मैहतान्सिज

MEHTAENSIS

प्रो0 के.सी. मैहता के नाम पर जारी क्षेत्रीय केन्द्र के शोध का छमाही न्युजलैटर

(Six-monthly newsletter named after Prof. K.C. Mehta)

वर्ष / **VOL. 33** अंक/**No.1** जनवरी / **January–2013**

सहकर्मियों से अनुरोध किया जाता है कि वे अपने आस-पास क्षेत्र से रतुआ नमूने एकत्रित करके प्रभेद विश्लेशण के लिए भेजें । The co-operators are requested to send the rust samples for pathotype analyses

संकलन :
क्षेत्रीय केन्द्र,
गेहूँ अनुसंधान निदेशालय,
(भा. कृ. अनु. प.)
फ्लावरडेल, शिमला-171002

फोन 0177– 2621978 फैक्स : 0177–2620108 ई मेल : dwrfdl@hotmail.com

1. सारांश/Executive summary

गेहूँ के तीनों प्रकार के रतुए ग्री-म ऋतु की फसल जो नीलगिरी पहाड़ियों (तमिलनाडु), लेह (जम्मू कश्मीर) में पाए गए तथा काला रतुआ किन्नौर और लाहुल स्पिति के हिस्सों में नहीं देखा गया। इसके अतिरिक्त हिमाचल प्रदेश में रवी फसल में रतुओं का प्रकोप नहीं पाया गया। कर्नाटक के कुछ भागों में बहुत कम मात्रा में भूरा रतुआ पाया गया। तीनों रतुओं के 210 से अधिक नमूनों का प्रभेदों के लिए विश्ले-ाण किया गया। रतुए का कोई नया प्रभेद नहीं आंका गया। काले रतुए के प्रभेद 40ए, 40-1; भूरे रतुए के 77-5, 104-2; पीले रतुए के 46एस119, 78एस84 भारत एवं पड़ोसी देशों में पाए गए।

गेहूँ एवं जौ की 1811 किस्मों में रतुआ प्रतिरोधी ृक्ति का परीक्षण किया गया तथा इन में से कुछ में रतुआ प्रतिरोधी जीन आंके गए तथा कुछ में जीन को सत्यापित किया गया। रा-ट्रीय संग्रहाल्य में विभिन्न रतुओं के 126 प्रभेद जीवित अवस्था में तथा कम तापमान पर सुरक्षित रखे गए । रतुआ ृोध देश के अन्य भागों में सुचारू रूप से हो इसके लिए रतुआ के जीवाणु सरकारी एवं गैर सरकारी संगठनों के 38 वैज्ञानिकों /केन्द्रों को प्रेि-त किए गए ।

गेहूँ रोग परीक्षण नर्सरी जिसमें सार्क नर्सरी भी ृामिल है देश के 45 विभिन्न क्षेत्रों में लगाई गई है । रतुआ प्रतिरोधी सामग्री तैयार करने हेतू एवं आनुवांशिक विश्ले-ाण हेतु 34 क्रौस संयोजन परीक्षित किए गए तथा उचित पंक्तियां आगे बढाने के लिए लगाई गई ।

All the rusts of wheat were observed in Summer Crop of Nilgiri hills (Tamil Nadu) and Leh (Jammu & Kashmir) whereas black rust was not observed in Dalang and Kinnaur areas of Himachal Pradesh. Owing to the dry weather there was no record of rusts except for mild brown rust in Karnataka.

Analysis of 213 samples of rusts of wheat and barley indicated that there was no occurrence of new pathotypes. Pathotype 40A followed by 40-1 of black rust, 46S119 followed by 78S84 of yellow rust and 77-5 followed by 104-2 of brown rust were predominant in wheat growing areas of India and neighboring countries. To identify the rust resistant lines, characterizing resistance genes, confirm the presence of resistance genes and genetics of rust resistance 1811 lines of wheat were subjected to multi pathotype evaluation. National repository of 126 pathotypes of different rust pathogens was maintained, nucleus bulk inocula were supplied to 38 Scientist/centres in public and private sectors. Wheat disease monitoring nursery was a organized for planting at 45 locations. Evaluation and advancement of 34 cross combinations is being undertaken.

