मेहतान्सिज
Mehtaensis

प्रो. के.सी. मेहता के नाम पर जारी क्षेत्रीय केन्द्र के शोध का छःमाही न्यूज़लेटर

संस्थापक: डा. एस. नागराजन

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Founder Dr. S. Nagarajan

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Prof. K.C. Mehta (1892-1950)

Founder of the Flowerdale station

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सारांश /Summary

फसल वर्ष 2025–26 के दौरान, भाकृअनुप–भारतीय गेहूँ एवं जौ अनुसंधान संस्थान, राज्य कृषि विश्वविद्यालयों, कृषि विज्ञान केंद्रों, भारतीय कृषि अनुसंधान परिषद के संस्थानों, राज्य कृषि विभागों और अन्य सहयोगी संगठनों के सहयोगात्मक प्रयासों से देशव्यापी समन्वित निगरानी कार्यक्रम चलाया गया। व्यापक क्षेत्रीय सर्वेक्षणों से पता चला कि इन क्षेत्रों में भूरा (पत्ती) रतुआ सबसे अधिक फैलने वाला रतुआ रोग था, जबकि पीला (धारीदार) रतुआ अनुकूल पर्यावरणीय परिस्थितियों में केवल स्थानीय क्षेत्रों तक ही सीमित रहा। यहां काला (तना) रतुआ लगभग अनुपस्थित रहा व मध्य प्रदेश के कुछ अलग–थलग स्थानों तक ही सीमित था। निगरानी ने पुष्टि की कि इस फसल वर्ष में कोई गंभीर रतुआ महामारी नहीं हुई, जो मुख्य रूप से निरंतर निगरानी, समय पर रोग की सूचना और रोग प्रतिरोधी गेहूँ की किस्मों की खेती के कारण संभव हुआ।

पंजाब के रोपड़ जिले में 11 फरवरी 2026 को सबसे पहले पीला (धारीदार) रतुआ रोग देखा गया, जिससे HD2967 और स्थानीय गेहूँ की किस्में प्रभावित हुईं, और तापमान बढ़ने के साथ गिरावट आने से पहले यह हरियाणा तथा जम्मू–कश्मीर के सीमित क्षेत्रों में फैल गया।

शेष पेज 1 पर..........

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कार्यकारी सारांश/Executive summary

इस फसल वर्ष में भूरा रतुआ रोग लगने की पहली घटना 16 जनवरी 2026 को पंजाब में दर्ज की गई, और बाद में महाराष्ट्र, उत्तर प्रदेश, हरियाणा, पश्चिम बंगाल और जम्मू–कश्मीर से इसकी सूचना मिली, हालांकि रोग की गंभीरता आमतौर पर कम से मध्यम रही। मध्य प्रदेश के सीहोर और नरसिंहपुर जिलों में पुराने गेहूँ के जीनोटाइप और ऑफ–टाइप पौधों पर काला रतुआ छिटपुट रूप से पाया गया, जिससे कोई महत्वपूर्ण फैलाव या आर्थिक क्षति नहीं हुई।

रोगजनक प्रभेदों के वितरण को निर्धारित करने के लिए बारह भारतीय राज्यों और नेपाल से कुल 491 रतुआ नमूनों का विश्लेषण किया गया। पीले रतुआ रोगजनकों के लिए गेहूँ के सात प्रभेदों और जौ का एक प्रभेद पहचाना गया, जिसमें प्रभेद 238S119 की प्रबलता सबसे अधिक थी, इसके बाद प्रभेद 46S119 की प्रबलता पाई गई। पीले रतुआ रोगजनक की पॉपुलेशन कई महत्वपूर्ण प्रतिरोध जीनों *Yr5, Yr10, Yr15, Yr16, Yr32* और *YrSP* के प्रति अविरुलेंट बनी रही, जो यह दर्शाता है कि ये जीन प्रभावी सुरक्षा प्रदान करना जारी रखे हुए हैं। विश्लेषण किए गए 49 काले रतुआ नमूनों में से आठ प्रभेद पहचाने गए, जिनमें प्रभेद 11 सबसे अधिक व्याप्त रहा। तना रतुआ रोगजनक की पॉपुलेशन कई प्रमुख प्रतिरोध जीनों *Sr26, Sr27, Sr31, Sr32, Sr35, Sr39, Sr40* और *Sr43* के प्रति अविरुलेंट थी। 302 भूरे रतुआ आइसोलेट्स के विश्लेषण से 25 प्रभेदों की पहचान हुई, जिनमें 52-4 और 52/77-9 ने मिलकर कुल आबादी का लगभग दो–तिहाई हिस्सा बनाया, जो भारत और नेपाल में उनकी प्रबलता को दर्शाता है।

इस फसल वर्ष की एक प्रमुख वैज्ञानिक उपलब्धि महाराष्ट्र से एक नए भूरे रतुआ प्रभेद की पहचान थी, जिसे 52-6 के रूप में नामित किया गया है। इस प्रभेद में प्रतिरोध जीनों *Lr24* और *Lr39* के प्रति अतिरिक्त विरुलेंट है, जबकि यह *Lr26* के प्रति अविरुलेंट बना हुआ है। *Lr24* के प्रति आक्रामकता का उद्भव विशेष रूप से महत्वपूर्ण है क्योंकि यह जीन कई दशकों से भारतीय भूरे रतुआ आबादी के खिलाफ प्रभावी रहा है और गेहूँ प्रजनन कार्यक्रमों में इसका व्यापक रूप से उपयोग किया गया है। इस नए प्रभेद के जैविक व्यवहार और आनुवंशिक विशेषताओं पर विस्तृत अध्ययन वर्तमान में प्रगति पर है।

प्रमुख रतुआ रोगजनकों के खिलाफ पौध प्रतिरोध के लिए नियंत्रित पर्यावरणीय परिस्थितियों में 5,000 से अधिक गेहूँ और जौ की लाइनों का मूल्यांकन किया गया। इनमें से 202 एडवांस वैरायटी ट्रायल (AVT) गेहूँ प्रविष्टियों और 245 नेशनल बार्ले डिजीज स्क्रीनिंग नर्सरी (NBDSN) प्रविष्टियों ने कई प्रभेदों के प्रति व्यापक प्रतिरोध स्क्रीनिंग से गुज़रे। इस मूल्यांकन ने गेहूँ और जौ सुधार कार्यक्रमों में उपयोग के लिए व्यापक

स्पेक्ट्रम प्रतिरोध के मूल्यवान स्रोतों की पहचान की। दो गेहूँ प्रविष्टियों, PBW1012 और VL2064, ने तीनों रतुआ रोगों के खिलाफ पूर्ण प्रतिरोध प्रदर्शित किया, जबकि कई अतिरिक्त प्रविष्टियों ने भूरे और काले रतुआ, काले और पीले रतुआ, या अलग–अलग रतुआ रोगजनकों के प्रति प्रतिरोध दिखाया। ये प्रतिरोधी जीनोटाइप भविष्य के प्रजनन प्रयासों के लिए मूल्यवान डोनर सामग्री का प्रतिनिधित्व कर सकते हैं जो टिकाऊ रतुआ–प्रतिरोधी किस्मों को विकसित करने के लिए उपयोगी होंगे।

जीन पोस्ट्यूलेशन अध्ययनों ने उन्नत गेहूँ सामग्री में मौजूद प्रमुख रतुआ प्रतिरोध जीनों की विशेषता बताई। पीले रतुआ के लिए, *Yr2* सबसे अधिक बार पाया जाने वाला जीन था, इसके बाद *Yr9* था। भूरे रतुआ प्रतिरोध जीनों में, *Lr13*, *Lr23* और *Lr10* सबसे अधिक व्यापक थे, जबकि *Lr24* और *Lr26* जैसे महत्वपूर्ण जीन भी कई विशिष्ट गेहूँ की लाइनों में पहचाने गए। काले रतुआ का प्रतिरोधक क्षमता तेरह *Sr* जीनों द्वारा नियंत्रित थी, जिसमें *Sr2, Sr11, Sr7b* और *Sr13* सबसे अधिक बार पाए गए।

बहुत से अच्छा प्रदर्शन करने वाले जीनोटाइप्स में कई प्रतिरोध जीनों के संयोजन थे, जो विविध रतुआ प्रभेदों के प्रति व्यापक स्पेक्ट्रम सुरक्षा प्रदान करते थे और भविष्य की गेहूँ की किस्मों में टिकाऊ प्रतिरोध की संभावनाओं को बढ़ाते थे। प्रमुख रतुआ प्रभेदों के लिए पौध और वयस्क पौधे की प्रतिक्रियाओं की तुलना करके रेस–विशिष्ट वयस्क पौधा प्रतिरोध (APR) का भी मूल्यांकन किया गया। कुल 101 गेहूँ की प्रविष्टियों ने भूरे रतुआ के प्रति APR प्रदर्शित किया व 114 प्रविष्टियों ने पीले रतुआ के प्रति APR व्यक्त किया, और 21 प्रविष्टियों के पास काले रतुआ के लिए APR था।

2025–26 फसल वर्ष के दौरान देश भर में जौ के रतुआ रोग का प्रकोप बहुत कम रहा। हिमाचल प्रदेश से जौ के पीले रतुआ के केवल कुछ अलग–थलग मामले दर्ज किए गए, जबकि भूरा रतुआ केवल राजस्थान में देखा गया और जौ के काले रतुए की कोई भी क्षेत्रीय घटना दर्ज नहीं की गई। 227 जौ प्रविष्टियों की स्क्रीनिंग से एक या एक से अधिक रतुआ रोगों के प्रति प्रतिरोधी कई लाइनों की पहचान की गई। चयनित जौ प्रविष्टियों में प्रतिरोध जीन *Rph3* और *Rph19* को सफलतापूर्वक पोस्ट्यूलेट किया गया, जो रतुआ–प्रतिरोधी जौ किस्मों के विकास के लिए मूल्यवान आनुवंशिक संसाधन प्रदान करते हैं।

