

Print ISSN : 0972-8813
e-ISSN : 2582-2780

[Vol. 19(1), January-April, 2021]

Pantnagar Journal of Research

(Formerly International Journal of Basic and
Applied Agricultural Research ISSN : 2349-8765)



G.B. Pant University of Agriculture & Technology, Pantnagar



ADVISORYBOARD

Patron

Dr. Tej Partap, Vice-Chancellor, G.B. Pant University of Agriculture and Technology, Pantnagar, India

Members

Dr. A.S. Nain, Ph.D., Director Research, G.B. Pant University of Agri. & Tech., Pantnagar, India
Dr. A.K. Sharma, Ph.D., Director, Extension Education, G.B. Pant University of Agri. & Tech., Pantnagar, India
Dr. S.K. Kashyap, Ph.D., Dean, College of Agriculture, G.B. Pant University of Agri. & Tech., Pantnagar, India
Dr. N.S. Jadon, Ph.D., Dean, College of Veterinary & Animal Sciences, G.B. Pant University of Agri. & Tech., Pantnagar, India
Dr. K.P. Raverkar, Ph.D., Dean, College of Post Graduate Studies, G.B. Pant University of Agri. & Tech., Pantnagar, India
Dr. Sandeep Arora, Ph.D., Dean, College of Basic Sciences & Humanities, G.B. Pant University of Agri. & Tech., Pantnagar, India
Dr. Alaknanda Ashok, Ph.D., Dean, College of Technology, G.B. Pant University of Agri. & Tech., Pantnagar, India
Dr. Alka Goel, Ph.D., Dean, College of Home Science, G.B. Pant University of Agri. & Tech., Pantnagar, India
Dr. R.S. Chauhan, Ph.D., Dean, College of Fisheries, G.B. Pant University of Agri. & Tech., Pantnagar, India
Dr. R.S. Jadaun, Ph.D., Dean, College of Agribusiness Management, G.B. Pant University of Agri. & Tech., Pantnagar, India

EDITORIALBOARD

Members

Prof. A.K. Misra, Ph.D., Chairman, Agricultural Scientists Recruitment Board, Krishi Anusandhan Bhavan I, New Delhi, India
Dr. Anand Shukla, Director, Reefberry Foodex Pvt. Ltd., Veraval, Gujarat, India
Dr. Anil Kumar, Ph.D., Director, Education, Rani Lakshmi Bai Central Agricultural University, Jhansi, India
Dr. Ashok K. Mishra, Ph.D., Kemper and Ethel Marley Foundation Chair, W P Carey Business School, Arizona State University, U.S.A
Dr. B.B. Singh, Ph.D., Visiting Professor and Senior Fellow, Dept. of Soil and Crop Sciences and Borlaug Institute for International Agriculture, Texas A&M University, U.S.A.
Prof. Binod Kumar Kanaujia, Ph.D., Professor, School of Computational and Integrative Sciences, Jawahar Lal Nehru University, New Delhi, India
Dr. D. Ratna Kumari, Ph.D., Associate Dean, College of Community / Home Science, PJTSAU, Hyderabad, India
Dr. Deepak Pant, Ph.D., Separation and Conversion Technology, Flemish Institute for Technological Research (VITO), Belgium
Dr. Desirazu N. Rao, Ph.D., Professor, Department of Biochemistry, Indian Institute of Science, Bangalore, India
Dr. G.K. Garg, Ph.D., Dean (Retired), College of Basic Sciences & Humanities, G.B. Pant University of Agric. & Tech., Pantnagar, India
Dr. Humnath Bhandari, Ph.D., IIRRI Representative for Bangladesh, Agricultural Economist, Agrifood Policy Platform, Philippines
Dr. Indu S Sawant, Ph.D., Director, ICAR - National Research Centre for Grapes, Pune, India
Dr. Kuldeep Singh, Ph.D., Director, ICAR - National Bureau of Plant Genetic Resources, New Delhi, India
Dr. M.P. Pandey, Ph.D., Ex. Vice Chancellor, BAU, Ranchi & IGKV, Raipur and Director General, IAT, Allahabad, India
Dr. Martin Mortimer, Ph.D., Professor, The Centre of Excellence for Sustainable Food Systems, University of Liverpool, United Kingdom
Dr. Muneshwar Singh, Ph.D., Project Coordinator AICRP- LTFE, ICAR - Indian Institute of Soil Science, Bhopal, India
Prof. Omkar, Ph.D., Professor, Department of Zoology, University of Lucknow, India
Dr. P.C. Srivastav, Ph.D., Professor, Department of Soil Science, G.B. Pant University of Agriculture and Technology, Pantnagar, India
Dr. Prashant Srivastava, Ph.D., Cooperative Research Centre for Contamination Assessment and Remediation of the Environment, University of South Australia, Australia
Dr. Puneet Srivastava, Ph.D., Director, Water Resources Center, Butler-Cunningham Eminent Scholar, Professor, Biosystems Engineering, Auburn University, U.S.A.
Dr. R.C. Chaudhary, Ph.D., Chairman, Participatory Rural Development Foundation, Gorakhpur, India
Dr. R.K. Singh, Ph.D., Director & Vice Chancellor, ICAR-Indian Veterinary Research Institute, Izatnagar, U.P., India
Prof. Ramesh Kanwar, Ph.D., Charles F. Curtiss Distinguished Professor of Water Resources Engineering, Iowa State University, U.S.A.
Dr. S.N. Maurya, Ph.D., Professor (Retired), Department of Gynecology & Obstetrics, G.B. Pant University of Agric. & Tech., Pantnagar, India
Dr. Sham S. Goyal, Ph.D., Professor (Retired), Faculty of Agriculture and Environmental Sciences, University of California, Davis, U.S.A.
Prof. Umesh Varshney, Ph.D., Professor, Department of Microbiology and Cell Biology, Indian Institute of Science, Bangalore, India
Prof. V.D. Sharma, Ph.D., Dean Academics, SAI Group of Institutions, Dehradun, India
Dr. V.K. Singh, Ph.D., Head, Division of Agronomy, ICAR-Indian Agricultural Research Institute, New Delhi, India
Dr. Vijay P. Singh, Ph.D., Distinguished Professor, Caroline and William N. Lehrer Distinguished Chair in Water Engineering, Department of Biological Agricultural Engineering, Texas A&M University, U.S.A.
Dr. Vinay Mehrotra, Ph.D., President, Vinlax Canada Inc., Canada

