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सारांश

कटाई उपरान्त करनाल बंट की उपस्थिति के लिए विभिन्न 'मंडियों' से अनाज के नमूने एकत्र किय गये। 7509 अनाज के नमूनों का विश्लेषण किया गया और कुल मिलाकर 16.42% नमूने संक्रमित पाए गए। अधिकतम करनाल बंट का संक्रमण राजस्थान (34.99%) के अनाज के नमूनों में देखा गया। लेकिन औसत दानों में संक्रमण बहुत कम था। यहाँ के नमूनों में संक्रमण 0.01 से लेकर बहुत 4.8 प्रतिशत तक था। इस साल गुजरात, मध्य प्रदेश, महाराष्ट्र और कर्नाटक से लिए गए नमूने करनाल बंट संक्रमण से मुक्त पाए गए। पिछले फसल मौसम के दौरान पीला रतुआ, भुरा रतुआ, काला रतुआ के पैथोटाइप 238S119, 77-9 (121R60-1) and 40A क्रमशः प्रमुख रहे। फसल वर्ष 2022-23 के लिए विभिन्न गेहूँ उगाने वाले क्षेत्रों के लिए फसल सुरक्षा प्रौद्योगिकियां की विवेचना 62 वीं अखिल भारतीय गेहूँ और जौ वर्कर्स की बैठक 28-30 अगस्त, 2023 के दौरान एमपीयूएटी, उदयपुर में आयोजित की गई। विभिन्न समन्वयक केन्द्रों से प्राप्त सूचना के अनुसार समय पर बोई गई गेहूँ की फसल में अच्छा अंकुरण और विकास देखा गया, इस प्रकार अब तक फसल स्वास्थ्य अच्छा है।

Summary

Post-harvest samples were collected from different 'mandies' for the presence of Karnal bunt and a total of 7509 grain samples collected from various mandies. Overall 16.42% samples were found infected and samples from Rajasthan showed maximum infection (34.99%). The maximum grain infection ranged from 0-4.80% was observed in a sample from Rajasthan. This year the sample collected from Gujarat, Madhya Pradesh Maharashtra and Karnataka were found free from Karnal bunt infection. During the previous cropping season pathotype 238S119, 77-9 (121R60-1) and 40A of stripe, leaf and stem rust remained predominant, respectively. The Crop Protection Technologies' for different wheat growing zones for 2022-23 crop season finalized in 62nd All India Wheat & Barley Workers' Meet held at MPUAT, Udaipur from 28-30 August, 2023 along with brief about strategy planning meetings are also being presented in this issue. The sowing of timely sown wheat crop has been completed and good germination and growth were observed, thus overall crop health is good.

Survey and surveillance is an important activity under crop protection programme for monitoring the diseases and insect pest situation during the cropping season as well as off season. The information of crop health was gathered through

surveys, mobile phones and whatsapp from the farmers and “Crop Health Newsletter” was issued regularly upto March 2023. Post-harvest samples for grain analysis were collected from different ‘mandies’ for the presence of Karnal bunt, black point and grain discolouration during 2023, details are given in subsequent sections of this newsletter. The Crop Protection Technologies’ for different wheat growing zones for 2022-23 crop season finalized in 62nd All India Wheat & Barley Workers’ Meet held at MPUAT, Udaipur during August 28-30, 2023 are also being presented in this issue.

Post-harvest analysis of grains

A total of 7509 grain samples collected from various mandies in different zones and were analyzed at cooperating centers (Table 1). The overall 16.42% samples were found infected. The samples from Rajasthan showed maximum infection (34.99%). The average incidence of Karnal bunt infected gains was ranging from 0 to 4.8%. The maximum grain infection of 4.8% was observed in a sample from Rajasthan. Madhya Pradesh, Karnataka, Gujarat and Maharastra were found free from Karnal bunt infection. In general the Karnal bunt infection was less in comparison to previous year (2021-22).