प्रजनन गतिविधियां हाइब्रिडाइजेशन, जनरेशन एडवांसमेंट, जीन पिरामिडिंग और मैपिंग पापुलेशन डेवलपमेंट के माध्यम से टिकाऊ रतुआ प्रतिरोध विकसित करने पर केंद्रित थीं। प्रतिरोधी गेहूँ और जौ प्रजनन पॉपुलेशन को क्रमिक पीढ़ियों के माध्यम से आगे बढ़ाया गया, जबकि *Yr10, Yr15, Lr80* और *Sr65* जैसे

महत्वपूर्ण प्रतिरोध जीनों से जुड़े कई क्रॉस आगे बढ़ाए गए। नए रतुआ प्रतिरोध जीनों की पहचान और विशेषता को सुविधाजनक बनाने के लिए मैपिंग पॉपुलेशन को भी आगे बढ़ाया गया।

देश भर में रतुआ अनुसंधान का समर्थन करने के लिए गेहूँ, जौ, जई और अलसी को प्रभावित करने वाले रतुआ रोगजनकों के 150 से अधिक प्रभेदों को होस्ट पौधों पर व क्रायोप्रेजरविशन दोनों के माध्यम से बनाए रखा गया था। प्रतिरोध स्क्रीनिंग, रोग संबंधी जांच और प्रजनन कार्यक्रमों के लिए मानकीकृत रोगजनक संस्कृतियों की उपलब्धता सुनिश्चित करते हुए, भारत भर के 44 वैज्ञानिकों और अनुसंधान केंद्रों को विभिन्न रतुआ प्रभेदों के न्यूक्लियस और बल्क इनोकुलम की आपूर्ति की गई थी।

प्राकृतिक खेत की स्थिति के तहत रोग के विकास की निगरानी के लिए भारत भर के 36 सुनियोजित स्थानों पर 58वीं गेहूँ रोग निगरानी नर्सरी (WDMN) का समन्वय किया गया था। पीला रतुआ ठंडे उत्तरी गेहूँ पैदा करने वाले क्षेत्रों तक सीमित रहा लेकिन जहां भी अनुकूल परिस्थितियां बनीं, वहां उच्च गंभीरता तक पहुंच गया। भूरा रतुआ सभी गेहूँ पैदा करने वाले क्षेत्रों में सबसे व्यापक रूप से वितरित रोग पाया गया, जबकि काला रतुआ केंद्रीय और दक्षिणी क्षेत्रों में केवल कुछ स्थानों तक सीमित रहा। महत्वपूर्ण बात यह है कि इस मौसम में देश में कहीं भी Ug99–प्रकार का तना रतुआ या गेहूँ ब्लास्ट नहीं पाया गया। SAARC गेहूँ रोग निगरानी नर्सरी भी कई दक्षिण एशियाई देशों में लगाई गई थी, जिससे क्षेत्रीय निगरानी और सहयोगात्मक रोग निगरानी प्रयासों को और मजबूती मिली।

A nationwide coordinated surveillance programme was conducted during the 2025–26 crop season across all major wheat-growing regions through the collaborative efforts of ICAR–Indian Institute of Wheat and Barley Research (ICAR-IIWBR), State Agricultural Universities, Krishi Vigyan Kendras, ICAR institutes, State Departments of Agriculture, and other collaborating organizations. Extensive field surveys indicated that brown (leaf) rust was the most widespread rust disease, while yellow (stripe) rust occurred only in localized pockets under favourable environmental conditions. Black (stem) rust remained almost absent and was confined to a few isolated locations in Madhya Pradesh. The surveillance confirmed that no severe rust epidemic occurred during the season. Yellow rust was first observed on 11 February 2026 in Ropar district of Punjab, affecting HD2967 and local wheat varieties, and later spread to limited areas of Haryana and Jammu & Kashmir before declining with the rise in temperature. Brown rust appeared earlier in the season, with the first incidence recorded on 16 January 2026 in Punjab, and subsequently reported from Maharashtra, Uttar Pradesh, Haryana, West Bengal, and Jammu & Kashmir, although disease severity remained generally low to moderate. Black rust was detected only sporadically in Sehore and Narsinghpur districts of Madhya Pradesh on older wheat genotypes and off-type plants, without causing significant spread or economic damage.

A total of 491 rust samples collected from twelve Indian states and Nepal were analysed to determine the distribution of pathogen pathotypes. Seven pathotypes of wheat yellow rust and one pathotype of barley yellow rust pathogens were identified, with pathotype 238S119 being the most predominant, followed by 46S119. The yellow rust pathogen population remained avirulent to several important resistance genes, *including Yr5, Yr10, Yr15, Yr16, Yr32,* and *YrSP*, indicating that these genes continue to provide effective protection. Among 49 black rust samples analysed, eight pathotypes were identified, with pathotype 11 remaining the most prevalent. The stem rust population was avirulent to several major resistance genes such as *Sr26, Sr27*, *Sr31*, *Sr32*, *Sr35*, *Sr39*, *Sr40,* and *Sr43*. Analysis of 302 brown rust isolates resulted in the identification of 25 pathotypes, among which 52-4 and 52/77-9 together constituted nearly two-thirds of the total population, indicating their dominance across India and Nepal.

A major scientific achievement during the season was the identification of a new brown rust pathotype, designated as 52-6, from Maharashtra. This pathotype possesses additional virulence against the resistance genes *Lr24* and *Lr39* while remaining avirulent to *Lr26*. The emergence of virulence against *Lr24* is particularly significant because this gene has remained effective against the Indian brown rust population for several decades and has been extensively utilized in wheat breeding programmes. Detailed studies on the biological behaviour and genetic characteristics of this new pathotype are currently in progress.

More than 5,000 wheat and barley lines were evaluated under controlled environmental conditions for seedling resistance against major rust pathogens. Among these, 202 Advanced Varietal Trial (AVT) wheat entries and 245 National Barley Disease Screening Nursery (NBDSN) entries underwent comprehensive resistance screening against multiple pathotypes. The evaluation identified valuable sources of broad-spectrum resistance for use in wheat and barley improvement programmes. Two wheat entries, PBW1012 and VL2064, exhibited complete resistance against all three rusts, while several additional entries displayed combined resistance to brown and black rusts, black and yellow rusts, or resistance against individual rust pathogens. These resistant genotypes represent valuable donor material for future breeding efforts aimed at developing durable rust-resistant cultivars.

Gene postulation studies characterized the major rust resistance genes present in advanced wheat material. For yellow rust, *Yr2* was the most frequently detected gene, followed by *Yr9*. Among brown rust resistance genes, *Lr13, Lr23,* and *Lr10* were the most prevalent, while important genes such as *Lr24* and *Lr26* were also identified in several elite wheat lines. Black rust resistance was governed by thirteen *Sr* genes, with *Sr2, Sr11, Sr7b,* and *Sr13* occurring most frequently. Several promising genotypes possessed combinations of multiple resistance genes, providing broad-spectrum protection against diverse rust pathotypes and enhancing the prospects of durable resistance in future wheat varieties. The race-specific adult plant resistance (APR) was also evaluated by comparing seedling and adult plant reactions to predominant rust pathotypes. A total of 101 wheat entries exhibited APR to brown rust, 114 entries expressed APR against yellow rust, and 21 entries possessed APR to black rust.

Barley rust incidence remained very low throughout the country during the 2025–26 crop season. Only a few isolated cases of barley yellow rust were recorded from Himachal Pradesh, while brown rust occurred only in Rajasthan, and no field incidence of barley black rust was reported. Screening of 227 barley entries identified numerous lines resistant to one or more rust diseases. Resistance genes *Rph3* and *Rph19* were successfully postulated in selected barley entries, providing valuable genetic resources for the development of rust-resistant barley cultivars.

Breeding activities focused on developing durable rust resistance through hybridization, generation advancement, gene pyramiding, and mapping population development. Resistant wheat and barley breeding populations were advanced through successive generations, while several crosses involving important resistance genes such as *Yr10, Yr15, Lr80,* and *Sr65* were progressed. Mapping populations were also advanced to facilitate the identification and characterization of novel rust resistance genes.

To support rust research across the country, more than 150 pathotypes of rust pathogens affecting wheat, barley, oat, and linseed were maintained both on host plants and through cryopreservation. Nucleus and bulk inoculum of different rust pathotypes were supplied to 44 scientists and research centres across India, ensuring the availability of standardized pathogen cultures for resistance screening, pathological investigations, and breeding programmes.

The 58th Wheat Disease Monitoring Nursery was coordinated at 36 strategic locations across India to monitor disease development under natural field conditions. Yellow rust remained confined to the cooler northern wheat-growing regions but reached high severity wherever favourable conditions prevailed. Brown rust was the most widely distributed disease across all wheat-growing zones, whereas black rust remained restricted to only a few locations in the central and southern regions. Importantly, no Ug99-type stem rust or wheat blast was detected anywhere in the country during the season. The SAARC Wheat Disease Monitoring Nursery was also conducted across several South Asian countries, further strengthening regional surveillance and collaborative disease monitoring efforts.

1. Incidence of wheat and barley rusts in India

During the 2025–26 crop season, systematic surveillance of wheat rust diseases was undertaken across the major wheat-growing regions of India. Monitoring was carried out through a coordinated network comprising scientists from ICAR–Indian Institute of Wheat and Barley Research (ICAR-IIWBR), State Agricultural Universities (SAUs), Krishi Vigyan Kendras (KVKs), ICAR institutes, State Departments of Agriculture, and other collaborating organizations. Extensive roving surveys were conducted in Punjab, Haryana, Uttar Pradesh, Madhya Pradesh, Maharashtra, West Bengal, Uttarakhand, Jammu & Kashmir, Himachal Pradesh, Rajasthan, and other wheat-growing states to monitor the occurrence, distribution, and progression of rust diseases under field conditions.