Editor-in-Chief

Dr. Manoranjan Dutta, Head Crop Improvement Division (Retd.), National Bureau of Plant Genetic Resources, New Delhi, India

Managing Editor

Dr. S.N. Tiwari, Ph.D., Professor, Department of Entomology, G.B. Pant University of Agriculture and Technology, Pantnagar, India

Assistant Managing Editor

Dr. Jyotsna Yadav, Ph.D., Research Editor, Directorate of Research, G.B. Pant University of Agriculture and Technology, Pantnagar, India

Technical Manager

Dr. S.D. Samantray, Ph.D., Professor, Department of Computer Science and Engineering, G.B. Pant University of Agriculture and Technology, Pantnagar, India

CONTENTS

Study of genetic diversity in bread wheat (<i>Triticum aestivum</i> L.em.Thell) under late sown irrigated conditions VIJAY KAMAL MEENA, R K SHARMA, NARESH KUMAR, MONU KUMAR and ATTAR SINGH	1
Selection of teosinte (<i>Zea mays</i> subsp. <i>parviglumis</i>) predomestication alleles to inflate maize genetic resources SMRUTISHREE SAHOO, NARENDRA KUMAR SINGH and ANJALI JOSHI	8
Effect of crop establishment methods and nutrient management options on productivity and economics of baby corn (<i>Zea mays</i> L.) ABHISHEK BAHUGUNA and MAHENDRA SINGH PAL	16
Effect of organic and inorganic mulches on soil properties and productivity of chilli (<i>Capsicum annuum</i> L.) crop grown on alfisols K. ASHOK KUMAR, C. INDU, J. NANDA KUMAR REDDY, M. BABY, P. DINESH KUMAR and C. RAMANA	21
Performance of plant growth promotory rhizobacteria on maize and soil characteristics under the influence of TiO₂ nanoparticles HEMA KUMARI, PRIYANKA KHATI, SAURABH GANGOLA, PARUL CHAUDHARY and ANITA SHARMA	28
Bio-efficacy of <i>Ageratum houstonianum</i> Mill. (Asteraceae) essential oil against five major insect pests of stored cereals and pulses JAI HIND SHARMA and S. N. TIWARI	40
Resistance in rice genotypes against brown planthopper, <i>Nilaparvata lugens</i> 14 SWOYAM SINGH and S.N. TIWARI	46
Fumigant toxicity of alpha-pinene, beta-pinene, eucalyptol, linalool and sabinene against Rice Weevil, <i>Sitophilus oryzae</i> (L.) JAI HIND SHARMA and S.N. TIWARI	50
Potato Dry Rot: Pathogen, disease cycle, ecology and management SANJAY KUMAR, PARVINDER SINGH SEKHON and AMANPREET SINGH	56
Health status of farmers' saved seed of wheat crop in Haryana S. S. JAKHAR, SUNIL KUMAR, AXAY BHUKER, ANIL KUMAR MALIK and DINESH KUMAR	70
Socio economic impact of rice variety CO 51 on farmers in Kancheepuram and Tiruvarur districts of Tamil Nadu DHARMALINGAM, P., P. BALASUBRAMANIAM and P. JEYAPRAKASH	73
Assessment of students' knowledge level on e-learning, e-resources and IoT S.SENTHIL VINAYAGAM and K.AKHILA	77
An analysis of the factors influencing the opinion of social media users on online education and online purchasing in Namakkal district of Tamil Nadu N. DHIVYA and R. RAJASEKARAN	81
Nutritional status of children in Uttarakhand: A case study ANURADHA DUTTA, AMRESH SIROHI, PRATIBHA SINGH, SUDHA JUKARIA, SHASHI TEWARI, NIVEDITA PRASAD, DEEPA JOSHI, SHWETA SURI and SHAYANI BOSE	86
Performance evaluation of hydraulic normal loading device on varying soil conditions for indoor tyre test rig SATYA PRAKASH KUMAR, K.P. PANDEY, MANISH KUMAR and RANJEET KUMAR	90
Performance evaluation of bullock drawn plastic mulch cum drip lateral laying machine A. V. KOTHIYA, A. M. MONPARA and B. K. YADUVANSHI	96
Performance evaluation of bullock drawn battery powered sowing machine A. M. MONPARA, A. V. KOTHIYA and R. SWARNKAR	103