Table 1: Karnal bunt situation in the country during 2022-23 crop seasons

State	Total Samples	Infected Samples	Infected samples (%)	Range of infection (%)
Punjab	2521	188	7.46	0.00-0.29
Haryana	2281	488	21.39	0.00-0.85
Rajasthan	403	141	34.99	0.10-4.80
Uttarakhand	1534	416	27.11	0.01-0.75
Gujarat	86	0	-	-
Madhya Pradesh	406	0	-	-
Maharashtra	228	0	-	-
Karnataka	50	0	-	--
Overall	7509	1233	16.42	0.00-4.80

Pathotype distribution of rust pathogens in India

During cropping year (2022-23), 230 samples of stripe rust of wheat [*Puccinia striiformis* f. sp. *tritici*] were analyzed from five Indian states (Himachal Pradesh, Punjab, Haryana, Uttarakhand, and Rajasthan) and Nepal. A total of eight pathotypes {238S119, 110S119, 46S119, T (47S103), P (46S103), 79S68, 6S0, and 7S0] of wheat stripe rust pathogen were identified. During the cropping season frequency of pathotype 238S119 was maximum followed by 110S119. Only one pathotype 57 (0S0) of *Puccinia striiformis* f. sp. *hordei* (Psh) was identified in 2 barley yellow rust samples collected from Tehri, Ranichauri (UK).

Similarly, a total of 493 samples of wheat leaf rust pathogen were analyzed from 12 states of India and neighboring country Nepal. Nineteen pathotypes were identified in these samples. Pathotype 77-9 (121R60-1) was the most widely distributed. Pathotype 77-5 (121R63-1), which remained most predominant for more than 20 years was observed in 15.82% samples only. The remaining 14 pathotypes were identified in 20.28% samples only. The *P. triticina* population from Uttarakhand was highly diverse as highest number of pathotypes (14) was detected in the samples collected from Uttarakhand. In Nepal 4 pathotypes were detected in 26 samples. Unlike Indian scenario pathotype 52-4, detected in 16 samples, was the most predominant in Nepal.

In case of stem rust of wheat, a total of 49 samples were received from four Indian states (Gujarat, Maharashtra, Tamil Nadu, and Uttarakhand) during the crop season. Five pathotypes of *P. graminis* f. sp. *tritici* were identified. Pathotype 11 (79G31=RRTSF) was recorded in more than 32% of the samples analyzed during the season, which was followed by 40A (26.53%) and 40-3 (22.4%). Diversity of black rust pathogen was observed maximum in Tamil Nadu.

Table 2: First report of yellow rust occurrence in previous cropping season

Crop year	First occurrence	Location	State
2022-23	January 20, 2023	Donal, Rupnagar	Punjab
2021-22	January 14, 2022	Nikku Nangal, Sh Anandpur Sahib block of Rupnagar district of Punjab	Punjab
2020-21	January 17, 2021	Pattii (Manakpur) block Sh. Anandpur Sahib, Rupnagar District of Punjab	Punjab

2019-20	December 26, 2019	Chandesar and Darolli, Anandpur Sahib, Rupnagar Punjab	Punjab
2018-19	January 14, 2019	Fatehgarh Viran, Chamkour Sahib, Rupnagar, Punjab	Punjab
2017-18	January 9, 2018	Two fields in Rupnagar and SBS Nagar, Punjab	Punjab

Crop Protection Technologies for 2022-23 crop season

The host resistance is the effective, eco-friendly and cheapest way to manage diseases and pests. The disease scenario of different zones varies but the problem of yellow rust disease which is mainly prevalent in North Western Plains Zone (NWPZ) and Northern Hills Zone (NHZ) of the country is a major cause of concern.

Stripe or Yellow Rust

Yellow rust is predominant in the areas of North Western Plains Zone (NWPZ) and Northern Hills Zone (NHZ). Generally, disease appears in the Month of January and February but sometimes its appearance is also reported in December. During the crop season 2022-23, it appeared late in mid of January in donal village of Rupnagar district of Punjab. Strict watch is needed by the farmers and extension officers during this time to detect the occurrence so that timely management can be adopted to check further spread.