The surveillance indicated the widespread occurrence of brown (leaf) rust and localized incidence of yellow (stripe) rust in several wheat-growing areas. Disease severity generally remained low to moderate and was largely confined to susceptible cultivars and favourable agro-climatic conditions. Black (stem) rust was largely absent during the season and was detected only at a few locations in the Sehore and Narsinghpur districts of Madhya Pradesh. Its occurrence was restricted mainly to older wheat genotypes and off-types, with no significant spread observed. Overall, the surveillance confirmed that the national wheat crop remained largely free from severe rust epidemics during the 2025–26 season, reflecting the effectiveness of continuous monitoring and the cultivation of resistant varieties.

The first incidence of yellow rust was reported on 11 February 2026 in Dukli village, Sri Anandpur Sahib Block, Ropar district, Punjab. The disease affected HD2967 and local wheat varieties, producing 3–4 disease foci with severity reaching 80S on local wheat and 60S on HD2967. Secondary spread was observed on variety PBW826, while lower disease severity (10–20S) was recorded in Chandpur and Hariyal villages on varieties HD3086 etc. and other local cultivars. Subsequently, on 20 February 2026, yellow rust was observed in Jind district, Haryana, on variety HD2851 with a severity of 40S. By

31 March 2026, surveys in Jammu and Samba districts of Jammu & Kashmir reported only trace levels of yellow rust, with uredia changing to telia because of increasing temperatures, indicating the disease had entered its late developmental stage.

The first incidence of brown rust during the 2026 wheat-growing season was recorded on 16 January 2026 at Nanowal village, Sri Anandpur Sahib Block, Ropar district, Punjab, where the disease appeared on wheat variety HD3086 with a severity of up to 20S. This represented the earliest detection of rust during the survey period. Subsequently, on 11 February 2026, brown rust was observed again in Ropar on variety HD2967 with a severity of 20S. During the same period, surveys in Satara district, Maharashtra, detected brown rust with severity ranging from trace to 10S. Further surveys conducted on 20 February in Nashik district reported brown rust on varieties Lok 1, Kanak Sona, and private cultivars with severity reaching 40S, while by 28 February the disease had spread to several villages in Satara with severity ranging from 5S to 10S. During March 2026, brown rust was reported from Uttar Pradesh (7 March), Haryana (11 and 19 March), Maharashtra (12 and 20 March) with disease severity reaching 60S on Daftare Chamak, West Bengal (27 March), and Jammu & Kashmir (31 March) where only low to moderate disease levels were observed. Overall, brown rust showed progressive spread in different wheat-growing regions during the season.

No confirmed widespread incidence of black rust was recorded during the season. Surveys conducted across Madhya Pradesh, Gujarat, Karnataka, Tamil Nadu, and Maharashtra reported no significant occurrence of black rust, except for sporadic infections observed in the Sehore and Narsinghpur districts of Madhya Pradesh. These isolated cases were confined to a few older genotypes and off-type plants.

The wheat and barley rusts were kept under check with the help of cooperators, through exhaustive rust surveillance in different wheat growing areas of India and neighboring countries. Besides the staff of the station, 30 wheat researchers (Table 1) from different institution/State/Countries helped in effective monitoring of wheat and barley rust diseases and sending wheat and barley rust samples. Wheat monitoring teams of different zones also reported the occurrence of wheat rusts in the areas visited by them.

Table 1. List of actively involved co-operators in monitoring wheat and barley rusts during 2025-26.

Cooperators	Organization/State
Indian States	
B.M. Mhaske	ARS, Niphad, Maharashtra
Deepshikha	GBPUAT, Pantnagar, US Nagar, Uttarakhand
Dharam Pal Walia	RS, ICAR-IARI, Shimla, Himachal Pradesh
Hanif Khan	ICAR-IIWBR, Karnal, Haryana
IB Kapadiya	Wheat Research Station, JAU, Junagadh
Jaspal Kaur	PAU, Ludhiana, Punjab
KK Mishra	ICAR- VPKAS Almora
KK Mishra	JNKVV, Powarkheda, MP
KJ Vihol	ARS, Vijapur, Gujarat
Mahantesh	UAS, Dharwad
MB Baranaik	UAS, Dharwad
M Prashar	Mahyco Private Limited, Jalna, Maharashtra
Manmohan Baghel	CCSKV, Hisar, Haryana
P Nallathambi	IARI-RS Wellington, T. N.
PL Kashyap	ICAR-IIWBR, Karnal
Pradeep Sharma	ICAR-IIWBR, Karnal
Pradeep SinghShekhawat	RARI, Durgapura, Jaipur, Rajasthan
Prakash, T L	RS, ICAR-IARI, Indore, Madhya Pradesh
Raghunath Mandal	BCKV, Mohanpur, Kalyani
RPS Verma	Karnal, Haryana
RV Thakkar	ARS, Vijapur, Gujarat
S B Sawant	BAU Sabour, Bhgalpur, Bihar
Shivali Dhiman	KVK Dhaulakuan, Sirmaur
Sudha S	UAS, Dharwad
Sudhir Navathe	Agharkar Research Institute, Pune, Maharashtra
Uma Maheshwari	IARI-RS Wellington, T. N.
VK Yadav	CSAUAT, Kanpur, UP
VP Choudhary	NDUAT, Ayodhya
Nepal	
Suraj Vaidya	NARC, Kathmandu, Nepal

2. Monitoring pathotype distribution of *Puccinia* species on wheat and barley

During 2025-26, 491 samples including three rusts of wheat, yellow rust of barley collected/received from twelve Indian states and Nepal were analyzed. Detail of the pathotype distribution is discussed below.

i. Yellow (Stripe) rust of Wheat and Barley (*Puccinia striiformis* f. sp. tritici, *Pst* and *Puccinia striiformis* f. sp. *hordei, Psh*)

During current season, 140 yellow rust samples of wheat were analyzed from six states (Himachal Pradesh, Punjab, Haryana, Uttarakhand, Rajasthan, Uttar Pradesh) of India and Nepal. Seven pathotypes of *Puccinia striiformis* f. sp. *trititci* (*Pst*, yellow rust of wheat) {238S119, 110S119, 46S119, T (47S103), P (46S103), 6S0, and 111S68} and one pathotype 0S0 (57) of *Puccinia striiformis* f. sp. *hordei* (*Psh*, yellow rust of barley) were identified (Table 2). *Pst* populations were avirulent to *Yr5*, *Yr10*, *Yr15*, *Yr16*, *Yr32*, and *YrSP*. Most of the yellow rust samples were analysed from Rajasthan (39) followed by Punjab (33). During this cropping season, the frequency of pathotype 238S119 was maximum (29.3%) followed by 46S119 (24.3%). Pathotypes 110S119 and 47S103 were identified in equal frequency. Pathotype 0S0 (57) was identified in 4 samples of barley. Other pathotypes were identified in low frequency (Table 2).

ii. Black (Stem) rust of Wheat (*Puccinia graminis* f.sp. *tritici,* Pgt)

A total of 49 black rust samples received from Gujarat, Haryana, Himachal Pradesh, Madhya Pradesh, Maharashtra, and Karnataka, were pathotyped on wheat differentials. Eight pathotypes 11, 15-1, 21, 21-1, 21A-2, 40A, 40-2 and 40-3 of *Puccinia graminis* f. sp. *tritici* (*Pgt*) were identified. The *Pgt* population was avirulent to *Sr26*, *Sr27,* ***Sr31***, *Sr32*, *Sr35, Sr39, Sr40, Sr43, SrTt3* and *SrTmp*. Maximum number of samples (#15) was pathotyped from Haryana and Madhya Pradesh followed by Gujarat (11) and Maharashtra (04) (Table 3). Like previous years Pathotype 11 (79G31=RRTSF), virulent on *Sr2, Sr5, Sr6, Sr7b Sr9a, Sr9b, Sr9c, Sr9d, Sr9f, Sr9g, Sr10, Sr13, Sr14, Sr15, Sr16, Sr17, Sr18, Sr19, Sr20, Sr21, Sr28, Sr29, Sr30, Sr34, Sr36, Sr38* and *Sr*McN, was recorded in maximum frequency (34.7% of the samples). Pathotypes 15-1 and 40-3 were identified in 28.5% and 24.4% of the samples, respectively. Pathotype 40A was identified in only two samples, while pathotypes 21, 21-1, 21A-2, and 40-2 were each identified in a single sample (Table 3).

iii. Brown (Leaf) rust of Wheat (*Puccinia triticina*, Pt)

A total of 302 brown rust isolates were analyzed during 2025–26 from different wheat-growing regions of India and Nepal, resulting in the identification of 25 pathotypes. The brown rust population was dominated by pathotype 52-4, which accounted for 101 isolates (33.4%), followed closely by 52/77-9 with 97 isolates (32.1%), indicating that these two pathotypes remain the most prevalent across the Indian subcontinent. The next most common pathotype was 77-5 (36 isolates; 11.9%), while 20-1, 77-1, and 179 were represented by 11, 7, and 7 isolates, respectively. All other pathotypes occurred at relatively low frequencies (1–6 isolates), reflecting considerable diversity within the pathogen population (Table 4).

Among the Indian states, Karnataka (68 isolates) contributed the highest number of samples, followed by Madhya Pradesh (58), Punjab (41), Maharashtra (37), and Himachal Pradesh (33). The predominant pathotypes varied across regions. Pathotype 52-4 was widely distributed and dominant in Himachal Pradesh, Punjab, Madhya Pradesh, Rajasthan, Maharashtra, and Karnataka. Likewise, 52/77-9 showed broad adaptation and was frequently detected in several major wheat-growing states (Table 4). The diversity of the brown rust population was highest in Madhya Pradesh and Karnataka, where the maximum number of pathotypes was identified among the samples analyzed. Nepal contributed 30 isolates, with 52/77-9 and 52-4 being the predominant pathotypes, indicating a rust population composition similar to that observed in northern India.

