

Table 6: Details of rust inoculum and Genetic Stock supplied up to 31.12.2015

S. No.	Name	Place	Kind of rust/pathotypes supplied
1.	V.K. Mishra	BHU, Varanasi	FLW29, FLW30
2.	A.P. Agarwal	Bilaspur, Chhattisgarh	Black and Brown
3.	Shailendra Jha	IARI, New Delhi	Brown and Yellow
4.	B.C. Game	Nasik, Maharashtra	Black and Brown
5.	B.K. Honrao	Pune, Maharashtra	Mixture of Black and Brown
6.	D.A. Gadekar	Nasik, Maharashtra	Black and Brown
7.	D.P. Walia	Tutikandi, HP	Yellow, Black and Brown FLW10, 16, 21, 22
8.	Dhanvir Singh	Dhaulakuan, HP	Mixture of yellow
9.	JaspalKaur	Ludhiana, Punjab	Brown and Yellow
10.	JavadBahar Khan	Kanpur, UP	Brown and Yellow
11.	K.K. Mishra	Powarkheda, MP	Black and Brown
12.	K.K. Mishra	VPKAS, Almora	Brown and Yellow
13.	K.H. Dhabhi	JAU, Junagarh, Gujrat	Black and Brown
14.	Maharastra Hybrid Seed Co.	Karnal, Haryana	Black, Brown & Yellow Mix.
15.	M.S. Saharan	Karnal, Haryana	Yellow and Brown
16.	M. K. Pandey	Jammu, J. & K.	Yellow and Brown
17.	A. K. Vasandrai	HPKV, Malan	Yellow and Brown
18.	T.L. Prakash	IARI, Indore	Brown and Black
19.	R.S. Beniwal	CCSHAU, Hisar	Black and Brown
20.	J.B. Sharma	IARI, New Delhi	Black
21.	P.V. Patil	UAS, Dharwad,	Black and Brown
22.	P.S. Shekhawat	Jaipur, Rajasthan	Yellow and Brown (Barley& Wheat)
23.	Praveen Chuneja	Ludhiana, Punjab	Brown
24.	RajvirYadav	New Delhi	Yellow Mix
25.	RashmiAgrawal	New Delhi	Yellow
26.	RituBala	Ludhiana, Punjab	Yellow and brown
27.	RudraNaik, V.	Dharwad, Karnataka	Brown Mix
28.	S.I. Patel	SDAU, Vijapur, Gujarat	Black and Brown
29.	S.K. Jain	Almora, Uttarakhand	Yellow mix (Wheat & Barley)
30.	Laxmikant	VPKAS, Almora	Brown and yellow mix FLW1, 10, 21

31.	S.S. Vaish	Varanasi, UP	Yellow and Brown
32.	SabanaParveen	Karnal, Haryana	Brown and yellow mix
33.	SatinderKaur	Ludhiana, Haryana	Brown mix
34.	Vaibhav Singh	New Delhi	Yellow, brown , Black + seed
35.	Vinod	New Delhi	Yellow, brown &black
36.	Dr. Vishnu Goyal	IIWBR, Karnal	Yellow mix (Barley)
37.	Pradeep Sharma`	IIWBR, Karnal	FLW 29 and FLW30
38.	S. G. Sawathe	MPKV, Mahabaleshwar	Seed of Differential set of Brown & Black

7. Monitoring of wheat and barley rusts

To monitor the occurrence of wheat and barley rusts, off-season (2015) wheat disease monitoring nurseries (WDMNs) were conducted at Dalang Maidan (H.P.), Sangla (H.P.), Kukumseri (H.P.) and Leh (J. & K.). For main crop season (2015-16), WDMN has been planted at more than 50 locations in the areas bordering to neighbouring countries, hotspot locations and main wheat belt areas of the country. To monitor the occurrence of different diseases of wheat in SAARC countries, SAARC-WDMN was planted at 28 locations across the six SAARC countries *viz.*, Afghanistan, Bangladesh, Bhutan, India, Nepal and Pakistan. So far rusts have not been reported on any of the entries of these nurseries.