Management:

- Grow the varieties recommended for the zone.
- Discourage growing one variety on large area, while create a mosaic of varieties growing at least 3-4 diverse stripe rust tolerant varieties.
- Use balanced and recommended quantity of fertilisers – avoid high dose of nitrogen.
- Keep strict watch on appearance of the stripe rust and immediately spray the affected crop with recommended fungicides, viz., Propiconazole @ 0.1% or Tebuconazole 50 % + Trifloxystrobin 25 % WG @ 0.06% and repeat after 15 days, if needed.

Leaf or brown rust and stem or black rust

Stem and leaf rusts are the major diseases of wheat in Central Zone (CZ), Peninsular Zone (PZ) and Southern Hill Zone (SHZ).

Management:

- Grow the varieties recommended for the zone.
- To avoid large scale cultivation of single variety and grow at least 3-4 varieties at village level.
- Use balanced and recommended quantity of fertilisers – avoid high dose of Nitrogen.
- Keep strict watch on appearance of the disease and immediate spraying of affected areas with recommended fungicides, viz., Propiconazole @ 0.1 % or Tebuconazole 50% + Trifloxystrobin 25% WG @0.06% to avoid further spread of rust spores from initial infection foci.

Table 3: Wheat rust resistant varieties recommended for different zones

Disease	Zone	Timely sown	Late sown
Yellow rust	NWPZ	DBW 327, DBW 332, DBW 303, WH 1270, DBW 187, DBW 222, DBW187, HD 3226, WB 02, PBW 723, HPBW01, DBW 88, HD 3086, WH 1105, HD 2967, DPW 621-50, DBW 296, HUW 838, NIAW 3170, HD 3237, HI 1620, WH 1142, HD 3043, PBW 660, PBW 644, WH 1080	JKW 261, PBW 752, DBW 173, DBW 90, WH 1124, DBW 71, HD 3059, PBW 590, PBW 757, HI 1621, HD 3271
	NHZ	HS 562, HPW 349, VL 907, HS 507	HS 490, VL 892
Brown rust	CZ	Pusa Ojaswi (HI 1650), Vidhya (CG 1036), Pusa Kirti (HI 8830), DDW55 (Karan Manjari), DBW187, MACS SAKAS (MACS6768), HI 1653, HI1654, HI 1544, GW 366, GW 322, GW 273, HI 8759(d), HI 8737(d), HD 4728(d), HI 8713 (d), MPO 1215 (d), HI 8498(d)	CG 1029, HI 1634, MP 3336, MP 1203, HD 2932, HD 2864, MP 4010
	PZ	HI8826 (Pusa Poshtik), MACS4100 (MACS JEJURI), DDW 48(d), DBW 168, MACS 6478, UAS 304, MACS 6222, NIAW 917, Raj 4037, GW 322, MACS 3949(d), UAS 428 (d), UAS 415 (d), MACS 2971(dic), DDK 1029 (dic)	HI 1633, HD 3090, AKAW 4627, HD 2932, Raj 4083, HD 2833.
	SHZ	HW 5216, COW (W) -1, HW 2044, HW 1098 (dic)	

Karnal bunt

The disease mainly occurs in parts of Northern Plains, especially Punjab, Haryana, Rajasthan, foot hills of J&K and HP, tarai area of Uttarakhand, and in lesser severity

in Bihar and UP. The disease severity is high in situations when ear head (spike) emergence – coincides with rainfall. Karnal bunt is difficult to diagnose in the field and only seen after threshing of grains.

Management

- Use of certified or disease free seed.
- Follow crop rotation for 2-3 years in highly infected fields.
- Zero tillage helps in reducing Karnal bunt incidence.
- In Karnal bunt prone areas, if there is rains during flowering spray Propiconazole @ 0.1% at the time of 50% flowering.
- To minimize losses due to Karnal bunt grow resistant/tolerant varieties in disease prone areas viz., HD 3226, DBW 173, PBW 502 and PDW 223, PDW 291, PDW 314 (Durum) in Northern Western Plains Zones, HPW 251, HS 490, HS 507 in Northern Hills Zone and GW 366, HD 2864, MP 3336 and HI 8498 (Durum) in Central Zone.