New pathotype of brown rust pathogen

52-6

A new *P. triticina* pathotype, designated as 52-6, was identified on a wheat sample collected from Ukkadgaon, Chhatrapati Sambhajinagar district, Maharashtra, during the 2025–26 cropping season. Based on the international differential set, it belongs to the 52 group and is avirulent to the resistance genes *Lr2a* (Webster), *Lr2b* (Carina), and *Lr2c* (Loros). It closely resembles pathotype 52-2/77-11 (125R28-1) but differs by exhibiting additional virulence to ***Lr24*** and ***Lr39***, while remaining avirulent to *Lr20*. Importantly, the new pathotype remains avirulent to the widely deployed resistance gene *Lr26*. The emergence of *Lr24* virulence represents a significant development because this gene remained effective against the Indian brown rust pathogen population for several decades and has been extensively used in wheat breeding programmes. The detailed studies of this new pathotype are in progress.

Table 2. Pathotype distribution of yellow rust of wheat (*Puccinia striiformis* f. sp. *tritici*) in India and neighboring countries during 2025-26.

S. No.	State/UT/Country	No. of isolates Analyzed	*Pst* Pathotype							*Psh* pathotype
			238S119	**110S119**	**46S119**	**T (47S103)**	**P (46S103)**	**111S68**	**6S0**	**57**
1.	Himachal Pradesh	15	6	1	3	-	1	-	-	4
2.	Punjab	33	15	3	9	2	3	-	1	
3.	Haryana	4	-	1	2	-	1	-	-	-
4.	Uttarakhand	5	1	2	1	1	-	-	-	-
5.	Rajasthan	39	8	10	2	12	1	-	6	
6.	Uttar Pradesh	2	1	1	-	-	-	-	-	-
Other country										
1	Nepal	42	10	3	17	7	3	2	-	-
	Total	**140**	**41**	**21**	**34**	**22**	**9**	**2**	**7**	**4**

NB: Yellow rust of wheat (*Puccinia striiformis* f. sp. *trititci, Pst*); Yellow rust of barley (*Puccinia striiformis* f. sp. *hordei, Psh*)

Table 3. Pathotype distribution of black rust of wheat (*Puccinia graminis* f. sp. *tritici*) in India during 2025-26.

S. No.	States/Countries	Number of isolates analyzed	Pathotypes identified*¥							
			11	**15-1**	**21**	**21-1**	**21A-2**	**40A**	**40-2**	**40-3**
1	Gujarat	11	07	-	-	-	-	02	-	02
2	Haryana	15	-	12	-	-	-	-	-	03
3	Himachal Pradesh	03	-	-	01	01	01	-	-	-
4	Madhya Pradesh	15	07	02	-	-	-	-	01	05
5	Maharashtra	04	02	-	-	-	-	-	-	02
6	Karnataka	01	01	-	-	-	-	-	-	-
	Total	**49**	**17**	**14**	**01**	**01**	**01**	**02**	**01**	**12**

***Indian binomial names ¥North American equivalents 11 (79G31*; RRTSF¥), 15-1 (123G15; TKTSF), 21 (9G5; CHMSC), 21-1 (24G5; CKMSC), 21A-2 (75G5; CCTJC), 40A (62G29; PTHSC), 40-2 (58G13-3; PKRSC), 40-3 (127G29; PTTSF) based on Jin *et al.*, *Plant Dis.* 2008, 92: 923-6.**

Table 4. Pathotype distribution of brown rust of wheat (*Puccinia triticina*) in India and neighboring countries during 2025-26.

S. No.	State/Country	No. of isolates analyzed	PATHOTYPES 12 (5R5)	12-2 (1R5)	12-4 (69R13)	12-6 (5R45)	12-7 (93R45)	20-1 (93R57,-1)	52/77-9 (121R60-1)	52-2/ 77-11 (125R28)	52-3 (121R60)	52-4 (121R60-1,7)	52-5 (125R28-1,7)	77-1 (109R63)	77-2 (109R31-1)	77-5 (121R63-1)	77-6 (121R55-1)	77-13 (93R55-1,7)	104B (29R23)	104-1 (21R31-1)	104-2 (21R55)	104-3 (21R63)	104-4(93R57)	106 (0R9)	162 (93R7)	162-2 (93R39)	179 (24R44)
1.	Himachal Pradesh	33	1	-	-	-	-	-	12	-	-	18	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-
2.	Punjab	41	-	-	-	-	-	-	20	-	-	16	-	1	-	3	-	-	1	-	-	-	-	-	-	-	-
3.	Haryana	1	-	-	-	-	-	-		-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4.	Uttar Pradesh	5	-	-	1	-	-	-	1	-	-	2	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
5.	Uttarakhand	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
6.	Bihar	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
7.	West Bengal	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8.	Madhya Pradesh	58	-	2	-	1	-	-	13	3	-	19	-	-	-	11	-	1	-	2	-	1	-	-	2	1	2
9.	Gujarat	11	-	-	-	-	-	-	4	-	-	3	1	-	1	2	-	-	-	-	-	-	-	-	-	-	-
10.	Rajasthan	15	-	-	-	-	-	-	4	-	-	9	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-
11.	Maharashtra	37	-	-	-	-	1	1	15	-	-	9	-	-	-	7	-	-	-	-	1	2	-	-	-	-	1
12.	Karnataka	68	1	-	-	-	-	9	17	2	2	15	1	6	-	10	-	-	-	-	-	3	1	-	-	-	1
Other country																											
1.	Nepal	30	1	2	-	-	-	1	10	1	-	9	-	-	-	-	-	-	-	2	-	-	-	1	-	-	3
	Total	**302**	**3**	**4**	**1**	**1**	**1**	**11**	**97**	**6**	**2**	**101**	**2**	**7**	**1**	**36**	**1**	**3**	**1**	**4**	**2**	**6**	**1**	**1**	**2**	**1**	**7**

3. Seedling resistance test (SRT) in wheat against virulent pathotypes of rust pathogens and characterization of rust resistance genes

During the 2025–26 crop season, more than 5,000 wheat and barley lines were evaluated at the seedling stage to identify sources of resistance against rust diseases. Of these, 447 promising wheat entries, comprising 202 lines from the Advanced Varietal Trials (AVT) and 245 lines from the National Barley Disease Screening Nursery (NBDSN), were subjected to detailed resistance screening under controlled environmental conditions with regulated light and temperature (Table 5). The AVT entries were evaluated against a comprehensive set of 67 rust pathotypes representing the three major *Puccinia* species infecting wheat. These included 15 pathotypes of *Puccinia striiformis* f. sp. *tritici* (yellow rust), 23 pathotypes of *P. graminis* f. sp. *tritici* (black rust), and 29 pathotypes of *P. triticina* (brown rust). The selected pathotypes represent the most virulent and prevalent races currently occurring across the major wheat-growing regions of India, ensuring a robust assessment of resistance. This systematic screening facilitates the identification of wheat lines possessing broad-spectrum and potentially durable resistance to multiple rust pathogens. The resistant sources identified through the screening will serve as valuable genetic resources for developing high-yielding, climate-resilient, and rust-resistant wheat and barley cultivars, thereby strengthening national wheat and barley improvement efforts and enhancing long-term food security.

Table 5. Details of wheat and barley materials used for Seedling Resistance Test during 2025-26.

S. No.	Description	No of Lines	Pathotypes		
			Black rust	Brown rust	Yellow rust
1.	Wheat Lines (Dr. Surendra)	03	Multiple	Multiple	Multiple
2.	Wheat Lines (Dr. Shailendra Jha)	05	-	-	Multiple
3.	Wheat Lines (Dr. Vikas VK)	05	11, 40A, 40-2, 15-1	-	-

4.	Wheat Lines (Dr. Vikas VK)	07	11, 40A, 40-2, 15-1	-	-
5.	Wheat Lines (Dr Dharam Pal)	08	-	-	Multiple
6.	Wheat Lines (Dr Dharam Pal)	24	-	52-4	238S119
7.	Wheat Lines Dr. Satinder Kaur)	26	-	12-5, 77-5, 77-9, 104-2, 52-4	6S0, 110S119, 238S119, 46S119, 110S84, T
8.	Wheat Lines (Dr M. Sivasamy)	34	-	12-5, 77-1, 77-5, 77-9, 104-2	46S119, T, 110S84, 110S119, 238S119
9.	Wheat Lines (Dr. Vikas VK)	34	11, 21A-2, 40A, 117-6, 295	-	-
10.	Wheat Varieties (Dr. Satish)	64	11, 21A-2, 40A, 117-6	12-5, 77-5, 77-9, 104-2	110S84, 110S119, 238S119, T
11.	Wheat Lines (Prashant Babu)	108	-	52-4, Mixture	-
12.	Wheat Lines (Dr. Sudheer)	120	-	77-5, 77-9, 104-2	110S119, 46S119, 238S119
13.	Wheat Lines (Dr Dharam Pal)	150	-	52-4, 77-5	-
14.	Wheat Lines (AVT 2025-26)	202	Multiple	Multiple	Multiple
15.	Wheat Germplasm (Dr. TL Prakash)	207	-	-	110S84, 110S119, 238S119, T
16.	Wheat Varieties (Dr. Vikas Gupta)	250	11, 21A-2, 40A, 117-6	12-5,77-5, 77-9, 104-2	110S84, 110S119, 238S119, T
17.	Wheat Lines (Prashant Babu)	252	-	-	110S119, 238S119, T, 110S84
18.	Wheat Genotypes, (Deepak Baranwal)	331	-	52-4, 77-5, 77-9, 104-2	46S119, 110S119, 238S119
19.	Duram Wheat (Dr. Sunil)	369	11, 40A, 40-117-6	12-5, 77-5, 77-9, 104-2	110S119, 238S119, 110S84, T
20.	Wheat Lines, (Dr. Vikas VK)	491	-	77-5, 77-9, 52-4, 104-2	238S119, 110S119, T
21.	Wheat Lines (Dr. V Rana)	531	-	-	238S119, Mixture
22.	Wheat Lines (Dr. Hanif Khan)	628	-	52-4, 77-5, 77-9	46S119,110S119,238S119
Barley					
1.	Barley Material (Ms. Prachi)	166	-	-	Multiple
2.	Barley Material (Dr. Chunni Lal)	236	-	Multiple	G, M, Q, 57, 6SO, ST24
3.	Barley Lines (NBDSN and EBDSN)	245	11, 21A-2, 40A, 117-6, 122	Multiple	G, M, Q, 24, 57, 6S0, 7S0
4.	Barley Material (Dr. V. Kaur)	507	-	-	G, M, Q, 24, 57, 6S0
Total		**5003**			

Rust resistance in AVT lines

AVT entries PBW1012 and VL2064 exhibited resistance to all pathotypes of the three rust pathogens (Table 6). Twenty-two AVT entries exhibited resistance to all the pathotypes of both black and brown rusts. None of the AVT entries showed resistance against all tested pathotypes both of brown and yellow rust pathogens. However, UP3145 conferred resistance to both black and yellow rusts. Additionally, 11 lines were found resistant to brown rust, and 15 exhibited resistances to yellow rust. Fourteen entries (including those carrying the *Sr31*) conferred resistance to black rust pathotypes only (Table 6).

