Wheat crop health was monitored during off season and crop season (October and November) 2017 by different cooperators of All India Coordinated Research Project on Wheat and Barley. The post harvest grain analysis of wheat samples collected from different ‘mandies’ was done for presence of Karnal bunt, black point and grain discolouration during 2017 and results are given in this newsletter. The Crop Protection Technologies’ for different wheat growing zones for 2017-18 crop season were finalized in the 56th All India Wheat & Barley Workers’ Meet held at BHU, Varanasi from 25-28 August, 2017 along with brief strategy planning meetings are also being presented in this issue.

Highlights

- No yellow rust incidence reported from any part of North India in Nov. 2017.
- No wheat blast reported from West Bengal districts close to Indo-Bangladesh borders.
- The Karnal bunt incidence was 17.7% on an average in North India whereas Central and Peninsular zone wheat samples were free from Karnal bunt.
- Strategy planning meetings were held before onset of sowing of wheat to control yellow rust, Karnal bunt, smuts and to manage wheat blast threat.
- A skill up gradation course on “Survey and surveillance, creation of epiphytotics and uniform recording of diseases in wheat & barley”, will be held from December 18-20, 2017, at Crop Protection Programme, ICAR-IIWBR Karnal (Haryana)
- The crop protection technologies for 2016-17 crop season are given in the issue.

Off season survey of rusts

To investigate the role of grasses in the epidemiology of wheat rusts, off season surveys were undertaken by the staff of IIWBR,RS Flowerdale, Shimla. The rust samples were collected from grasses growing in different parts of districts of Lahaul & Spiti, Shimla and Bilaspur of Himachal Pradesh during September to November, 2017. The rusts of 20 samples of different grass species were inoculated on different cereals. Wheat didn’t get infection, however one grass sample from Shimla infected oat. It indicated that these grasses were not playing any role in the epidemiology of wheat rusts.

(Source: S. C. Bhardwaj and scientists of IIWBR RS Flowerdale)

Post harvest analysis of grains

KARNAL BUNT (KB)

A total of 7,144 grain samples collected from 2016-17 crop after harvest from various mandies in different zones, and were analyzed at cooperating centers (Table 1). Among different states samples taken from M.P., Maharashtra and Gujarat were found free from Karnal bunt infection. The overall infection was 17.7%. The samples
from Haryana showed maximum infection (57.4%) followed by Rajasthan (42.8%) and U.P. (36.5%)

Table 1. Karnal bunt situation in the country during 2016-17 crop season

<table>
<thead>
<tr>
<th>State</th>
<th>Total samples</th>
<th>Infected samples</th>
<th>% infected samples</th>
<th>Range of infection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Punjab</td>
<td>2138</td>
<td>353</td>
<td>16.51</td>
<td>0.00-1.99</td>
</tr>
<tr>
<td>Haryana</td>
<td>1516</td>
<td>865</td>
<td>57.41</td>
<td>0.05-3.00</td>
</tr>
<tr>
<td>Delhi</td>
<td>130</td>
<td>0</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Rajasthan</td>
<td>509</td>
<td>291</td>
<td>42.81</td>
<td>0.1-5.2</td>
</tr>
<tr>
<td>Uttarakhand</td>
<td>920</td>
<td>62</td>
<td>6.74</td>
<td>0.25-10.00</td>
</tr>
<tr>
<td>Jammu</td>
<td>483</td>
<td>83</td>
<td>17.18</td>
<td>0.25-5.00</td>
</tr>
<tr>
<td>U.P.</td>
<td>74</td>
<td>27</td>
<td>36.5</td>
<td>1.0-20.0</td>
</tr>
<tr>
<td>M.P.</td>
<td>526</td>
<td>0</td>
<td>0</td>
<td>--</td>
</tr>
<tr>
<td>Maharashtra</td>
<td>175</td>
<td>0</td>
<td>0</td>
<td>--</td>
</tr>
<tr>
<td>Gujarat</td>
<td>673</td>
<td>0</td>
<td>0</td>
<td>--</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>7144</strong></td>
<td><strong>1681</strong></td>
<td><strong>17.715</strong></td>
<td><strong>0.1-20.0</strong></td>
</tr>
</tbody>
</table>

