

# Expectations of Indian Private Sector from HRDC

**Ish Kumar,  
Yog Raj & V. Kini**

- **Private sector gives lot of significance to the role played by IRRI in Hybrid Rice Development from the very beginning.**
- **IRRI can play another important role thru HRDC again.**

# Objectives of HRDC

## Research on developing parental lines & Hybrids

- **Hybrid rice product development**
- **Enhancing yield heterosis in both DS & WS by +20%.**
- **Increasing and stabilizing seed production;**
- **Improving resistance to abiotic and biotic stresses**
- **Improving hybrid rice grain quality.**

# Objectives of HRDC

➤ **Provide information on hybrid performance and develop best management practices through:**

- Multi-location hybrid performance trials
- Research on hybrid seed production & best management practices for key hybrid rice mega-environments.

➤ **Support information sharing, generating public awareness and capacity building**

# **Profile of Indian member Private Companies**

Companies of large, medium and small size has long term interest in HRDC

- **4 years+ : 8 Companies**
- **2 – 4 years : 5 Companies**
- **below 2 years : 2 Companies**

## **Company Size**

- > 1 bn INR : 10**
- 1-0.5 bn INR : 1**
- < 0.5 bn INR : 4**

## **No. Of Selections**

- 50 : 13 members**
- 100 : 2 members**

# **Major expectations from HRDC while joining the consortium**

## **Access to:**

- **Diverse germplasm/ parental lines**
- **New CMS lines**
- **Divergent R lines with improved grain type.**
- **Hybrids with high yield & better grain quality**
- **New CMS lines other than WA cytoplasm.**
- **Lines with biotic & abiotic stress tolerance**
- **Training in hybrid rice**
- **Access to new technology**

**Status of Selected Breeding Material from**  
**HRDC**

- Used in developing Test Crosses : 8**
- Material still in pedigree nursery : 6**
- Used in developing hybrids but hybrids could not be forwarded : 1**

## **Finished Lines received after becoming HRDC member - Feedback**

- Members showed their concerns about non receipt of new finished lines**
- However, the earlier finished lines were supplied:**

<b>No of recipients</b>	<b>A/B lines</b>	<b>R Lines</b>	<b>Inbreds</b>	<b>F1 hybrids</b>
<b>1</b>	<b>18</b>	<b>68</b>	<b>50</b>	
<b>1</b>	<b>12</b>	<b>55</b>		
<b>1</b>	<b>5</b>			<b>15</b>
<b>1</b>	<b>10</b>	<b>16</b>		<b>3</b>
<b>1</b>	<b>2</b>	<b>5</b>		
<b>1</b>	<b>15</b>	<b>50</b>		

**No. of companies showing interest in each biotic stress tolerance- Feedback**

<b>BLB</b>	<b>False Smut</b>	<b>Blast</b>	<b>BPH</b>	<b>WBPH</b>	<b>Importance Score</b>
<b>9</b>	<b>10</b>	<b>6</b>	<b>5</b>	<b>1</b>	<b>9</b>
<b>4</b>	<b>1</b>	<b>4</b>	<b>6</b>	<b>2</b>	<b>7</b>
<b>2</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>8</b>	<b>5</b>
<b>-</b>	<b>-</b>	<b>1</b>	<b>-</b>	<b>2</b>	<b>3</b>

**Note: 1 member each showed interest for Neck Blast and Stem Borer resistance also.**

**No. Of companies showing interest in each abiotic stress tolerance- Feedback**

<b>Drought</b>	<b>Salinity</b>	<b>Submergence</b>	<b>Importance Score</b>
<b>12</b>	<b>3</b>	<b>1</b>	<b>9</b>
<b>-</b>	<b>7</b>	<b>2</b>	<b>7</b>
<b>3</b>	<b>4</b>	<b>7</b>	<b>5</b>
<b>-</b>	<b>-</b>	<b>3</b>	<b>3</b>
<b>-</b>	<b>-</b>	<b>1</b>	<b>1</b>

*Importance Score for Biotic and Abiotic Stress Tolerance*  
*(Wt. Avg.)*

- **False Smut : 7.8**
- **BLB : 7.9**
- **BPH : 7.1**
- **Blast : 7.0**
- **WBPH : 5.3**