2. Incidence of wheat rusts

All the rusts of wheat were observed in summer crop in Nilgiri hills (Tamil Nadu) and Leh–Ladhakh (Jammu & Kashmir). In Himachal Pradesh both yellow and brown rusts were recorded in Dalang Maidan (Lahaul & Spiti) whereas, black rust was not observed anywhere in Himachal Pradesh. In regular crop the weather has remained quite dry and there was no report of occurrence of wheat rusts. Areas surveyed were Kangra, Hamirpur, Bilaspur and Sirmaur districts in Himachal Pradesh. Most of the areas were rainfed and crop was normal. In Peninsular India, mild brown rust was reported in some parts of Karnataka.

3. Sample receipt and analyses

During this period 331 samples of three rusts of wheat and barley were received/collected from summer crop areas and Karnataka. The detail of samples is given in Table-1.

Table- 1 : Samples of wheat and barley rusts received up to 31.12.2012

S. No.	States	Rusts			
		Black	Brown	Yellow	
				Wheat	Barley
1	Tamil Nadu	80	112	12	1
2	Jammu & Kashmir	1	4	17	1
3	Himachal Pradesh	0	11	98	0
4	Karnataka	0	4	0	0
	Total	81	131	117	2

4. Pathotype distribution of *Puccinia* species

During this period 213 samples of wheat and barley rusts were analyzed for pathotype distribution. It includes some of the carryover samples from previous crop season.

i. Black rust of wheat (*Puccinia graminis tritici*)

Forty one samples were analyzed from Tamil Nadu, Jammu & Kashmir and Nepal. Six pathotypes were identified in these samples. Pathotype 40A was the most predominant followed by 40-1. The race structure of

Tamil Nadu was most diverse where five pathotypes were identified. In Jammu Kashmir and Nepal, pathotype 34-1 was identified in one sample each (Table -2).

Table- 2 : Pathotype distribution of *Puccinia graminis tritici* up to 31.12.2012

Sr. No.	States	No. of Isol. analyzed	Pathotypes*					
			15-1	34-1	40A	40-1	40-2	40-3
1	Tamil Nadu	39	2	0	22	11	1	3
2	Jammu & Kashmir	1	0	1	0	0	0	0
3	Nepal	1	0	1	0	0	0	0
	Total	41	2	2	22	11	1	3

*15-1(123G15), 34-1(10G13), 40A(62G29), 40-1(62G29-1), 40-2(58G13-3),40-3(127G29)

ii. Yellow rust (*Puccinia striiformis*)

Seventy eight samples were analyzed from seven states of India, Nepal and Bhutan. Pathotype 46S119 was most frequent and was observed in most of the areas followed by pathotype P. Pathotype 78S84 has reduced in frequency. In Nilgiri hills pathotype I and 46S119 were observed in nearly same frequency. Pathotype CI, CII & CIII were observed like previous year in Leh area of Jammu and Kashmir. Two samples of barley yellow rust from Nilgiri hills and Punjab yielded pathotypes 57 and G, respectively (Table -3).

iii. Brown rust (*Puccinia triticina*)

Ninety four samples of brown rust were analyzed from seven states of India, Bhutan and Bangladesh. Nineteen pathotypes were identified in these samples. Pathotype 77-5 was the most frequent and was observed in more than 40% samples followed by pathotype 104-2, which was observed in more than 10 % samples. Racial diversity was maximum in Bangladesh followed by Uttar Pradesh (Table-4). Some of the samples have given different infection type than the existing pathotypes and are being studied for further variation.