8. Request for sending of rust samples of wheat and barley

To monitor pathotype distribution of wheat and barley rusts effectively and to detect new pathotypes in the initial stages in different agro-ecological regions of India, rust samples are analyzed for the identification of pathotypes. Therefore, help of all the co-operators is solicited for collecting wheat rust samples from different regions, farmers' fields and disease monitoring nurseries representing different cultivars/lines in this endeavour to combat wheat and barley rusts in the region.

Collection of rust samples

A good rust sample needs following treatment:

- I. Small bits (2-3") of rust infected fresh leaves/stems should be shade dried overnight at room temperature.

II. Shade dried samples should be put in paper envelopes separately or wrapped in newspaper and sent immediately by post.

III. Following information may be given on each envelope

- a. Type of rust: brown/black/yellow
- b. Details of host: wheat/barley, variety/line
- c. Place of collection
- d. Date of collection
- e. Name and address of the co-operator

IV. Since samples from lines/varieties having little rust or from rust resistant material are important from analysis point of view, therefore, these should be treated on priority.

Precautions to be taken

- i. Samples should be representative of a locality, variety and not repetitive.
- ii. Samples should not be taken from moist, dried or dead plant parts/plants.
- iii. Only fresh uredial infections may be sent, as old and dried plant parts may not have viable spores.
- iv. Samples should be sent at the earliest possible to ICAR-IIWBR, Flowerdale, Shimla, H.P.

Very Important

- i. Glossy paper/polythene envelopes should not be used for collecting or mailing samples.
- ii. Samples should not be taken from the sites of artificial inoculations; otherwise it should be mentioned accordingly.

9. News and new Joining

- i. Dr. Indu Sharma, Director of ICAR-IIWBR, Karnal visited the station on 3rd October, 2015.
- ii. Dr. S.K. Nayar, former head of the regional station visited the station on 4.11.2015.

- iii. Dr. Om Prakash Gangwar, Scientist was on deputation to Plant Breeding Institute, Cobbitty, University of Sydney, Australia from Sept. 15 to Dec. 01, 2015 for training on “Characterization of rust resistance in wheat” under ICAR-ACIAR project. He also participated in BGRI technical workshop 2015 held at Sydney, Australia, from 17-20 Sept., 2015 and IXth International Wheat Conference held at the same venue from 21-24 Sept., 2015.
- iv. Dr. S. C. Bhardwaj Head & Principal Scientist, participated in the BGRI technical workshop 2015, held at Sydney, Australia, from 17-20 Sept., 2015 and 9th International Wheat Conference held at Sydney from 21-24 Sept., 2015.
- v. Siddanna Savadi, Scientist Plant Biotechnology joined the station on Sept.01, 2015.
- vi. Siddanna Savadi was conferred PhD degree in the Field of Plant Biotechnology on 23.12.2015. Dr Siddanna Savadi worked on transgenic development in Indian mustard (*Brassica juncea*) for increased oil content and seed size under supervision of Dr S.R. Bhat at National Research Centre on Plant Biotechnology, New Delhi.
- vii. Dr. Prem Lal Kashyap, Scientist, Plant Pathology joined the regional station on 13.1.2016 upon transfer from ICAR-NBAIM, Mau, U.P.

10. Village Adoption and Frontline Demonstration

A team of five Scientists of the regional station namely S. C. Bhardwaj, Hanif Khan, O.P. Gangwar, Pramod Prasad and Siddanna Savadi was constituted to adopt five villages under the Hon'ble Prime Minister's initiative “Mera Gaon Mera Gaurav”. The objective of this scheme is to provide with the farmers the required information, knowledge and advisories on regular basis. The team visited Arki Tehsil of District Solan, H.P. on 29th Sept. 2015 and identified village Tanseta, Badog, Brahmna, Rajjena and Nanog under the Block Kunihar, District Solan. A

‘Kisan Gaushthi’ in the presence of Pradhan and Panchayat members was held in village Badog on 29.09.2015 in which large number of farmers from the adopted village participated and discussed their current farming practices and the problems they are facing in increasing the productivity. The farmers were provided the contact numbers of the team members to make available them the required information whenever needed.