1-9 score with 9 as  
most important

- **Drought : 8.2**
- **Salinity : 6.9**
- **Submergence: 4.5**

## **Increase in the number of selections –** **Members Feedback**

**All the members intended to increase the no. of selections for following reasons:**

- Limited selection in early generation does not capture the desired variability from the large displayed breeding populations.**
- The limit proposed to be increased by 2 times for fixed lines & 3-4 times for the segregating material. IRRI is in a position to meet the requirement due to availability of wider germplasm.**

## **Preference for selecting Breeding Material in different generations- Feedback**

- **F2 : 5 members**
- **F3 & F4 : 5 members**
- **F5 & Fixed Lines : 5 members**

### **Preference for selection in F2 :**

- **Bulk of F1 : 1**
- **Bulk of F2 : 3**
- **Single Plant Selection in F2 : 1**

**Expectations on improving heterosis**  
**in new parental lines – Members**  
**Feedback**

**All participants expressed importance to develop improved parental lines for yield heterosis as one of the highest priority by intersubspecific crosses or through NPT etc.**

**Expectations to increase High out-pollination in female lines – Members Feedback**

- **Being an important trait, the members emphasized on increasing out-pollination & stigma receptivity in CMS lines.**
- **The members also suggested testing the newly bred material for female development in regional hubs for their producability.**

**Expectations to increase emphasis on developing parental lines (especially CMS lines) for improved grain, milling and eating quality parameters.**

**Improved milling and eating quality parameters were rated as the next significant, after high OCR in female lines**

# **Large Scale Hybrid Seed Production Status- Members Feedback**

- Most of the members have hybrid seed production yield between 1-2.5 t/ha though higher yield too was obtained sporadically depending on the hybrid.**
- Training to members was effective.**
- Some members indicated research efforts to be increased for inducing early flowering by chemicals.**

## **Use of HRDC lines in improving biotic stress tolerance**

- **Some pyramided lines with Xa genes have been used for BLB tolerance by many. At least 3-4 companies out of 15 have developed commercial products resistant to BLB.**
- **Since selections are made from early segregating material from HRDC, the members are still to develop stable improved lines from the above material.**

**Important expectations from HRDC in next 3-5 years – Members feedback**

- **Development of CMS parental lines with:**
  - **High OCR in females lines.**
  - **Better cooking & milling quality.**
  - **Biotic and abiotic stress tolerance.**
  - **SS, MS & Fine grain type**
  - **Different durations early , medium & late**
  - **Diverse cytoplasmic background in CMS**
  - **Drought tolerance with earliness.**

Contd.....

# **Important expectations from HRDC in next 3-5 years - Members feedback**

## **Development of new restorer lines with:**

- High restoration
- Genetic divergence
- Disease & insect resistance
- Different maturity R lines
- Different grain type with better quality
- High pollen shedding lines.
- Identify molecular markers for the important traits.

## **1. Development of diverse parental lines for high heterosis.**

## **Expectations from HRDC in next 3-5 years - Members feedback**

- **Validate QTLs for biotic, abiotic stress tolerance & yield**
- **Develop GP pools for yield & other important traits.**
- **TGMS lines with better heterosis and high OCR**
- **Improved heterosis with high milling recovery lines**
- **Heterotic grouping in rice**
- **Research on prediction of heterosis**
- **False Smut Resistance A & R lines.**

## **Other Suggestions**

- Background information about the F2/lines offered for selection should also be made available.**
- Stabilized lines should also be offered for selection rather than only early segregating material .**
- HRDC material should be displayed at IRRI sub centres for selection**
- Training and capacity building programs should be strengthened in MAS, purity maintenance, process improvement in seed production.**
- MRYT should be abolished and more emphasis should be on GP enrichment**

## **Other Suggestions from members**

**Background information on the displayed progenies with brief description of parents in the selection fields**

**should be provided.**

**Some members suggested that MRYT trialling activities may be reviewed- 2 groups of thought:**

- i) Increase no. of locations in SE Asian countries.**
- i) Abolish hybrid testing since it does not serve purpose of notification or accreditation by the local country authorities. These resources may be used for germplasm enrichment.**
- ii) Study on new seed production systems may be undertaken.**

# **Major Expectations- summary**

- Enhance genetic diversity among parental lines.**
- Develop populations and new CMS lines having high outcrossing traits.**
- Develop populations to extract parental lines with better milling, eating & grain quality parameters.**
- Increase emphasis on parental lines development with resistance to BLB, BPH and false smut on priority basis.**
- Providing molecular markers for major traits.**

**Thanks**