Av. Range of infection

Strategy Planning Meetings
(i). Planning meeting on “Seed Treatment of Wheat” in the office of DG, Agriculture, Govt. of Haryana, Panchkula on 19 July 2017 under chairmanship of Hon. Shri. Dusmanta Kumar Behera, Director, Agriculture, Govt. of Haryana, Krishi Bhavan, Sector 21, Panchkula on 19 July 2017: The meeting was attended by senior addl. and deputy directors of Agriculture and MD of Haryana Beej Corporation as well as Dr. R.S. Beniwal of CCS HAU Hisar. The issue of seed treatment of wheat seed produced by public sector units in Haryana was discussed at length and I supported fungicidal seed treatment keeping in view of presence of loose smut and flag smut in Haryana. It was agreed to treat the seed of wheat with recommended fungicides like tebuconazole 2DS, Carbendazim 50 WP and Carboxin 75 WP and tender the procurement of these using chemical name. I suggested not mentioning seed treatment for Karnal bunt since it may not work until and unless seed crop is given foliar sprays of fungicides like propiconazole @0.1% at ear emergence stage.

(ii). Preparedness on occurrence of blast disease on wheat: Strategy planning meetings was also conducted on “Preparedness on occurrence of blast disease on wheat” on 07.9.2017 in Kolkata under Chairmanship of Additional Chief Secretary, Govt. of west Bengal. It was attended by Agriculture Commissioner and Joint Secretary (Crops) DAC & FW, ADG (PP&B), Director, IIWBR and other higher officials of Govt of West Bengal, ICAR officials and SAUs. It was decided to keep no wheat zone up to 5 km distance from Border of Bangladesh in Indian states, prevent entry of wheat seed and grains from Bangladesh, wheat holiday in Nadia and Murshidabad districts as well as planting of trap plot nurseries along Indo-Bangladesh borders.

(iii). Awareness for stripe rust management
The awareness programmes have been organized regarding diseases and insect pest management in wheat with special emphasis on yellow rust. ICAR-IIBWR organized Scientist – Farmers’ interaction on ‘Seed Day’ on 10 October 2017 in which special lecture has been given on ‘Disease management in wheat’ followed by question answers session. Posters were also displayed to educate farmers aware on identification of stripe rust disease and its management. More than 1500 farmers attended the fair. The seed of rust resistant varieties like WB 02 and H 3086 was
distributed. Stripe rust management cards were also distributed among the farmers. Under “Mera Gaon Mera Gaurav” scheme, teams of scientists comprising of Plant Pathologists and Entomologists visited the adopted villages and created awareness among farmers about identification of different diseases and insect pests of wheat and their management practices.

(iv). **Management of yellow rust and Karnal bunt**: Strategy planning meeting was conducted to “Evolving strategies for enhancing wheat production with special reference to management wheat rust and Karnal bunt disease” on 6.10.2017 at IISR Lucknow, U. P. under the chairmanship of hon. Secretary (AC & FW). The overview was given by Director, IIWBR and states and SAUs of UP, Bihar, MP, Haryana, H.P and Punjab. The participants were informed about the yellow rust resistant varieties for different states and arranging corrections in the literature prepared by UP Plant Protection department. The meeting was also addressed by ACP, U. P., Secretary Agric. and Director, U. P. Govt. The Secretary AC & FW stressed the need of proper management of wheat diseases and lauded the efforts of IIWBR on evaluation and identification of wheat blast resistant wheat varieties. He stressed the need to increase3 the productivity in wheat in U.P. and in India so that excess grains may be exported. JS (Crops) of DAC & FW stressed the need to replace older and susceptible varieties of wheat with newly released varieties and exchange of information on diseases for their proper management at farmers’ fields. Director, IIWBR Karnal offered help to all the wheat growing states and particularly to Haryana and U. P. in replacing old varieties of wheat and adoption of new technology in wheat production and protection.

(v). **Project proposal presentation Meeting on wheat blast on 14 Nov. 2017**: Director, IIWBR Karnal made presentation and discussion of wheat blast project in the meeting chaired by Hon. Secretary, DAC & FW, Krishi Bhavan, New Delhi. It was also attended by Joint Director (Agric. Extension), Govt. of West Bengal.

