

## RESEARCH

### CEREAL CROPS

#### 1. Promising wheat and barley genotypes under evaluation in AICRP

##### 1.1 HS698

HS698 was developed from a three-way cross "ZANDER33/HD2687//HS484" using Bulk-Pedigree method of breeding. It produced on an average grain yield of 32.5q/ha under rainfed production conditions of Northern Hill Zone (NHZ). HS698 promoted from IVT to AVT-1 under late sown restricted irrigation production conditions of NHZ, due to its significant grain yield superiority and rust resistance over the check variety VL892. Apart from promotion, 06 wheat genotypes nominated for testing under timely sown rainfed and late sown restricted irrigated production conditions of NHZ under AICRP trials.

##### 1.2 BHS497

Barley genotype BHS497 produced an average grain yield of 32.5q/ha under rainfed conditions of Northern Hill Zone (NHZ). BHS497 promoted from IVT to AVT-1 under timely sown rainfed production conditions of NHZ, due to its grain yield superiority and rust resistance over the check. Apart from promotion, 05 barley genotypes were also nominated for testing under timely sown rainfed production conditions of NHZ under AICRP trials.

#### Genetic stocks for unique traits registered with NBPGR, New Delhi

##### 2.1 Wheat

**2.1.1 HS545 (INGR#23027)** was developed from a cross "HD2819/HS435" using Bulk-Pedigree

method of breeding. HS545 showed resistance to all the pathotypes of brown rust including 77-8 and 77-10, known virulences for *Lr19* and *Lr28* under seedling resistance test. HS545 is validated for presence of *Lr24/Sr24* using molecular marker *Sr24#12*. The rust resistance gene pool present in HS545 would be a useful source for developing potential rust resistant genotypes in India.

##### 2.2 Barley

**2.2.1 BHS 483 (BBM 833)/ INGR22131**, a naked barley line developed from a cross "BHS352/BHS366" was found to be resistant against leaf and stripe rusts and hence registered with NBPGR.

**2.2.2 BHS 485 (BBM 839)/ INGR22129**, a naked barley genetic stock developed from a cross "HBL276/BHS369" was found to be resistant against leaf and stripe rusts. The line is also a promising source of malt barley due to protein content of 10.3% (dry weight) and starch content of 64.3% (dry weight).

**2.2.3 BHS 486 (BBM 845)/ INGR22130**, a barley genotype was developed from a cross "HBL276/BHS365". It was found to be resistant to leaf, stripe and stem rusts and hence, registered with NBPGR.

**2.2.4 BHS479 (BBM 798)/ INGR 22029**, a hulled barley genotype developed from a cross "BBM556/BHS169//BHS369". It has shown resistance to all the pathotypes of leaf rust and stripe rust at the seedling stage (except for race 24).

**2.2.5 BHS480 (BBM 803)/ INGR 23066**, a hulled barley genotype developed from a cross (BLG132/BHS369). It has shown resistance to all

pathotypes of leaf and stem rust at the seedling stage (except for race 11).

## HORTICULTURAL CROPS

### 3. Kiwi

**3.1. Use of bio-regulator, summer pruning and girdling increases fruit size:** Sitofix /CPPU greatly stimulate fruit growth indicating that it can be a powerful tool for improving kiwi fruit size. CPPU produced a darker skin colour, changes in appearance, increased fruit size, advanced ripening by one week, reduced flesh firmness, increased soluble solids and decreased titrable acidity. Average fruit weight has been further increased by light summer pruning in intervals as well as girdling technique.

### 4. Apple

#### 4.1 New fungus *Fusarium fujikuroi* causing core rot identified

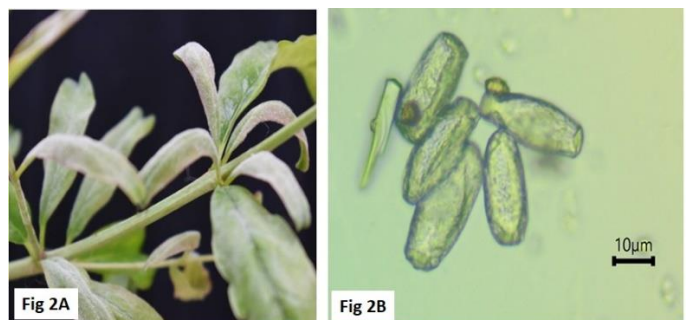
During the survey of apple orchards severe fruit drop was observed (Fig 1). Fungus was purified from these infected fruits. Based on morphological, molecular (TEF 1 and ITS gene), and Koch postulates studies of collected isolates, the causal fungus was identified as *Fusarium fujikuroi*. To the best of our knowledge, this is the first report of core rot of apple caused by *Fusarium fujikuroi* in India. Core rot reduced the nutritional value of apple cultivars, viz., 'Golden Delicious' and 'Royal Delicious', after 10 and 20d of infection. The disease showed to have decay and rotting of the fruit, resulting in a loss of essential nutrients. This led to decreased levels of DPPH, carotenoid, phenols, acidity, total soluble solid, sucrose, amino acid, ascorbic acid, and anthocyanin in the affected portions of the inoculated fruit. The core rot disease was reported to influence the extent of these effects on sucrose, and TSS properties also. Total soluble sugar content was increased 1.91 and 1.21-fold in 'Golden Delicious' and 'Royal Delicious' fruit respectively after 20d of inoculation. Additionally, the presence of *F. fujikuroi* triggered enzymatic reactions that further degrade antioxidants, reducing their levels in the infected areas.