Table-3 : Pathotype distribution of *Puccinia striiformis* up to 31.12.2012

Sr. No.	State	No. of Isolates Analysed	Pathotypes*									
			46S119	78S84	P (46S103)	T (47S103)	I (380102)	CI (14S64)	CII (15S64)	CIII (78S64)	57 (0S0)	G (4S0)
1	Himachal Pradesh	34	11	8	11	4	0	0	0	0	0	0
2	Haryana	1	0	0	1	0	0	0	0	0	0	0
3	Jammu & Kashmir	9	0	1	3	0	0	1	3	1	0	0
4	Punjab	4	2	1	0	0	0	0	0	0		1
5	Tamil Nadu	14	7	0	0	0	6	0	0	0	1	0
6	Uttar Pradesh	2	1	0	0	1	0	0	0	0	0	0
7	Uttrakhand	2	2	0	0	0	0	0	0	0	0	0
8	Nepal	8	1	1	6	0	0	0	0	0	0	0
9	Bhutan	4	2	1	1	0	0	0	0	0	0	0
	Total	78	26	12	22	5	6	1	3	1	1	1

* P(46S103), T (47S103), I (380102), CI (14S64), CII (15S64), CIII (78S64), 57(0S0), G(4S0)

Table-4 : Pathotype distribution of *Puccinia triticina* up to 31.12.2012

Sr. No.	States	No. of Isola-tes analy-sed	Pathotypes*																	
			12	12-1	12-2	12-4	12-9	77A	77-1	77-2	77-3	77-5	77-9	77-10	104-2	104-3	104-4	107-1	162	162A	162-2
1	Tamil Nadu	32	0	0	0	0	0	1	0	0	0	24	7	0	0	0	0	0	0	0	0
2	Himachal Pradesh	4	0		0	0	0	0	0	1		2	0	1	0	0	0	0	0	0	0
3	Uttar Pradesh	18	0	1	0	0	0	0	0	2	1	2	0	0	2	4	5	0	0	0	0
4	Karnataka	4	0	3	0	0	0	0	0	0	0		1	0	0	0	0	0	0	0	0
5	Punjab	1	0	1	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0
6	Uttrakhand	3	0	0	0	0	0	0	0	0	0	1	0	0	2	0	0	0	0	0	0
7	Jammu & Kashmir	4	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2
8	Bangladesh	21	0	0	1	1	1			3	1	6	0	0	4	1		1	1	1	0
9	Bhutan	7	1	0	0	0	0	0	0	0	1	3	0	0	1	0	0	0	0	0	0
	Total	**94**	**1**	**5**	**1**	**1**	**2**	**1**	**1**	**6**	**3**	**38**	**8**	**1**	**11**	**5**	**5**	**1**	**1**	**1**	**2**

*12(5R5),12-1(5R37), 12-2(1R5), 12-4(69R13), 12-9(93R37-1), 77A(109R31), 77-1(109R63), 77-2(109R31-1), 77-5(121R63-1), 77-9(121R60-1), 77-10(377R60-1),104-2(21R55), 104-3(21R63), 107-1(45R35), 162(93R7), 162A(93R15), 162-2(93R39)

5. Seedling resistance test

During this period 1811 lines of wheat and barley were/ are being evaluated against different pathotypes of three rusts. It includes lines of AVT, NBDSN, Breeders'/Pathologists' material for rust resistance and genetic studies (Table-5).

Table-5 : Details of material for seedling rust resistance up to 31.12.2012

Sr. No.	Details of Lines	No. of Lines	Pathotypes		
			Black rust	Brown rust	Yellow rust
1	AVT I & II	273	Selected	Selected	Selected
2	NBDSN/EBDSN	235	4	Mix	All
3	Other's Material				
a.	Project Director	463	Selected	Selected	Selected
b.	R. Yadav, New Delhi	69	-	Selected	Selected
c.	Kuldeep Singh, Ludhina	132	-	Selected	Selected
d.	BHU, Varanasi	288	Selected	Selected	Selected
e.	Rekha Malik, Karnal	64	Selected	-	-
f.	Australian material	245	Selected	-	-
g.	I.K.Kalappanavar	42	Selected	Selected	-
	Total	1811			

6. Repository of pathotypes and supply of nucleus inocula

A collection of 126 pathotypes of different rust pathogens of wheat, barley, oat and linseed was maintained in live culture as well as cryo-preserved. For the smooth conduct of rust research by wheat breeders/pathologists in public and private sector, nucleus/bulk inoculums of different rust were supplied to 38 centres/Scientists during this period (Table-6).