(vi.) **Wheat Blast workshop in Bangladesh**: The workshop was held from 13-14 July 2017 in Dhaka, Bangladesh and was organized by CIMMYT- BARI. It was attended by ADG (FFC) and Dr. Dr. D. P. Singh, from ICAR-IIWBR, Karnal. The strategies were discussed for arranging evaluation of Indian wheat varieties against wheat blast in Bangladesh at its hot spot location, Jessore.

**Evaluation of Indian wheat varieties against wheat blast**: A total of 100 new Indian wheat varieties were sent for testing against wheat blast in Bolivia, Bangladesh and USA through CIMMYT.

**Crop Protection Technologies for 2017-18 crop season**

The host resistance is the effective, eco-friendly and cheapest mean to management disease 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. Usually, it is observed that the early infection of stripe rust begin in wheat fields under the shades like poplar trees, in early sown crop (i.e. October). Hence, strict watch is needed by the farmers and extension officers in such fields.
Management

- Grow the varieties recommended for the zone.
- Discourage growing of decreases under one variety and grow 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%.
- For avoiding the losses due to stripe rust of wheat in NWPZ and NHZ, varieties like WB 02, PBW 723, HD 4728, DBW 90, PBW 644, WH 1080, WH 1142, DBW 71, TL 2942, TL 2969, HS 507, HS 542, VL 829, VL 892, KRL 210, HD 3171 and K1317 should be grown. Since most of the varieties recommended for NWPZ and NHZ do not carry high level of seeding resistance, hence, chemical sprays may be followed especially if rust occurs during second half of December to mid February.

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 % to avoid its further spread of rust spores from initial infection foci.

Varieties Recommended for the zones
Central Zone (Madhya Pradesh, Chhattisgarh, Gujarat)
Timely sowing: HI 1544, GW 322, DL 803-3, MP 3288, HI 8498(durum) and HD 4672 (durum)
Late sowing: MP 1203, HD 2864, HD 2932 and Raj 4083
Peninsular Zone (Maharashtra, Karnataka)
Timely sowing: MAACS 6222, Raj 4037, GW 322, HUW 510, HD 2189, MACS 2971 (dicoccum) and HD 8663 (durum).
Late sowing: AKAW 4627, HD 2932, HD 2833, Raj 4083 and PBW 533.
Southern Hills Zone (Tamil Nadu)
HW 2044, HW 1085, Co(W)-1

Karnal bunt
The disease mainly occurs in parts of Northern Plains, especially Punjab, Haryana, foot hills of J&K and HP, tarai area of Uttrakhand and in lesser severity in Rajasthan, 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 will help to check introduction disease in new areas.
- Follow crop rotation and avoid growing wheat for 2-3 years in highly infected fields.
- Zero tillage helps in reducing Karnal bunt incidence.
• In Karnal bunt prone areas, 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. PBW 502 and PDW 223, PDW 291, PDW 314 (Durum) in Northern Western Plains Zones, HPW251, HS 490, HS 507 in Northern Hills Zone and GW 366, HD2864, 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.
• For the control of powdery mildew in disease prone areas, spray of Propiconazole (@ 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 (resistant) varieties, like **NHZ**: HS 490, VL 829, **NWPZ**: C 306, HD 3086, WH 1021, WH 1080, WH 1142, **NEPZ**: DBW 39, HD 2733, HD 2888, K 0307, K 8027, **CZ**: DBW 110, HD 8627 (d) should be encouraged.

**Loose smut**
It is totally seedborne disease and occurs in cooler states.
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.

**Flag smut**
Flag smut disease also poses problems in isolated fields in Punjab, Haryana, and Rajasthan.
Management
• Use disease free seed.
• 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.