Table 6. Rust resistance in advanced wheat material (AVT: 2025-26)

Rusts	No. of lines	Variety/line
Brown, Black and Yellow	02	PBW1012, VL2064
Brown and Black	22	CG1029 (C), GW569, GW572, GW573, HD3090 (C), HI1563 (C), HI1696*, HI1697*, HI1699, HI1700*, HI1708, HI1709, HI1711, MACS6222 (C), MACS6768 (C), MACS6869, MACS6870, NIAW4533, PBW723, PWU49, RAJ4083 (C), UAS3044
Black and Yellow	01	UP3145
Brown only	11	DDW71 (d), HD3508, HD3515, HD3541, MACS3949 (d)(C), MACS4146, MACS4147, MACS4154 (d), NIDW1557 (d)*, PBW833, PBW970
Black only	14	DBW110 (C), DBW303 (C), DBW377 (C), HI1633 (C), HI1634 (C), HP1983, HS507 (C), MACS6854, MACS6885, NIAW4649, PBW771 (C), RAJ4597, VL3042, VL907 (C)
Yellow only	15	DBW491, HD3495, HD3499, HD3507, HD3542^{M}, HP1986, HP1987, HS721, HS722, PBW757, PBW976, PBW979, SVPL22-02*, VL3041, VL3043

Rust resistance genes in AVT lines (Gene postulation)

Wheat rust resistance genes (*Lr*, *Sr*, and *Yr*) were characterized using the gene-matching technique based on host–pathogen interaction patterns. Gene postulation was carried out in wheat lines exhibiting differential infection responses to specific rust pathotypes. In cases where clear differential host–pathogen interactions were not observed, resistance genes were inferred using complementary evidence, including linked genetic traits, morphological markers, and characteristic infection type patterns.

This integrated approach enabled reliable postulation of rust resistance genes and facilitated the identification of valuable genetic sources for wheat improvement and the development of rust-resistant cultivars.

Yr-genes

Among the 202 lines of AVT, *Yr* genes were characterized in 115 lines. *Yr* genes were postulated in lines where differential interactions were observed and some cases tight linkage of *Yr* genes to other *Lr* and *Sr* genes also implicated the presence of a resistance gene. Two *Yr* genes viz. *Yr2*, and *Yr9* contributed to yellow rust resistance in Indian wheat material. Among the postulated *Yr* genes, the frequency of *Yr2* was maximum and it was characterized in 102 lines (88.7%). *Yr9* was postulated in 13 entries (Table 7).

Table 7. *Yr*-genes postulated in AVT entries during 2025-26

Yr gene	No. of lines	Variety/ line
Yr2+	102	HI1700*, BRW3975, CG1029 (C), CG1040 (C), DBW110 (C), DBW187 (C), DBW252 (C), DBW296 (C), DBW303 (C), DBW327 (C), DBW359 (C), DBW377 (C), DBW458*, DBW465*, DBW466*, DBW467*, DBW486, DBW487, DBW493, DBW495, DBW499, DBW500, DBW503, DBW507[#], DBW509*, DWR162 (C), GW322 (C), GW572, GW573, HD2932 (C), HD3086 (C), HD3118 (C), HD3171 (C), HD3249 (C), HD3293 (C), HD3386 (C), HD3504, HD3505, HD3506, HD3508, HD3509, HD3515[M]*, HD3543[B], HI1563 (C), HI1605 (C), HI1621 (C), HI1653 (C), HI1696*, HI1697*, HI1708, HI8627(d) (C), HI8860(d), HPW520, HPW522, HS490 (C), HS562 (C), HS720, HW1098 (C), JKW261 (C), K1317 (C), K2407, K2410, KRL19 (C), KRL2402[$], MACS4146(d)*, MACS6222 (C), MACS6887[Q], MP1399 (C), MP1401*, MP1409, MP3598*, MP4010 (C), NBPGR-DIC-01, NIAW3170 (C), NIAW4621*, NIAW4624[Q]*, NIAW4741, NIDW1149(d) (C), NW8104, NW8122, NWS2247, PBN2023-19, PBW644 (C), PBW826 (C), PBW833 (C), PBW974, PBW980, PDW291 (C), PDW314 (C), RAJ4083 (C), UAS3037, UAS3038[Q], UP3152, UP3156, UP3156, UP3157, UP3163[B], VL2061, VL892 (C), WH1353, WH1355, WHD969(d)*
Yr9+	13	HD3090 (C), HI1633 (C), HI1634 (C), HI1699*, HS507 (C), MACS6768 (C), MACS6854*, NIAW4649, PBW723, PBW771 (C), RAJ4597, VL3042, VL907 (C)
Total	**115**	

Lr-genes

Eight *Lr* genes (*Lr1*, *Lr2a*, *Lr3*, *Lr10*, *Lr13*, *Lr23*, *Lr24*, and *Lr26*) were characterized in 143 entries. *Lr13* was the most commonly postulated brown rust resistance gene that was characterized, alone or in combination, in maximum number of lines (58) followed by *Lr23* (43 lines) and *Lr10* (38 lines). The *Lr24* that is linked with *Sr24* was postulated in 24 entries. *Lr26,* tightly linked with *Yr9* and *Sr31*, was characterized in 13 lines. Other *Lr* genes i.e. *Lr1*, *Lr3,* and *Lr2a* were postulated 29, 11, and 3 entries, respectively. Resistance to brown rust in five entries was based on a combination of three different genes (Table 8).

Table 8. *Lr*-genes postulated in AVT entries during 2025-26

Lr Gene	No. of lines	Lines/Varieties
Lr2a+1+	**1**	MACS6885
Lr3+	3	DBW359 (C), HP1983*, HPW520
Lr13+	24	CG1040 (C), DBW222 (C), DBW303 (C), DBW486, HD2932 (C), HD3249 (C), HD3499, HD3504, HD3506, HI1605 (C), HI1621(C), HPW510, HPW521, HPW522, KRL19(C), MACS6887, NIAW4621*, NWS2247, UAS3034*, UP3152, UP3163, VL3038, VL3039, VL3040*
Lr13+1+	15	DBW465*, DBW503, DBW509*, GW322 (C), HD3509, K1317 (C), K2410, PBN2023-19, PBW644 (C), MP1399 (C), MP1401*, PBW974, PBW980, UP3145*, VL2063
Lr13+2a+1	1	NIAW4741
Lr13+3+	1	HD3059 (C)
Lr13+10+	20	BUDW3 (d), DBW252 (C), DBW495, HD3293 (C), HD3386 (C), HD3495, HD3542, HD3543, HS720, HS722, KRL2402, MP1409, NW8122, PBW976, PBW979, UAS3037, UP3156, VL892 (C), WH1353, WH1355
Lr13+10+1+	2	DBW507, NIAW3170 (C)
Lr13+10+3+	2	HD3086 (C), HI1653 (C)
Lr23+	13	DDW69, HI8855 (d)*, HI8860 (d), HI8861 (D), KRL210 (C), MP3598*, NIDW1149 (D)(C), PDW314 (C), PDW367 (d)*, UAS478(d)(C), UAS485 (d), UAS490 (d), WHD969 (d)*
Lr23+1+	12	DBW327 (C), DBW377 (C), DBW458*, DBW466*, DBW467*, K2407, MACS6877, NIAW4624*, PBW826 (C), UAS3038, UP3157, VL3043
Lr23+3+	1	HP1987
Lr23+3+1+	1	HS721
Lr23+3+2a	1	SVPL22-02*
Lr23+10+	5	BRW3975, BUBW1, DBW173 (C), DBW493, DBW500
Lr23+10+1+	3	DBW110 (C), DBW187 (C), DBW487
Lr23+10+3+	2	HS490 (C), HS562 (C)
Lr23+13+	1	JKW261 (C)
Lr23+13+10+	2	DBW296 (C), HD3171 (C)
Lr24+	20	CG1029 (C), GW569, GW572, GW573, HI1563 (C), HI1696*, HI1697*, HI1700*, HI1708, HI1709, HI1711, MACS6222 (C), MACS6869, MACS6870, NIAW4533, PBW1012, PWU49, RAJ4083 (C), UAS3044, VL2064*
Lr24+26+	4	HD3090 (C), HI1699*, MACS6768 (C), MACS6854*

Lr26+	2	HI1633 (C), PBW723
Lr26+1+	3	HS507 (C), NIAW4649, VL3042
Lr26+10+	2	RAJ4597, VL907 (C)
Lr26+23+1+	2	HI1634 (C), PBW771 (C)
Total	**143**	

Sr-genes

Thirteen black rust resistance genes (*Sr2, Sr5, Sr7b, Sr8a, Sr8b, Sr9b, Sr9e, Sr11, Sr13, Sr24, Sr28, Sr30* and *Sr31*) were characterized in the 169 AVT entries (Table 9). The frequency of *Sr2* was the highest, being postulated in 60 entries, followed by *Sr11* (53 entries) *Sr7b* (42 entries), and *Sr13* (34 entries). The rye translocation gene *Sr31*, which is linked with *Lr26/Yr9*, was characterized in 13 entries, while *Sr24*, linked with *Lr24*, was identified in 24 entries. Other black rust resistance genes including *Sr9b, Sr9e, Sr5, Sr30, Sr8a, Sr8b and Sr28* were postulated in 24, 17, 15, 13, 6, 3 and 2 entries, respectively. The resistance genes occurred either singly or in different gene combinations involving up to four genes. Among the evaluated entries, DBW252 possessed a combination of *Sr8a+Sr5+Sr11+Sr2*, while KRL19 carried *Sr8a+Sr9b+Sr11+Sr2*, representing the maximum number of black rust resistance genes identified in a single genotype. Several other lines possessed three-gene combinations, such as HD3504 (*Sr8b+Sr9e+Sr11*), DBW466 (*Sr9b+Sr13+Sr11*), HD3542 (*Sr13+Sr11+Sr2*), HD3171 (*Sr11+Sr7b+Sr2*) etc., whereas the remaining entries carried one or two Sr genes (Table 9).