7. Development of rust resistant genetic stocks and genetic studies

Fourteen segregating populations viz. HI1500 x Eagle (F5), HI1500 x *Sr*43 (F5), NI5439 x Eagle (F5), Lok-1 x *Sr*39 (F3), Lok-1 x *Sr*32 (F3), Lok-45 x *Sr*32 (F3), HI1500 x *Sr*32 (F6), Raj 3765/ Eagle (BC2F4), *Yr*24 x Kalyansona (F2), *Yr*26 x Kalyansona (F2), Lok-1 x Kite (F2), HI1077 x Kite (F2), Raj 3765 x Kite (F2) and NI5439 x Kite (F2) were evaluated for seedling resistance against the races of rusts and have been planted in the field for selection and generation advancement. Six segregating populations Viz. Agra local x Sonalika (F2), LWH

Table-6 : Details of rust inoculum supplied up to 31.12.2012

Sr. No.	Name	Place	Kind of rust/pathotypes supplied
1	A.N. Mishra	Indore	Black and Brown
2	A.P. Agarwal	Bilaspur	Black and Brown
3	B.K. Honrao	Pune	Mixture of Black and Brown
4	B.K. Das	Mumbai	Mixture of Black and Brown
5	Dhanvir Singh	Dhaulakuan	Mixture of Black and Brown
6	D.A. Godekar	Nasik	Black and Brown
7	D.P. Walia	Tutikandi	Yellow
8	Hitesh Kumar	Karnal	Mix. of Brown
9	I.K. Kalappanwar	Dharwad	Mix., of Brown, Black and seed
10	Javad Bahar Khan	Kanpur	Brown and Yellow (Wheat & Barley)
11	J.B. Sharma	New Delhi	Brown
12	J.P. Jaswal	Pantnagar	Brown and Yellow
13	K.V. Jivani	Junagarh	Black and Brown
14	Madhumeeta Jindal	Ludhiana	Yellow, Brown (Wheat & Barley)
15	P.C. Mishra	Powerkheda	Mixture of Black and Brown
16	P.P.S. Pannu	Ludhaiana	Yellow
17	M.S. Saharan	Karnal	Yellow and Brown
18	Pradeep Shekhawat	Jaipur	Yellow and Brown (Barley)
19	R.P.S. Verma	Karnal	Brown and Yellow(Barley)
20	R.K. Bansal	Jaipur	Black and Brown
21	R.T. Sapkal	Mahabaleshwar	Brown and Black
22	Rajvir Yadav	New Delhi	Yellow Mix, Brown and Black
23	Rashmi Agrawal	New Delhi	Brown and Yellow
24	Rakesh Devlash	Kullu	Yellow and Brown mix
25	R .Selva Kumar	Karnal	Yellow and brown
26	S.K. Jain	Almora	Brown and yellow mix (Wheat & Barley)
27	S.K. Rana	Malan	Brown and yellow mix
28	S.S. Karwasara	Hissar	Brown and yellow mix. (Wheat and Barley)
29	Satish Kumar	Karnal	Yellow and brown
30	Satinder Kaur	Ludhiana	Yellow mix
31	S. Acharya	Gujarat	Black and Brown
32	Subodh Kumar	Pantnagar	Yellow and Brown
33	U.D. Singh	New Delhi	Yellow, brown , Black + seed
34	Vishnu Goyal	Karnal	Yellow, Brown (Wheat & Barley)
35	Vinod Kumar	New Delhi	Brown
36	T.R. Sharma	New Delhi	Brown (Genome Sequencing work)
37	MAHYCO	Karnal	Brown and Black
38	Mukesh Pandey	Jammu	Yellow Mix.

x Lok-1 (F3), Sonalika x Kalyansona (F3), LWH x FLW-14(F3), NI 5439x Sr32, (F5) and NI5439 x Lok-1 (F3) were evaluated for seedling resistance and transplanted for generation advancement. Forty four F2 populations of spring x winter wheat crosses (obtained from PI crop improvement DWR) were tested against races of yellow rust and brown rust and were planted in the field for selection and generation advancement.