Short Communication

Health status of farmers' saved seed of wheat crop in HaryanaS. S. JAKHAR¹, SUNIL KUMAR², AXAY BHUKER¹, ANIL KUMAR MALIK³ and DINESH KUMAR⁴¹ Department of Seed Science and Technology, ² Krishi Vigyan Kendra, Sirsa, ³ Department of Extension Education, ⁴ Department of Agricultural Economics, Chaudhary Charan Singh Haryana Agricultural University, Hisar**Key words:** Farmers' seed, infection, IMSCS, seed health, samples

Wheat (*Triticum aestivum* L.) belonging to family *Poaceae* is an important cereal crop grown worldwide. It is staple food for about 2.5 billion people. The global production volume of wheat amounted to over 765 million metric tons (Shahbandeh, 2021). India comes second in production after China. The sown area of wheat in India for the year 2019-20 was 313.57 lac hectares and yield recorded 3.4 metric ton per hectare and production was 107.18 million tons (USDA, 2021).

Quality seed alone can raise agricultural production up to 20 per cent in any farming system. The use of quality seed has become more essential to provide enough food security for the rising population. Seed health status was known by the presence or absence of seed-borne diseases and insect infestation. Seed-borne diseases are referred as particular plant diseases that are associated with the seed and may transmit through seed. Disease free seed is a primary means of reducing the introduction of pathogens into fields and it also reduces the inoculum production and secondary spread of disease after its establishment. The scientific work on the microorganisms as bacterial (Malfanova *et al.*, 2013; Truyens *et al.*, 2015), fungal (Porrás-Alfaro and Bayman, 2011; Rodriguez *et al.*, 2009) and oomycete (Thines, 2014) residing in and on seeds has been done tremendously in last few years

Farmers saved seed contributes about 85 per cent of total seeds utilized for sowing in India (NITI Ayog, 2018). Seed replacement rate in case of wheat is 40.30 per cent (ICAR, 2017). The remaining 59.70 per cent is farmers saved seed which may act as carrier for spreading of the inoculum in the disease free areas. Farmers use their own saved seeds from the previous harvest which may not be stored in very appropriate conditions required for seed storage as 80 per cent of farmers can't differentiate between seed and grain (Raj *et al.*, 2007). This study gives an overview of farmers' saved seeds in Haryana with highlighting the seed health status of seed of different varieties of wheat.

Collection of wheat seed samples: A total of 246 seed

samples (1kg each) were collected from different villages of 11 districts viz., Charkhi Dadri, Kurukshetra, Sirsa, Fatehabad, Jind, Hisar, Kaithal, Karnal, Yamunanagar, Ambala and Bhiwani in Haryana during October 2018-19 and 2019-20. The samples were collected from farmers after the harvest of the crop and were brought to the laboratory in sterile plastic bags. All the samples were tested in Seed Pathology Laboratory in the Department of Seed Science and Technology (CCS HAU, Hisar). The collected samples were analyzed for germination following standard germination test using paper towel method (ISTA, 2011) and infection of Karnal bunt and ear cockles by sodium hydroxides soak method (Agrawal, 1985). Each sample was replicated twice (2000 seeds each). The loose smut infection was observed in crop raised during *Rabi* season in both the years and per cent loose smut infection was calculated on infected tiller basis.