Table 9. *Sr*-genes postulated in AVT entries during 2025-26.

Sr genes	Number of lines	Variety/line
Sr31+24+	04	HD3090 (C), HI1699, MACS6768 (C), MACS6854
Sr31+5+	01	HS507 (C)
Sr31+2+	05	HI1633 (C), PBW723, PBW771 (C), VL3042, VL907 (C)
Sr31+	03	HI1634 (C), NIAW4649, RAJ4597
Sr24+2+	07	CG1029 (C), GW569, HI1563 (C), HI1697, HI1708, HI1711, MACS6870
Sr24+	13	GW572, GW573, HI1696, HI1700, HI1709, MACS6222 (C), MACS6869, NIAW4533, PBW1012, PWU49, RAJ4083 (C), UAS3044, VL2064
Sr30+8a+2+	01	PBW826 (C)
Sr30+5+2+	01	HD3386 (C)
Sr30+5+	06	DBW492, DBW509, KRL2402, MACS6887, MP1399 (C), UAS3034
Sr30+11+	01	VL892 (C)
Sr30+2+	04	HS720, PBW980, UAS3038, WH1353

Sr28+9b+	01	HS490 (C)
Sr28+	01	HI1621 (C)
Sr8a+5+11+2+	01	DBW252 (C)
Sr8a+9b+11+2	01	KRL19 (C)
Sr8a+9b+11+	01	HS562 (C)
Sr8a+2+	01	NIAW3170 (C)
Sr8b+9e+11+	01	HD3504
Sr8b+9e+	01	DBW491
Sr8b+	01	HPW522
Sr5+8a+2+	01	PBW757
Sr5+9b+	02	PBN2023-19, VL2063
Sr5+13+	01	DBW327 (C)
Sr5+11+	02	DBW187 (C), HI1605 (C)
Sr9e+9b+	01	VL3038
Sr9e+13+	01	HD3495
Sr9e+11+	03	HP1986, HD3507, HW5307
Sr9e+7b+	01	DDW71(d)
Sr9e+2+	06	HI8627(d) (C), HI8713(d) (C), HI8737(d) (C), HPW510, PDW291 (C), PDW314 (C)
Sr9e+	03	HI8855(d), HPW521, UAS478(d) (C)
Sr9b+13+11+	01	DBW466
Sr9b+13+2+	01	DBW500
Sr9b+13+	05	DBW487, DBW495, K2407, Raj4595, UP3156
Sr9b+11+	03	HD3118 (C), HD3506, VL3040
Sr9b+7b+2+	01	DBW359 (C)
Sr9b+7b+	03	HD3515, HS721, NIAW4741
Sr9b+	04	BUBW1, DBW467, DWR162 (C), UP3163
Sr13+11+2+	02	HD3542, HW5308
Sr13+11+	07	DBW458, DBW493, DBW503, HD3508, HD3541, NBPGR-DIC-01, UAS3037
Sr13+7b+2+	01	WHD969(d)
Sr13+7b+	09	DBW296 (C), DDK1071, GW1369(d), HI8858(d), HPW520, HS722, MACS5068, NW8104, PDW367(d)
Sr13+2+	03	HD3293 (C), HI8853(d), HI8859(d)
Sr13+	03	K2410, NW8122, UAS485(d)
Sr11+7b+2+	01	HD3171 (C)
Sr11+7b+	07	BRW3975, DBW486, HD3499, HI8862(d), HI8863(d), PBW976, PBW979
Sr11+2+	15	BUDW3(d), DBW499, DDK1029 (C), GW322 (C), HD3059 (C), HD3249 (C), HI8823(d) (C), HI8860(d), HW1098 (C), MACS5069, NIDW1149(d) (C), PBW644 (C), PBW974, UAS490(d), WH1355
Sr11+	08	HD2932 (C), HD3509, HI8861(d), JKW261 (C), MACS4146(d), NIAW4624, UP3152, UP3157
Sr7b+2+	09	DDK1070, HD3086 (C), HI8854(d), KRL210 (C), MACS3949(d) (C), MACS4158(d), PBW833 (C), UAS489(d), VL3043
Sr7b+	10	DDW69, GW1370(d), HI1653 (C), HI8849(d) (C), Kharchia 65 (C), MACS4154(d), PBW970, PBW982, VL3041, WHD943 (C)
Total	**169**	

4. Race specific Adult Plant Resistance (APR) in AVT entries (2025-26)

To identify race-specific adult plant resistance (APR), 202 wheat lines from the Advanced Varietal Trials (AVT) were evaluated against the most prevalent and virulent pathotypes of the three major wheat rust pathogens under controlled polyhouse conditions during the 2025–26 crop season. Three representative pathotypes each of *Puccinia triticina* (77-5, 77-9, and 104-2), *P. striiformis* f. sp. *tritici* (46S119, 110S119, and 238S119), and *P. graminis* f. sp. *tritici* (11, 40A, and 117-6) were used for inoculation. The wheat lines were assessed at both the seedling and adult plant stages to distinguish race-specific APR from all-stage resistance. Genotypes that exhibited susceptibility at the seedling stage but developed resistance at the adult plant stage were classified as possessing adult plant resistance. The identified APR sources provide valuable genetic resources for breeding wheat cultivars with durable and long-lasting resistance against rust diseases under diverse agro-climatic conditions. The detailed information of wheat lines showing race specific APR to nine pathotypes of three wheat rust pathogens is presented in Table 10, 11 and 12.

Brown rust

One hundred one entries of AVT conferred APR to one or the other pathotypes of *P. triticina.* APR to all the pathotypes (77-5, 77-9 and 104-2) of brown rust pathogen was observed in six entries (DBW296, HD3171, HI1621, HPW520, NWS2247, VL3039). Sixteen entries had combined APR to 77-5 and 77-9 while combined APR to 77-5 and 104-2 or 77-9 and 104-2 was not recorded in any of the entries. APR to individual pathotypes 77-5, 77-9 and 104-2 was observed in 6, 72 and 1 entries, respectively (Table 10).

Table 10. Race specific adult plant resistance (APR) response in AVT lines to virulent pathotypes of *Puccinia triticina* during 2025-26

Pathotypes	No. of lines	Wheat Lines
All three pts. 77-5, 77-9 and 104-2	6	DBW296, HD3171, HI1621, HPW520, NWS2247, VL3039
Both 77-5 and 77-9	16	BUBW1, DBW110, DBW252, DBW493, DBW499, HP1983, HP1986, K2407, MACS6887, MP1399,

		MP1401, NIAW3170, RAJ4595, UP3152, UP3157, UAS3034,
77-5	6	DBW491, HD3507, MACS6885, NIAW4621, NIAW4624, UP3156,
77-9	72	BRW3975, CG1040, DWR162, DBW173, DBW187, DBW222, DBW359, DBW377, DBW465, DBW458, DBW466, DBW467, DBW486, DBW487, DBW495, DBW503, DBW507, DBW509, HD3086, HD3118, HD3293, HD3386, HD3495, HD3499, HD3504, HD3505, HD3506, HD3509, HD3542, HI1605, HI1634, HI8627, HI8737, HI8823, HI8853, HI8861, HI8862, HI8863, HP1987, HPW510, HS490, HS720, HS721, JKW261, K1317, K2410, KRL2402, MP1409, NW8104, NW8122, PBN2023-19, PBW644, PBW757, PBW826, PBW974, PBW976, PBW979, PBW980, RAJ4597, UAS3037, UAS3038, UP3156, UP3163, VL892, VL907, VL2061, VL2063, VL3038, VL3040, VL3042, WH1353, WH1355
104-2	1	DDK1070
Total	101	

Yellow rust

Of the 202 AVT entries, 114 showed adult plant resistance (APR) to different tested pathotypes of yellow rust pathogen (*P. striiformis* f. sp. *tritici, Pst*). Fifty-four entries (47.6%) possessed APR to three major *Pst* pathotypes individually. APR to 110S119 and 238S119 was observed in 32 entries (28.1%). Seven entries GW1375, HD3171 (C), HI8627(d) (C), HS562 (C), JKW261 (C) NIAW4649, and UAS478(d) (C) possessed APR to both 110S119 and 46S119 (Table 11). Eleven entries showed APR to 238S119.

Table 11. Race specific adult plant resistance (APR) response in AVT lines to virulent pathotypes of *Puccinia striiformis* f. sp. *tritici* during 2025-26.