Twenty five wheat genotypes (Durum, Spring and winter wheat) have been planted in the crossing block.

8. Request for collection and mailing of rust samples of wheat and barley

Evolution of new pathotypes in wheat rust pathogens is a natural mechanism of survival and continuing of its generation. It results in resistant varieties of wheat becoming susceptible over a period of time. Rusts of wheat can not be stopped by geographical and political boundaries. Races of wheat rusts that have occurred in East Europe and East Africa have been traced in Australia and Asia subsequently.

Monitoring of wheat crop is undertaken to pick up a virulent pathotype in initial stages (much before it attains epidemic proportions) and remain prepared with resistant varieties for early deployment.

To monitor pathotype distribution of wheat rusts effectively and to detect new pathotypes in the initial stages in different agro-ecological regions of India, wheat rust samples are analyzed for the occurrence of pathotypes. Therefore, help of all the cooperators is solicited for collecting wheat rust samples from different regions, farmers' fields and disease monitoring nurseries representing different cultivars/lines in this endeavor to combat wheat 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 envelops** separately or wrapped in newspaper and sent immediately by post.

III. **Following information may be given on each envelope**

- **Type of rust: brown/black/yellow**

- **Details of host: wheat/barley, variety/line**
- **Place of collection**
- **Date of collection**
- **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.

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. Wheat disease monitoring nurseries

To monitor the occurrence and spread of wheat diseases in India and neighbouring countries, wheat disease monitoring nurseries including SAARC nursery were organized and planted at more than 45 locations. So far rusts have not been reported anywhere in these nurseries.

10. News

a. Joining

- Dr. Hanif Khan, Scientist (Plant Breeding) joined at this station on 1.8.2012 after serving for four years at Central Institute for Arid Horticulture, Bikaner, and Rajashthan.

b. Visitors

- Dr. Sukhwinder Singh, Molecular Geneticist, Global Wheat Program, CIMMYT Mexico was at this station on July, 18, 2012. He discussed programmes of mutual interest.

- Dr. M.L. Lodha, Ex. Prof & Head, Division of Bio-chemistry, IARI, New Delhi, Dr. T.R.Sharma, Principal Scientist and NAAS Fellow visited this station on July19, 2012.

- H.P. Government officials from Department of Agriculture which included Subject matter specialists, Deputy Directors, Deputy Director ATMA were at this station on October 9, 2012. They were apprised of the latest rust research at this station and equipped with the latest know how to tackle field problems of wheat rusts.

- Ms Anna Garber Hammond from Cornel University, USA and Sh. Akshat Medakker, General Manager, Technical Management Advisory Services, Sathguru Management Consultants, Hyderabad, India were at the station to discuss the pre-BGRI 2013 workshop visit to Flowerdale, Shimla.

- Dr. Nizam Ahmed, Sr. Wheat Breeder, PBI, Cobetty, Australia, visited the station on 22.11.2012 to discuss double haploid research work at the station. He was accompanied by Dr. Vikas Gupta, Scientist, DWR, and Karnal.

c. Foreign Visits

- Sh. O.P. Gangwar, was at CIMMYT, Mexico from Aug 1-Sept.28, 2012 to attend Advance wheat improvement course.

- Dr. S.C. Bhardwaj attended BGRI-2012 workshop at Chinese Academy of Agriculture Sciences, Zhongguancun Nandajie 100081, Beijing, P.R.China from Aug 31-Sept.5, 2012 and presented a poster on 'Race changes in Puccinia species occurring on wheat in India'. He also visited Kenya to attend 'Standardization of stem rust note taking and evaluation of germplasm with emphasis on emerging threats of yellow rust and leaf rust' at Kenya Agr. Research Institute (KARI), Najoro from Sept.25-Oct.5, 2012.

Hindi Divas

- The station celebrated Hindi divas on 14.9.2012. The day was marked with interactive discussions. Different staff members put forth their views. Messages of President ICAR, Home Minister, Govt. of India were read. Activities and efforts to promote Hindi in day to day activities were discussed. A satisfaction was felt on the achievements made during the preceding year.