**Foliar Aphids**
Aphids are present in almost all wheat growing areas in the country. The aphids exist in different stages, viz., winged (alates), wingless (apterous), sexual and asexual forms. The rapid spread takes place through asexual reproduction where females give rise directly to nymphs rather than eggs. Infestation occurs usually during January, till crop maturity. Their damage leads to discoloration of leaves.
Management
• Since the aphids first appear on borders of the crop, spray the infested border rows with Imidacloprid 200 SL @20g a.i./ha at the beginning of the aphid colonization to check their further spread.
• Install yellow stick traps (4-5/acre) for monitoring aphid population in the field.
• Conserve natural enemies of aphids i.e. coccinellid beetles, spiders, syrphid fly, lacewings etc. for managing the aphid population in field.
• Spray 1000 ml of Quinalphos 25% EC in 500 liters of water per hectare 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.
• Seed treatment with Chloropyriphos 20% EC (3–4 ml/kg seed) or Fipronil 5 SC @ 6 ml/kg and imidacloprid 17.8SL @ 3.5 ml/kg can be done to avoid termite damage
• In standing crop, apply Chloropyriphos 20 EC by mixing 3 liter of chemical in 50 kg soil per hectare and broadcast in field before irrigation.

Pink stem borer
The incidence of pink stem borer is observed more in fields of rice-wheat cropping system where wheat is sown in zero tillage fields. For its management, foliar spray of quinalphos (Ecalux) 800 ml /acre as soon as pink stem borer is seen. Irrigation also helps in reducing the pink stem borer damage.
Management
• Hand picking of infested tillers and their destruction reduces borer attack.
• Foliar spray of quinalphos (Ecalux) 800 ml /acre as soon as pink stem borer is observed.
• Irrigation also helps in reducing the pink stem borer damage.
• To avoid the infestation use of Nitrogen fertilizers in split doses.
• Complete destruction of crop residues from previous crop will significantly reduce pink stem borer infestation in field.

Yellow rust of wheat
First report of yellow rust occurrence during last five crop seasons

<table>
<thead>
<tr>
<th>Crop year</th>
<th>First occurrence</th>
<th>Location</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016-17</td>
<td>29 Dec. 2016</td>
<td>Bella Dhyani (Ropar)</td>
<td>Punjab</td>
</tr>
<tr>
<td>2015-16</td>
<td>18 Dec. 2015</td>
<td>Brahampur (Anandpur Sahib)</td>
<td>Punjab</td>
</tr>
<tr>
<td>2013-14</td>
<td>1 January, 2014</td>
<td>Village-Ratangarh,Yamunanagar</td>
<td>Haryana</td>
</tr>
<tr>
<td>2012-13</td>
<td>9 January, 2013</td>
<td>Village –Hehindpur, SBS Nagar</td>
<td>Punjab</td>
</tr>
</tbody>
</table>

SYMPTOMS
• The first sign: Yellow streaks (pre-pustules), followed by small, bright yellow, elongated uredial pustules arranged in conspicuous rows on the leaves, leaf sheaths, glumes and awns.
- Mature pustules will break open and release yellow-orange masses of urediniospores.
- In some varieties, long, narrow yellow stripes will develop on leaves.
- The infected tissues may become brown and dry as the plant matures or becomes stressed. The urediniospores turn in to teliospores with increase in temperature after mid Feb.
- Severe early infection can result in plant stunting.

Symptoms of yellow rust of wheat

**Favourable conditions:**
- Urediniospores perpetuate on green host tissue, such as volunteer wheat or off season susceptible wheat growing on higher hills.
- The pathogen is best sustained when night time temperatures are <15°C.
- Stripe rust can develop on wheat at lower temperatures than other rusts.
- Optimum urediniospore germination occurs between 7-15°C. Infection and disease development is most rapid between 10-16°C.
- Urediniospores are spread via wind currents to healthy plants where they can initiate new infections.
- Heavy dew or intermittent rains can accelerate the spread.
- Infection tends to cease when temperatures consistently exceed 23°C.