APR to pathotype	No. of lines	Detail
238S119, 110S119 and 46S119	54	BRW3975, BUDW3(d), DBW187 (C), DBW296 (C), DBW303 (C), DBW327 (C), DBW458*, DBW465*, DBW466*, DBW467*, DBW487, DBW492, DBW495, DBW499, DBW500, DDK1029 (C), DDK1070, DDW71(d), HD3086 (C), HD3118 (C), HD3249 (C), HD3386 (C), HD3505, HD3506, HD3508, HD3509, HI1621 (C), HI1633 (C), HI1634 (C), HI1653 (C), HI8737(d) (C), HI8823(d) (C), HI8855(d)*, HI8859(d), HI8863(d), HPW520, HPW522, KRL2402$, MACS3949(d) (C), NIAW4621*, NIDW1149(d) (C), NWS2247, PBW980, PDW291 (C),

		RAJ4597, UAS485(d)*, UAS489(d), UP3156, UP3156, UP3157, UP3163[B], VL3038, VL3040[M]*, WHD969(d)*
238S119 and 110S119	32	DBW173 (C), DBW222 (C), DBW493, DBW509*, GW1369(d)*, GW322 (C), HD3293 (C), HD3504, HD3515[M]*, HI8858(d)*, HI8861(d), HPW521, HS507 (C), HW5307, K1317 (C), K2410, KRL210 (C), MACS4154(d), MACS6887[Q], MP1401*, NIAW4741, NIDW1557(d)*, PBN2023-19, PBW644 (C), PBW826 (C), Raj4595, VL2061, VL2063, VL3039, VL3042, WH1353, WH1355
110S119 and 46S119	07	GW1375, HD3171 (C), HI8627(d) (C), HS562 (C), JKW261 (C) NIAW4649, UAS478(d) (C)
238S119 and 46S119	04	DBW507[#], DWR162 (C), HI8854(d)*, UP3152
238S119	11	DBW377 (C), DDK1071, HI8849(d) (C), HI8862(d), MACS4146(d)*, PBW723, PBW974, PDW314 (C), RAJ4083 (C), VL892 (C), VL907 (C)
110S119	06	DBW359 (C), DBW486, MACS4147(d)*, MACS6870, NIAW3170 (C), UAS3037
Total	**114**	

Black rust

Combined APR to *Pgt* pathotypes 40A & 117-6 was recorded in one AVT entries (HD3086). APR to both 11 & 117-6 and 11 & 40A was not conferred by any of the entries. Four entries (Raj4595, UAS3038, DBW359, and MP4010) had APR to pathotype 11. While APR to pathotype 40A and 117-6, individually, was observed in eight (For 40A: HP1986, NIDW1557, HS562, PDW314, BUDW3, PDW367, HS721, and BRW3975; for 117-6: HD3507, DBW467, PBW976, HD3171, NBPGR-DIC-01, DBW493, GW322, and HS490) entries each (Table 12).

Table 12. Race specific adult plant resistance to the predominant and virulent pathotypes *Puccinia graminis* f. sp. *tritici* (*Pgt*) in wheat lines of AVT during 2025-26

Pathotypes	No. of Lines	Varieties/lines
40A & 117-6	01	HD3086
11	04	Raj4595, UAS3038, DBW359, MP4010
40A	08	HP1986, NIDW1557, HS562, PDW314, BUDW3, PDW367, HS721, BRW3975
117-6	08	HD3507, DBW467, PBW976, HD3171, NBPGR-DIC-01, DBW493, GW322, HS490
Total	**21**	

5. Pathotype distribution in barley rusts and rust resistance in NBDSN (2025-26)

Rust situation and physiologic variation in barley rusts

During the 2025–26 crop season, the incidence of barley rust diseases remained negligible across the major barley-growing regions of India. Only a few sporadic occurrences of barley yellow rust were recorded from selected locations in Himachal Pradesh, with no reports of widespread disease outbreaks or economic damage. Pathotype 0S0 (57) of barley yellow rust was identified from four samples collected in the state. Similarly, two barley brown rust samples collected from Rajasthan were identified as pathotypes H2 (31H15) and H3 (55H7), indicating limited pathogen diversity and restricted disease occurrence. Importantly, no incidence of barley black rust was reported from farmers' fields during the season, suggesting the absence of significant black rust pressure under prevailing agro-climatic conditions. The limited distribution and incidence of barley rusts during this period also reflect continued surveillance efforts and potentially resistant barley cultivars under cultivation.

Rust resistance in NBDSN lines during 2025-26

Two hundred twenty-seven NBDSN lines were screened against different pathotypes of three rusts of barley under precise conditions of temperature and light. These lines were evaluated against seven pathotypes of *P. striiformis hordei* (M, Q, 57, 24, G, 6S0, and 7S0), five pathotypes of *P. graminis tritici* (11, 21A-2, 40A, 117-6 and 122), and 11 pathotypes of *P. hordei* (H1 to H11). None of the NBDSN entries conferred resistance to all the pathotypes of three rust pathogens *P. striiformis hordei* (yellow rust), *P. hordei* (brown rust) and *P. graminis tritici* (black rust).

Sixteen lines (BHS498, BHS516, BHS519, RD2715, RD3119, RD3120, RD3129, RD3137, RD3138, RD3139, RD3140, RD3172, RD3173, RD3180, RD3186, and RD3187) were resistant to both brown and yellow rust pathotypes. Entries DWRB2532 and PL996 were resistant to brown and black rust pathotypes. Resistance to all the pathotypes of black, yellow and brown rust pathogens was conferred by 4, 31, and 45 lines, respectively (Table 13).

Table 13. Seedling resistance in NBDSN entries to the pathotype of three rusts of barley during 2025-26.

Rust/s	No. of lines	Lines
Brown and yellow	16	BHS498, BHS516, BHS519, RD2715, RD3119, RD3120, RD3129, RD3137, RD3138, RD3139, RD3140, RD3172, RD3173, RD3180, RD3186, and RD3187
black and brown	02	DWRB2532 and PL996
Yellow	31	BH1071, BH1080, BHS517, DWRB137, DWRB182 (C), DWRB2520, DWRB2548, DWRB2551, HUB113, PL955, PL982, PL994, RD2552, RD2794 (C), RD2899, RD2907 (C), RD3089, RD3102, RD3126, RD3128, RD3131, RD3168, RD3170, RD3175, RD3176, RD3178, RD3179, UPB1106, UPB1136, UPB1143, and UPB1145
Brown	45	BHS380, BHS400, BHS502, BHS518, BHS519, DWRB223(C), DWRB238(C), DWRB244(C), DWRB2312, DWRB2507, DWRB2508, DWRB2510, DWRB2516, DWRB2522, DWRB2524, DWRB2526, DWRB2527, DWRB2531, DWRB2541, DWRB2542, DWRB2545, HBL118, HBL898, HBL900, HBL901, HUB304, HUB305, HUB307, HUB308, HUB309, KB2411, NDB1845, NDB1846, NDB1847, PL891 (C), PL978, PL999, RD3158, RD3163, RD3169, RD3177, UPB1121, UPB1147, UPB1151, and VLB118
Black	4	BHS352 (C), DWRB2536, UPB1139, and UPB1150
Total	**98**	

Gene postulation (barley brown rust) in NBDSN lines

Using the gene-matching technique, the barley brown rust resistance genes *Rph3* and *Rph19* were postulated in four NBDSN entries each. *Rph3* was confirmed in RD3162, RD3179, UPB1139, and UPB1144, whereas *Rph19* was postulated in KB2421, RD3088, UPB1148, and VLB195 (Table 14).

Table 14. Postulated *Rpg*-gene in NBDSN lines during 2025-26

S. No.	Rph gene	No. of lines	NBDSN Lines
1.	*Rph3*	4	RD3162, RD3179, UPB1139, and UPB1144
2.	*Rph19*	4	KB2421, RD3088, UPB1148, and VLB195
Total		**8**	

6. Genetics of rust resistance and developing rust resistant genetic stocks

Development of rust resistant genetic stocks

Barley

Resistant plants, for all three rusts, of 14 crosses of (*Rph7*) Trumph (*Rph12*) and Magnif 104 (*Rph5*) crossed with RD3028, BH1035, VL173, KB1926, RD3089, RD3013, PL908 and RD3016 were harvested to the F_4 generation.

Wheat

Six suitable resident lines of the cross Hango-2 (*Lr80* and *Sr65*) X FLW 17 (WH 542 X Spalding Prolific) F_6 generation was planted at Flowerdale, Shimla, Pantnagar, Dhaula Kuan, HP and ICAR-IARI, Indore for the characterization of DUS characters and harvested (F_7 generation). The resistant plants of 6 crosses were harvested in F_6 generations. One population was advanced to F_5 generation. One cross was promoted to F_4 and 4 crosses to F_3 generations.

Pyramiding multiple rust resistance and generation advancement

The F_3 seeds obtained from different crosses such as Hango 2 x FLW10, FLW6 x*Yr15*, FLW4 x Yr10, FLW12 x Hango 2, FLW12 x Hango 2, Yr15 x FLW8 and FLW13 x Hango-2 were planted in Rabi 2025-26. Three rows with around 10 plants in each row was sown for each of these crosses. The F4 seeds were harvested May - June 2026.

Mapping population of Barley Rust

The $F_{2:3}$ generation of two crosses (BHS481 x Bilara-2 and BHS479 x Bilara-2) were sown in Rabi 2025-26 with around 2-3 seeds per F_2 plant using a single seed descent method. In May-june 2026, single spikelet of each $F_{2:3}$ plant was harvested separately. The DNA isolated from F_2 would be used for BSA for the mapping of resistant gene for yellow rust. The $F_{2:3}$ and $F_{2:4}$ could be used to develop a linkage map and identify the resistant locus.

The F_2 seeds from crosses BHS381 × BHS479, BHS479 × BHS481, BHS479 × Bilara-2, and BHS481 × Bilara-2 were also harvested.

7. Maintenance and supply of nucleus inoculum of pathotypes of wheat and barley rust pathogens

A collection of more than 150 pathotypes of different rust pathogens of wheat, barley, oat and linseed were maintained on host as well as cryo-preserved. For the smooth conduct of wheat and barley rust research, nucleus/bulk inocula of different pathotypes of wheat and barley rust pathogens was supplied to 44 scientists/research centers across India (Table 15).