Under “Mera Gaon Mera Gaurav” programme Frontline Demonstrations (FLDs) of the new wheat variety HS542 for North Hill Zone were started in the adopted villages. Under the FLD five quintals of wheat variety HS542 was distributed among twelve farmers of the village. An event under ‘Jai Jawan Jai Kisan’ initiative was organized on Dec. 25, 2015 at villages Badog which was attended by 60 farmers from the five adopted villages. Scientists from Regional Station Shimla: S.C. Bhardwaj, Hanif Khan, O.P. Gangwar, Pramod Prasad and Panchayat Pradhan Sh. Yog Raj were present. Farmers were made aware of their important role in meeting the challenges of food production and support of the Govt. of India and ICAR, Dept. of Agriculture to boost the production and making farming an economic pursuit. Importance of improved varieties of crops, control of weeds, diseases and pests was elaborated.

11. Hindi Divas

Hindi Divas was on 16.9.2015 at Regional Station, Flowerdale. The day was marked with interactive discussions. Activities and efforts to promote Hindi in day to day transactions were discussed. Persons from scientific, technical and administrative staff put forth their views on importance of Rajabhasha Hindi and way to improve its use in official work. Messages of President, ICAR (Agriculture Minister, Govt. of India) and Secretary DARE Govt. of India and DG, ICAR were read. A satisfaction was felt on the achievements made during the preceding year.

Annexure I

Constitution of differential sets 0, A and B for the binomial designation of brown, black and yellow rust pathotypes

Set-0	Set-A	Set- B
Brown rust (<i>Puccinia triticina</i>)		
IWP 94	<i>Lr14a</i>	Loros (<i>Lr2c</i>)
Kharchia Mutant	<i>Lr24</i>	Webster (<i>Lr2a</i>)
Raj 3765	<i>Lr18</i>	Democrat (<i>Lr3</i>)
PBW 343	<i>Lr13</i>	Thew (<i>Lr20</i>)
UP 2338	<i>Lr17</i>	Malakoff(<i>Lr1</i>)
K 8804	<i>Lr15</i>	Benno (<i>Lr26</i>)
Raj 1555	<i>Lr10</i>	HP 1633 (<i>Lr9+</i>)
HD 2189	<i>Lr19</i>	
Agra Local	<i>Lr28</i>	
Black rust (<i>Puccinia graminis tritici</i>)		
<i>Sr24</i>	<i>Sr13</i>	Marquis (<i>Sr7b+</i>)
NI 5439	<i>Sr9b</i>	Einkorn (<i>Sr21</i>)
<i>Sr25</i>	<i>Sr11</i>	Kota (<i>Sr28+</i>)
DWR 195	<i>Sr28</i>	Reliance (<i>Sr5+</i>)
HD 2189	<i>Sr8b</i>	Charter (<i>Sr11+</i>)
Lok 1	<i>Sr9e</i>	Khapli (<i>Sr7a, Sr13, Sr14</i>)
HI 1077	<i>Sr30</i>	Tc*6/ <i>Sr31/Lr26</i> (<i>Yr9</i>)
Barley Local	<i>Sr37</i>	
Agra Local		
Yellow rust (<i>Puccinia striiformis</i>)		
WH147	Chinese 166 (<i>Yr1</i>)	Hybrid 46 (<i>Yr4</i>)
Bilara	Lee (<i>Yr7</i>)	Heines VII (<i>Yr2+</i>)
WH416	HeinesKolben(<i>Yr6</i>)	Compair (<i>Yr8</i>)
HD2329	Vilmorin 23(<i>Yr3</i>)	<i>T.spelta album</i> (<i>Yr5</i>)
HD2667	Moro (<i>Yr10</i>)	Tc*6/ <i>Lr26</i> (<i>Yr9</i>)
PBW343	StrubesDickkopf	Sonalika (<i>Yr2+</i>)
HS240	Suwon92 X Omar	Kalyansona <i>Yr2</i> (KS)
Anza	Riebesel47/51(<i>Yr9+</i>)	
A-9-30-1		

Binomial designations are based on the binomial values arrived at on Set A and B whereas - indicates the number of susceptible line in O set. Some of the genes show temperature sensitivity like those on locus *Lr2*, *Lr10*, *Lr17*, *Lr18* ; *Sr13* etc.