BioSpect
the business of Bi
24 years of leveraging the business of Bio
www.biospectrumindia.co

Ã¢â?¬Å?We are well prepared to tackle wheat stem rustÃ¢â?¬?

13 May 2013 | Interviews | By Rahul Koul Koul

Ã¢â?¬Å?We are well prepared to tackle wheat stem rustÃ¢â?¬?



Ug99 is a lineage of wheat stem rust, a type of wheat plant disease present in the fields across Africa and Middle East. It is predicted to spread rapidly through these regions and further to India and its neighboring countries, thereby causing a wheat production disaster that would affect food security.

In response to this growing concern, the Directorate of Wheat Research (DWR), Karnal, a nodal institute of Indian Council for Agricultural Research (ICAR), has been working on many aspects by facilitating planning, exchange of experimental material, monitoring the trials or activities, data compilation and documentation of the wheat research.

Q: Tell us more about the buzz created by Ug99 and how is it going to affect India? What efforts are being undertaken to tackle this?
Ug99 and its variants differ from other strains of the Black Stem Rust (BSR) pathogen due to their ability to overcome resistance genes in wheat that have been durable against the BSR pathogen for decades. The research results from affected countries have shown that Ug99 can cause up to 100 percent crop losses and is virulent against varieties, which have previously protected the wheat against stem rust disease.

Now, it is being feared that the disease may spread to Asia, utilizing the same migratory route that was followed by the stripe rust resistant gene Yr9 from Africa to Asia and caused major epidemics across the epidemiological region of South Asia. Since this race (of Ug99) was detected in Iran in 2007, now the fear is that it may move into India over a period of time.

Therefore at the global level, the Borlaug Global Rust Initiative (BGRI), funded by the UK Department for International Development and Bill & Melinda Gates Foundation to combat deadly strains of Ug99, has been partnered, among others, by the Indian Council of Agricultural Research (ICAR), Nepalese Agricultural Research Council (NARC), CIMMYT (Spain's International Maize and Wheat Improvement Center), International Center for Agricultural Research in Dry Areas (ICARDA), the United Nations' Food and Agriculture Organization (FAO), and Hyderabad-based Sathguru Management Consultants. Durable Rust Resistance in Wheat (DRRW) project will support attempts to identify new resistance genes as well as reproduce and distribute rust resistant wheat seeds to farmers.

Â

Q: Please share some key insights on the wheat research in India?
Since its inception till now, the All India Coordinated Wheat Improvement Project (AICWP) has released 378 improved varieties of bread wheat, durum wheat, dicoccum wheat and triticale for commercial cultivation under various production conditions. In addition to the development and release of wheat varieties, development and registration of 136 trait-specific genetic stocks of wheat has been another big achievement of AICWIP. These genetic stocks include donors for resistance to major biotioc and abiotic stresses, primary yield component, grain quality attributes, and Cytoplasmic Male Sterility (CMS) lines.

Seeds of all these genetic stocks have been maintained in the National Gene Bank at National Bureau of Plant Genetic Resources (NBPGR), New Delhi and the germplasm of DWR, Karnal.

Q: What are some of the major challenges and how are you coping with these challenges?
Since the losses due to rust account for 60-80 percent of the total production, no variety can be released without checking. Among the best varieties was PW343, which used to cover 90 percent of the wheat area since 1994. Though it had enhanced yield, it was susceptible to stem rust. Therefore, its use was discontinued and new varieties were released.
Generally, farmers have a rigid mindset and it takes time to adopt to the new varieties. Hence the farmers have been advised to go for the diversification as they were using the crops not approved officially. Consequently, the occurrence of stem rust in Punjab, Haryana has been reduced.

However, India certainly has had an edge over others as far as wheat is concerned. The epidemic has been limited to the specific zones as each one of them is diverse and the genotypes are variable. Durable resistance is the only answer and that is when the varieties released are not totally free from rust. Adoption of molecular approach to complement conventional wheat improvement program is one of the recent initiatives taken up by DWR through a research network project. Research capabilities and facilities are being strengthened through various network projects to enhance output of competent research centers under AICW and BIP.

Q:What is the role being played by biotechnological tools in wheat improvement?
Many of the coordinating centers are working in the area of biotechnology and molecular markers were developed and are being used in breeding programs. There are numerous examples, but to name a few the PCR-based markers for selection have been developed for Yr10 (DWR, Karnal), SR31 (Bhabha Atomic Research Centre, Trombay), Lr24 and LR19 (Indian

Agricultural Research Institute, New Delhi), markers linked to Lr15, Lr3a, Lr28, Lr22 (NCL, Pune).

Â

Besides these, Quantitative Trait Loci (QTL) for tripe rust resistance were identified from T monococcum and T boeoticum (Punjab Agricultural University); for spot blotch resistance (Banaras Hindu University) for grain quality traits. Apart from that, genetic resource characterization and genetic diversity analysis are carried using molecular markers and seed storage proteins in tetraploid wheat.

Q:What are some of the major achievements and what is the outlook for future?
In the last fiscal year, we exceeded the target of 86 million tonnes with the production of 93.9 million tonnes. Our average of 3.14 per hectare even exceeded the global 3.1 per hectare. We are looking forward to repeat the performance. There were 29 million hectares that were under cultivation. Even the record 7 tonnes per hectare was registered last year by a farmer, which is a great achievement. We are proud to be a part of the ICAR system that is very unique and has no replication of work anywhere is the world. Even Dr Norman Borlaug, when he visited India was amazed to see the amount of work that is being done in the country. For the best results, policy planners, researchers, and farmers have to work closely. The production increases with zero tillage technique and timely sowing of seeds. We expect the states of Uttar Pradesh and Madhya Pradesh to increase production due to better awareness among farmers and usage of high yield varieties. Punjab is expected to do average production.

-The author of this interview, Mr Rahul Koul was on a visit to the Directorate of Wheat Research, Karnal at the invitation of Borlaug Global Rust Initiative and Sathguru Management Consultants.