Table 15. Details of rust inocula and seed supplied during the period.

Name	Affiliation
Awneet Kaur	BTC College of Agricultural Station, Sarkanda
BM Mhaske	Agriculture Research Station, Niphad
Chunni Lal	ICAR-IIWBR, Karnal
Dawindar Sharma	Thapad Institute of Engineering and Technology, Patiala
Deepshikha	GBPUAT, Pantnagar, Uttarakhand
G Vishwakarma	BARC, Mumbai, Maharashtra
Hanif Khan	ICAR-IIWBR, Karnal, Haryana
Harikrishna	IARI, Pusa, New Delhi
IB Kapadia	JAU, Junagarh, Gujarat
Jaspal Kaur	PAU, Ludhiana, Punjab
Joginder Pal	Rice and Wheat Research Station, CSKHPKV Palampur HP
Kiran Gaikwad	IARI, Pusa, New Delhi
KK Mishra	ICAR-VPKAS, Almora, Uttarakhand
KK Mishra	ARS, JNKVV, Powarkheda, Madhya Pradesh
Madhu Patiyal	ICAR-IARI Shimla
MA Sushir	RWRRS, Mahabaleshwar, Maharashtra
Malkhan Singh Gurjar	IARI, Pusa New Delhi
Manmohan Singh	CCSKV, Hisar, Haryana
MK Pandey	SKAUST Jammu
Neeraj Kulshrestha	ICAR-CSSRI Karnal Haryana
PL Kashyap	ICAR-IIWBR, Karnal, Haryana
Pradeep Bhati	BISA, PAU, Seed Farm Ladhowal (Ludhiana), Punjab
Pradeep Sharma	ICAR-IIWBR, Karnal, Haryana
Prakasha TL	ICAR-IARI, RS, Indore, MP
Prashant Babu	ICAR-IARI Delhi
PS Shekhawat	RARI, Durgapura, Jaipur, Rajasthan
Raunak Thakkar	SD Agriculture University, Bijapur, Gujrat
Ravinder Kumar	ICAR-IIWBR, Karnal, Haryana
Reyazul Rouf Mir	SKUAST-K Wadura, Sopore
Sandeep Kumar	ICAR-NBPGR Pusa, New Delhi

Satinder Kaur	PAU, Ludhiana, Punjab
Satish Kumar	ICAR-IIWBR, Karnal Haryana
SB Sawant	BAU Sabour, Bhagalpur, Bihar
Shailendra Jha	IARI, Pusa New Delhi
Shashi Bhushan Chaudhary	ICAR-NBPGR Pusa, New Delhi
Shivali Dhimaan	Krishi Vigyan Kendra, Dhaulakuan, Sirmaur
Sithiya Mahajan	Khalsa Agriculture University, Amritsar, Punjab
SS Punia	RARI Durgapura, Jaipur, Rajasthan
Sudha, S	UAS Dharwad
Sudhir Navathe	Agharkar Research Institute, Pune, Maharashtra
Vaibhav Singh	ICAR-IARI, New Delhi
Vijay Kumar Yadav	CSA, Kanpur, Uttar Pradesh
Vikas Gupta	ICAR-IIWBR, Karnal, Haryana
Vikendra Kaur	ICAR-NBPGR Pusa, New Delhi

8. Wheat Disease Monitoring Nurseries

The 58th wheat disease monitoring nursery was planted at 36 strategic locations evenly distributed throughout India. Data was received from 29 locations. Among the three rust diseases, yellow rust was the most severe, brown rust was the most widely distributed, while black rust remained restricted to a few locations.

Yellow rust was confined to the cooler wheat-growing regions of NHZ and NWPZ, where it was reported from all monitoring locations except IIWBR Regional Station, Shimla. No incidence was observed in NEPZ, CZ, PZ, or SHZ. Disease severity exceeded 40S at almost all affected locations, except Durgapura (Jaipur), where the maximum severity was 20S on Agra Local. At least five WDMN entries recorded ≥40S severity at Almora, Bajaura, Malan, Dhaulakuan, Dalang Maidan, Kathua, and Hisar, indicating high disease pressure and the presence of susceptible genotypes. These findings reaffirm that yellow rust continues to be the most important rust disease in the northern wheat belt under favourable cool and humid conditions.

Brown rust showed the broadest geographical distribution among the rusts. It was detected at eleven locations in NHZ and NWPZ, including Almora, Pantnagar, Flowerdale, Rajouri, Kathua, Hisar, Abohar, Ropar, Langroya, Ludhiana, and Jaipur. In NEPZ, it was reported from all locations except Kalyani and Raipur, while in CZ it occurred at Vijapur, Indore, and Powarkheda. In PZ and SHZ, brown rust was observed only at Pune, Akola, and Wellington. At Ropar, infection occurred only on Lal Bahadur, HD3086, and HD3226, whereas at Akola only HD2329, Agra Local, HD2160, and HD2204 were affected, with the remaining entries remained disease free.

Black rust was the least prevalent rust disease during the season. It was observed only at Vijapur and Powarkheda in the Central Zone and Wellington in the Southern Hills Zone. All WDMN entries in NHZ, NWPZ, NEPZ, and PZ remained free from black rust. Importantly, no *Sr31*-virulent (Ug99-type) black rust pathotypes or wheat blast were detected anywhere in the country.

SAARC wheat disease monitoring nursery was planted at 28 locations in India, Bangladesh, Bhutan, Nepal and Pakistan. Data were received from all the locations in India, Nepal and Bangladesh whereas; it is still awaited from other SAARC countries.

9. Visitors and News

a. Visitors

- Dr M.L. Jat, Secretary, DARE & DG, ICAR, Dr Sudhakar Pandey, Assistant Director General (Flower/Veg/Spices/Med. Plants), ICAR, Dr Brajesh Singh, Director, ICAR-CPRI, Shimla, and Dr Ratan Tiwari, Director, ICAR-IIWBR, Karnal visited the station on May 01, 2026.
- A group of 26 Students from CCS university, Meerut, visited the station on February 26, 2026

b. Training/conferences/Workshop/Meeting/Lectures etc. organized/attended

- Dr. Pramod Prasad participated in National Conference on "Current Perspectives on Crop Health and Sustainable Plant Disease Management" during February 18–20, 2026 at Bidhan Chandra Krishi Viswavidyalaya (BCKV), Kalyani, Nadia, West Bengal, India and delivered invited lecture titled "*Harnessing modern tools for durable disease resistance in wheat*".
- Dr Pramod Prasad participated in International Conference on "Biosciences Beyond Boundaries – Healthcare, Bioeconomy & Sustainable Well-Being" during March 13-14, 2026 at Sardar Bhagwan Singh University, Dehradun, Uttarakhand, India and delivered invited lecture titled "*National Surveillance of Wheat Rust Pathogens in India: Current Status and Emerging Trends*".

c. Joining/transfer/superannuation

- Mr. Banni Singh, Assistant, joined the station on 02-06.2026 after his transfer from ICAR-IIWBR, Karnal.

d. Awards

- Dr. Pramod Prasad was conferred with KC Mehta and Manoranjan Mitra award of Indian Phytopathological Society, New Delhi during the National Conference at BCKV, Kalyani, West Bengal, India.
- Dr. Pramod Prasad was Recognized as a Fellow of the Indian Phytopathological Society (FPSI 2025), as approved during the societies' 78th Annual General Body Meeting (2026) at BCKV, Kalyani, West Bengal, India.

e. Activities under Swachh Bharat Abhiyan

- As part of the Swachh Bharat Abhiyan, swachata Abhiyaan was organized at the station. All the staff of the station including research fellows and contractual staff contributed in the Abhiyaan and made the campus plastics and litter free.

Updated Constitution of differential sets- 0, A and B for the binomial designation of pathotypes of wheat rust pathogens

Set-0	Set-A	Set- B
brown rust (*Puccinia triticina*)		
IWP 94	*Lr14a*	Loros (*Lr2c*)
Kharchia Mutant	*Lr24*	Webster (*Lr2a*)
Raj 3765	*Lr18*	Democrat (*Lr3*)
PBW 343	*Lr13*	Thew (*Lr20*)
UP 2338	*Lr17*	Malakoff (*Lr1*)
K 8804	*Lr15*	Benno (*Lr26*)
Raj 1555	*Lr10*	HP 1633 (*Lr9*+)
HD 2189	*Lr19*	
Agra Local	*Lr28*	
Black rust (*Puccinia graminis tritici*)		
Sr24	*Sr13*	Marquis (*Sr7b*+)
NI 5439	*Sr9b*	Einkorn (*Sr21*)
Sr25	*Sr11*	Kota (*Sr28*+)
DWR 195	*Sr28*	Reliance (*Sr5*+)
HD 2189	*Sr8b*	Charter (*Sr11*+)
Lok 1	*Sr9e*	Khapli (*Sr7a, Sr13, Sr14*)
HI 1077	*Sr30*	Tc*6/*Sr31/Lr26*(*Yr9*)
Barley Local	*Sr37*	
Agra Local		
Yellow rust (*Puccinia striiformis*)		
WH147	Chinese 166 (*Yr1*)	Hybrid 46 (*Yr4*)
HS507	Lee (*Yr7*)	Heines VII (*Yr2*+)
Hobbit	Heines Kolben (*Yr6*)	Compair (*Yr8*)
PBW752	Vilmorin 23(*Yr3*)	*T. spelta album* (*Yr5*)
PBW757	Moro (*Yr10*)	Tc*6/*Lr26* (*Yr9*)
PBW343	StrubesDickkopf	Sonalika (*Yr2+)*
HS240	Suwon92 X Omar	Kalyansona*Yr2*(KS)
Anza	Riebesel47/51(*Yr9*+)	*Yr24/3**AvS (*Yr24*)
A-9-30-1	Cappelle-Desprez (*Yr16*)	*Yr15/6**AvS (*Yr15*)
Bilara-2 (Barley)	Carsten V (*Yr32*)	*YrSP/6**AvS (*YrSP*)