**Management of yellow rust**
- Strict monitoring: Roving Surveys, Trap Plot Nurseries, SMS from Extension officers and farmers for earliest detection.
- Meaningful co-ordination (Govt. of India –ICAR- SAUs -State Dept. of Agriculture -farmers) to keep vigil, sharing of information and issue of need based advisories.
- Creating awareness among farmers for promoting new released varieties resistant to yellow rusts in NHZ and NWPZ.
- Discouragement of cultivation of only single variety over large ha to avoid epidemics.
- Distribution of stripe rust diagnostic cards and other literature among farmers, use of print and electronic media, trainings for proper management of yellow rust.
- Monitoring of yellow rust pathotype distribution, shift in pathotypes and consequences.
- Advisories for need bases fungicide application propiconazole @0.1%).
Protocol for sampling
A good rust sample needs following treatment:

I. Small bits (2-3") of rust infected fresh leaves/stems should be shade dried/overnight at room temperature.

II. Shade dried samples should be put in paper envelops separately or wrapped in newspaper and sent immediately by post.

III. Following information may be given on each envelope - Type of rust: brown/black/yellow - Details of host: wheat/barley, variety/line - Place of collection - Date of collection - Name and address of the co-operator

IV. Since samples from lines/varieties having little rust or from rust resistant material are important from analysis point of view, therefore, these should be treated on priority.

Precautions to be taken

I. Samples should be representative of a locality, variety and not repetitive.

II. Samples should not be taken from moist, dried or dead plant parts/plants.

III. Only fresh uredial infection may be sent as old and dried plant parts may not have viable spores.

IV. Samples should be sent at the earliest possible to Incharge, ICAR-IIWBR RS, Flowerdale, Post Bag no.2, Shimla, H. P. PIN: 171002.

Very Important

I. Glossy paper/polythene envelopes should not be used for collecting or mailing samples. II. Samples should not be taken from the sites of artificial inoculations, otherwise it should be mentioned accordingly.

Crop health report
Maharashtra
Period: 1st - 30th November 2017

Wheat sowing has been completed in many of farmers' field in timely sown areas. The late sown crop will be in progress after sugarcane harvesting in Baramati area. Wheat crop reached at completion of seedling growth stage. There was no natural incidence of any rust, blight and other pests. Overall crop health status was good till today.

During the 4th week of November, weather was cloudy for few days and precipitation was received (29.2 mm), so the sowing was delayed in many of the farmer's fields. The information of the climatic parameters (1st - 30th Nov. 2017) has been presented as below:

<table>
<thead>
<tr>
<th>Week</th>
<th>Temperature</th>
<th>Rains (mm)</th>
<th>Relative humidity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Max.</td>
<td>Min.</td>
<td>Max.</td>
</tr>
<tr>
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<td>30.27</td>
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<td>45</td>
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<td>47</td>
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<tr>
<td>48</td>
<td>29.49</td>
<td>12.13</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Average mean

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Rains (mm)</th>
<th>Relative humidity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max.</td>
<td>30.30</td>
<td>14.40</td>
</tr>
<tr>
<td>Min.</td>
<td>29.2</td>
<td>86.31</td>
</tr>
</tbody>
</table>

(2 days rainy)
(4 days cloudy)

(Source: B.K. Honrao)

Skill up gradation course entitled “Survey and surveillance, creation of epiphytotics and uniform recording of diseases in wheat and barley from 18 - 20 December 2017 at ICAR-IIWBR Karnal

Wheat Crop Health Newsletter, Volume 23 (1), (2017-2018)
Wheat and barley suffers from many biotic stresses. The diseases like rusts, foliar blights, powdery mildew, smuts and Karnal bunt and insect pest like aphid and nematodes are gaining importance due to changes in cropping system, tillage practices and environment. As a result newer pathotypes of existing diseases and new diseases are emerging and become a matter of concern to the production of wheat and barley. So far most of these are managed effectively mainly though deployment of resistant varieties.

For the development the resistant varieties which may adopt at larger areas, a continuous programme for identify the resistance sources and evaluation of breeding material at multi-location is prerequisite. To achieve this, it is important to use the latest technologies for monitoring of diseases, creation of artificial epiphytotics and uniform disease recording. This will increase the precision and improve the data quality thus evolve newer varieties of wheat and barley resistant to diseases and insect pests. Therefore, a skill up gradation course are being conducted mainly for co-operators of AICRP on Wheat and Barley, officials of other departments of GOI, State Agriculture Departments, Universities as well as seed producing governmental agencies. A total of 26 participants will be admitted. The last date of application is 3rd Dec. 2017. There will be no registration fee.

Acknowledgement:
Thanks to Drs.Honorao and S. C. Bhardwaj for contributions and computer section of IIWBR for uploading the newsletter on web page.

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