### 5. Pomegranate

#### 5.1 First report of *Erysiphe punicae* as a causal organism on pomegranate for powdery mildew from India

Powdery mildew symptoms were observed on pomegranate plants of the cultivar G-37 and P-23 at the research farm (Dhanda) of ICAR-IARI Regional Station, Amartara Cottage, Shimla, 171,004 Himachal Pradesh, India (Fig 3A). *Erysiphe punicae* and *Podosphaeraxanthii* have been reported to cause powdery mildew (PM) in pomegranate globally but no record of causal organism was available in India. Microscopic examination revealed the presence of enormous ellipsoid conidium structures associated with the diseased specimen (Fig 3A). Conidia was hyaline,  $37\text{--}27 \times 14\text{--}11 \mu\text{m}$  (average  $31.96 \times 12.93 \mu\text{m}$ ), however, chasmothecia could not be observed in the specimen. The molecular identification based on internal transcribed spacer region primers disclosed the fungus identity as *Erysiphe punicae*. The pathogenicity test was subsequently performed to prove the Koch postulates on the initially identified host cultivar P-23. To the best of our knowledge, this is the first report of powdery mildew of pomegranate caused by *Erysiphe punicae* in India.



## EXTENSION

**Transfer of technologies through TSP, SCSP & MGMG Mission Poshan under Azadi ka Amrit Mahotsav:** The awareness and technical knowhow on varieties and scientific cultivation of barley were imparted with Leh farmers in association with the Sher-E-Kashmir University of Agriculture Sciences and Technology of Kashmir, High Mountain Arid Agriculture Research Institute, Leh. Displayed value-added products and farmers were encouraged to go for processing the barley for preparing products like “puffed barley”, “barley water” and “Sattu” for the upliftment of the livelihood status of the farming community, especially the self-help groups. Local germplasm of wheat and barley from Thiksey, Stakna, and other adjoining villages, was also collected and technical know-how on cultivation practices was also imparted. Dr Namgyal lauded IARI technologies and highlighted them among the farmers in Ladakhi Language. He emphasized the traditional germplasm used in Ladakh are “Nenak”, “Yangma”, “Yangkar”, “Sermo”, “Tug-zur” of barley which are involved in folk songs revealing the significance of these local germplasm.



## CAPACITY BUILDING

A field day was organized on “Farmer-Scientist Dialogue on Advanced Technologies of Cereals and Horticultural Crops” under Azadi ka Amrit Mahotsav on 26/10/2023 at Tribal village Ribba of Kinnaur district of Himachal Pradesh. Twenty four farmers participated in the dialogue.

## Front line demonstrations organized

Front line demonstrations in 1.2ha of barley varieties BHS380 and BHS400 were organized in different villages of Himachal Pradesh.

## RESEARCH PUBLICATIONS

- ≥ 10 NAAS Score Journals: 02
- 6 to <10 NAAS Score Journals: 02
- < 6 NAAS Score Journals: 07
- Other publications: 15

## AWARDS/RECOGNITIONS

- हिंदी व्यवहार प्रतियोगिता में भारतीय कृषि अनुसंधान संस्थान क्षेत्रीय केंद्र शिमला को मिला प्रथम पुरस्कार
- Dr Madhu Patial awarded Best oral presentation in National Seminar on “Plant Biodiversity for Food, Nutrition and Health Security in North-West Himalayas” held at Shoolini University, Solan, HP and in 5<sup>th</sup> International Conference “Global Insights on Research and Development in Agriculture and Allied Sciences”
- Dr Santosh Watpade awarded “Young Scientist Award” by Himalayan Phytopathological Society, Dr YS Parmar University of Horticulture and Forestry, Nauni-Solan (HP) and Best Oral Presentation in the National Symposium on “Plant and Soil Health Management: Issues and Innovations” organized by IPS

## EXTERNALLY FUNDED PROJECTS

- Contract Research Project “Micronutrient embedded sulphur fertilization in rice-wheat and maize/pearl millet-mustard system for enhancing productivity and biofortification (IARI Code: CRP 79-165).
- Bio-efficacy evaluation of new phytochemicals in apple (*Malus × domestica*) (IARI code: CSP 78-171)
- Evaluation of bio-efficacy of new agrochemical against pests in Apple (*Malus × domestica* Borkh.) (IARI code: CSP 78-172)

## MEETINGS ORGANIZED

110th meeting of IJSC was organized on 11.05.2023 under the chairmanship of Dr C. Viswanathan, Joint Director (R) ICAR-IARI New Delhi

## NEW JOINING

Dr Dharam pal joined as a Head of the Station on 25.04.2023.

## TRANSFERS

Dr A K Shukla relieved to join as a Head at ICAR-IGFRI Jhansi

## SUPERANNUATION

Mrs Indira Devi (MTS): 31.10.2023, Sh. Ranjeet Singh (Technical Assistant): 31.12.2023, Sh. Purushottam Chand (MTS): 31.12.2023 retired from the station.

## COMPILED & EDITED BY

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