Powdery mildew

It is mainly present in the cooler areas and hilly regions; foot hills and plains of North - Western India and the Southern hills (Nilgiris).

Management:

- Use recommended quantity of seed - avoid dense planting.
- Use balanced and recommended quantity of fertilisers – avoid high dose of nitrogen.
- For the control of powdery mildew in disease prone areas, spray of Propiconazole @ 0.1% or Azoxystrobin 18.2% w/w + Difenoconazole 11.4% w/w SC @ 0.1% can be given at the appearance of disease.

Foliar blight

Foliar blight is the main problem in humid and warmer areas especially in North Eastern Plains Zone (NEPZ).

Management:

- For effective management of the disease, cultivation of recommended (tolerant) varieties, like HI 1612, HD 3171, HD 2985, HI 1563, DBW 39, CBW 38, NW 1014, NW 2036, K 9107, HD 2733, DBW 14, HD 2888, K 0307, DBW 39 and HUW 468 should be encouraged.

Loose smut and Flag smut

Loose smut is internally seed borne disease and occurs in cooler states. Flag smut disease also poses problems in isolated fields in Punjab, Haryana, and Rajasthan and is an externally seed borne disease.

Management:

- Use disease free seed.
- Rouge out and destroy the infected tillers.
- Seed treatment with Carboxin 75 WP @ 2.5 g/kg seed or Carbendazim 50 WP @ 2.5 g/kg seed or Tebuconazole 2DS @ 1.25 g/kg seed or a combination of a reduced dosage of Carboxin (75 WP @ 1.25 g/kg seed) and a bioagent fungus *Trichoderma viride* (@ 4 g/kg seed) is recommended for loose smut.

Foliar Aphids

Present in all wheat growing areas in India but more severe in North Western Plains Zone (NWPZ) and Peninsular India

Management:

- Grow 4 rows of maize/sorghum/bajra around the field as a gourd guard/barrier crop.
- Judicious use of Nitrogenous fertilizers.
- Spray Imidacloprid 17.8 SL 100 ml per ha initially on border rows at the beginning of the aphid colonization. This will help in protecting the bio-agent insect, (lady bird beetle) inside the field which feed on aphid.
- Spray 1000 ml of Quinalphos 25% EC in 500 liters of water per ha. at economic threshold levels of 10-15 aphids per shoot.

Termites

Mainly found in the Northern and Central India, but also in some pockets of Peninsular India.

Management:

- Deep ploughing of fields during summer to control of insect pests in the field.
- Apply well rotten FYM only to discourage termite infestation.
- Avoid late sowing of crops.
- Crop planted in FIRBS is more prone to root aphid and termite attack while zero tillage shows less damage.

- Seed treatment with Chlorpyrifos 20% EC (3–4 ml/Kg seed) or seed treatment with pre-mixed insecticide Imidacloprid 18.5%+ Hexaconazole 1.5% FS @ 2 ml/kg seed is also very effective.
- Mix Chlorpyrifos 20 EC (3 liter) in 50 kg soil per hectare broadcast in field and irrigate.

Pink stem borer

Pink stem borer is a pest of rice, but due to climate shift, rising of mean temperature during November and December, it has also started causing damage to wheat crop and now an emerging pest of wheat.

Management:

- Hand picking of infested tillers and their destruction reduces borer attack.
- Bird perches @ 10/ acre should be erected for facilitating field visits of predatory birds.
- To avoid the infestation use of Nitrogen fertilizers in split doses.
- Conservation of beneficial insects like Coccinellids, *Apanteles*, mirid bug, bracon and ladybird beetle in the field.
- If infestation is more, spray 1300 ml of Quinalphos 25% EC in 500 liters of water per ha.

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