Farmers' saved seeds acts as carrier of seed inhabiting micro-flora which can be resulting in deterioration of quality and yield reduction. The perusal of data in Table 1 indicates that all the samples analyzed were satisfying the standards for germination (90.00-98.00 %). There is no occurrence of loose smut and cockles. But Karnal bunt was prominent disease occurred during the analysis process. The percentage of Karnal bunt was 32.53 and range of infection was 0.05-0.70 per cent (Above the prescribed limit *i.e.* 0.25 %) in samples, hence there was rejection of 7.93 per cent seed sample. Among all the districts, Karnal have maximum average infection (0.115 %), followed by Yamunanagar (0.110 %), Kurukshetra (0.107 %) and Charkhi Dadri (0.093 %); whereas minimum average infection was recorded in Ambala (0.037 %). The results found similarity with the studies of Jakhar *et al.* (2019a), Jakhar and Bhuker (2014).

The data presented in Table 1 also indicates the wheat seed health status of farmers own saved seed during 2019-20. A total of 120 seed samples from farmers own saved wheat seed were collected from wheat growing areas of Haryana (11 districts). This year also all the samples fulfilled the

Table 1: Wheat seed health status of farmers own saved seed

District	Total Varieties		Germination	Infected samples		Karnal Bunt(2018-2019)			Rejected samples	
	samples					Infected seed	Average infection	Range of infection		
	No.	No.	%	No.	%	No.	%	%	No.	%
Fatehabad	12	6	92.50-98.00	4	33.33	10	0.041	0.05-0.30	1	8.33
Charkhi-Dadri	8	5	94.00-96.50	3	37.50	15	0.093	0.05-0.40	2	25.00
Kurukshetra	14	8	90.50-96.00	6	42.85	30	0.107	0.05-0.65	3	21.42
Sirsa	12	8	90.00-96.00	3	25.00	8	0.033	0.05-0.20	0	0.00
Jind	14	9	96.00-98.00	4	28.57	12	0.042	0.05-0.25	0	0.00
Hisar	20	10	92.00-96.00	5	25.00	18	0.045	0.05-0.25	0	0.00
Kaithal	8	6	94.00-98.00	3	37.50	7	0.043	0.05-0.20	0	0.00
Karnal	10	6	90.00-94.00	4	40.00	23	0.115	0.05-0.70	2	20.00
Yamuna Nagar	10	7	92.00-98.00	4	40.00	22	0.110	0.05-0.65	2	20.00
Ambala	8	4	90.50-96.00	2	25.00	6	0.037	0.05-0.25	0	0.00
Bhiwani	10	7	92.00-96.00	3	30.00	8	0.040	0.05-0.25	0	0.00
Total	126		90.00-98.00	41	32.53	159	0.063	0.05-0.70	10	7.93
Karnal Bunt (2019-2020)										
Bhiwani	9	4	90.00-98.00	3	33.33	8	0.044	0.05-0.20	0	0.00
Fatehabad	14	5	94.00-96.00	5	35.71	70	0.250	0.05-3.00	1	7.14
Kurukshetra	10	6	90.00-96.00	6	60.00	70	0.350	0.05-3.00	2	20.00
Charkhi-Dadri	8	5	90.00-98.00	3	37.50	15	0.093	0.05-0.35	2	25.00
Hisar	18	9	94.00-98.00	6	33.33	88	0.214	0.05-2.75	3	16.66
Sirsa	12	5	90.00-96.00	2	16.66	3	0.012	0.05-0.10	0	0.00
Jind	12	6	92.00-96.00	4	33.33	10	0.041	0.05-0.20	0	0.00
Ambala	7	4	90.50-96.00	2	28.57	6	0.042	0.05-0.25	0	0.00
Kaithal	10	5	92.00-96.00	3	30.00	6	0.030	0.05-0.20	0	0.00
Karnal	10	5	92.00-98.00	4	40.00	83	0.415	0.10-3.10	3	30.00
YNagar	10	6	92.00-98.00	5	50.00	72	0.360	0.05-3.40	1	10.00
Total	120	-	90.00-98.00	43	35.83	431	0.179	0.05-3.10	12	10.00

standards for germination (90.00-98.00 %). This year also no loose smut and cockle infection was observed in field conditions. The Karnal bunt infected sample percentage in 2020 was slightly higher side (35.83) as compared to (32.53) in previous year. The range of infection also followed the similar trend of increasing and was 0.05-3.10 per cent (Above the prescribed limit *i.e.* 0.25 %) in farmers' own saved seed; hence there was rejection of 10 per cent as it was 7.93 per cent seed samples in last year. Among the districts, Karnal again recorded maximum average infection (0.415 %), followed by Yamunanagar (0.360 %), Kurukshetra (0.350 %) and Fatehabad (0.250 %); whereas minimum average infection was observed in Sirsa (0.012 %). The disease severity varies in districts was might be due to the favorable climatic conditions and management practices followed. The results are in accordance with the earlier findings of Jakhar *et al.* (2019b), Jakhar and Punia (2013).

The germination of seed samples collected during the survey has met out the germination (>85%) *i.e.* above the Indian Minimum Seed Certification Standards in both the years. None of the district was found free from Karnal bunt infection. However, the infection was recorded within permissible limit (0.25%) in Sirsa, Jind, Kaithal, Ambala and Bhiwani districts and rest of the districts were

crossing the permissible limit. The samples collected from the districts Yamuna Nagar, Karnal and Kurukshetra showed maximum infection. In both the years, none of the samples recorded nematode cockles and loose smut infection. Therefore, there is an urgent need for increasing the use of quality seed instead of farmers own saved seed or to use appropriate storage conditions so that the production can be increased by using quality seed as a basic input.

REFERENCES

- Agrawal, V.K. (1985). 'NaOH seed soak' method for routine examination of rice seed lots for rice bunt and its control. *Seed Research*, 13(2):159-161.
- ICAR (2017). Indian Council of Agricultural Research Krishi Bhavan, Dr. Rajendra Prasad Road, New Delhi-110001 AICRP on National Seed Project (Crops), Pp:143-147.
- ISTA (2011). International rules for seed testing. Chapter 5: the Germination test. ISBN 978-3-906549-53-8. International Seed Testing Association, Baserdorf, Switzerland, Pp: 16-45.
- Jakhar, S.S. and Bhuker A. (2014). Status of Karnal bunt in wheat seed produced in Haryana. *Bhartiya Krishi Anushandhan Patrika*, 29(2):59-61.
- Jakhar, S.S. and Punia, R.C. (2013). Status of Karnal bunt

- in farmers' own saved wheat seed in Haryana. *Plant Disease Research*, 28(2):157-158.
- Jakhar, S.S., Kumar, S. and Bhuker, A. (2019a). Status of Karnal bunt in Haryana. *Plant Disease Research*, 33(2):165-167.
- Jakhar, S.S., Kumar, S. and Malik, A.K. (2019b). Status of Karnal Bunt in Major Wheat Growing Regions of Northern Haryana. *Current Journal of Applied Science and Technology*, 38(2): 1-7.
- Malfanova, N., Lugtenberg, B.J.J. and Berg, G. (2013). Bacterial endophytes: who and where, and what are they doing there? In: *Molecular microbial ecology of the rhizosphere*. John Wiley & Sons, Inc., pp 391-03.
- NITI Aayog, (2018). Government of India. Working Group report on Demand and supply projections towards 2033; Crop, livestock, fisheries and agricultural inputs, Pp: 41-42
- Porras-Alfaro, A. and Bayman, P. (2011). Hidden fungi, emergent properties: endophytes and microbiomes. *Annual Review of Phytopathology*, 49: 291-315.
- Raj, M.H., Niranjana, S.R., Nayaka, S.C. and Shetty, H.S. (2007). Health Status of Farmers' saved paddy, sorghum, sunflower and cowpea seeds in Karnataka, India. *World Journal of Agricultural Sciences*, 3:167-177.
- Rodriguez, R.J., White, J.F., Arnold, A.E. and Redman, R.S. (2009). Fungal endophytes: diversity and functional roles. *New Phytologist*, 182:314-330.
- Shahbandeh, M. (2021). World rice acreage from 2010 to 2019. www.statista.com.
- Thines, M. (2014). Phylogeny and evolution of plant pathogenic oomycetes-a global overview. *European Journal of Plant Pathology*, 138:431-447.
- Truyens, S., Weyens, N., Cuypers, A. and Vangronsveld, J. (2015). Bacterial seed endophytes: genera, vertical transmission and interaction with plants. *Environmental Microbiology Reports*, 7:40-50.
- USDA (2021). Foreign Agricultural Service. India: Grain and Food Update. Report Number: IN2020-0056, Pp: 287-292

Received: April 22, 2021

Accepted: May 3, 2021