

2014 HRDC MRYT Locations

DS = 10, WS = 11, Entries = 43

- ★ Both seasons
- ★ DS only
- ★ WS only

Locations for 2014 HRDC MRYT *

Site	Country	Sponsor	2014DS		2014WS	
			R ²	CV	R ²	CV
Faizabad	India	Advanta			0.65	12.14
Pabna	Bangladesh	BRAC	0.49	9.45	0.75	8.34
Gazipur	Bangladesh	BRAC	0.67	7.51	0.59	12.28
West Bengal	India	Pan Seeds	0.60	11.44	0.85	9.43
Raipur	India	J.K. Agri Genetics	0.48	6.98	0.95	7.01
Hanoi	Vietnam	FCRI	0.74	6.58	0.53	10.08
Hyderabad	India	Bayer			0.73	6.18
Nueva Ecija	Philippines	PhilRice	0.55	18.35	0.51	18.21
Los Baños	Philippines	IRRI	0.60	5.77	0.84	6.71
Long An	Vietnam	Bioseed	0.60	16.22	0.84	8.01
General Santos	Philippines	Bioseed	0.69	7.12		
Sukamandi	Indoensia	ICRR	0.86	8.19		
Kediri	Indonesia	BISI			0.84	10.82
			10		11	
* Site with CV > 15.0% is dropped from analysis						

Thanks to the Site Sponsors for Providing Services to Other Members

Combined ANOVA of Hybrid Yield over Sites and Seasons

(2014 HRDC MRYT, excluding 3 Sites/Seasons w/ high CV)

Site	Country	Yield (kg/ha)	t Grouping	N	Season
Faizabad	India	11,472	A	86	WS
Hyderabad	India	10,700	B	123	WS
Raipur	India	8,838	C	245	DS+WS
Sukamandi	Indonesia	7,547	D	126	DS
GenSan	Philippines	7,527	D	126	DS
LosBanos	Philippines	7,153	E	255	DS+WS
Gazipur	Bangladesh	6,202	F	246	DS+WS
Pabna	Bangladesh	5,853	G	234	DS+WS
WestBengal	India	5,552	H	228	DS+WS
Hanoi	Vietnam	5,507	H	237	DS+WS
Kediri	Indonesia	4,084	I	126	WS
LongAn	Vietnam	3,654	J	98	WS

Hybrid Yield in 2014 DS over SITES

Site	Yield	t Grouping	N
Raipur	9369	A	126
LosBanos	8565	B	126
Sukamandi	7547	C	126
GenSan	7527	C	126
WestBengal	7447	CD	114
Gazipur	7337	D	126
Pabna	6143	E	114
Hanoi	6133	E	117
Mean	7539		

Hybrid Yield in 2014 WS over SITES

Site	Yield	t Grouping	N
Faizabad	11472	A	86
Hyderabad	10700	B	123
Raipur	8275	C	119
LosBanos	5775	D	129
Pabna	5577	E	120
Gazipur	5011	F	120
Hanoi	4896	F	120
Kediri	4084	G	126
WestBeng	3657	H	114
LongAn	3654	H	98
Mean	6217		

ANOVA for Yield over Seasons in 2014 HRDC MRYT

Season	Yield (kg/ha)	Yield gap (kg/ha)	t Grouping	N
2014 DS	7539	1322	A	975
2014 WS	6217		B	1155

Hybrid Performance in DS, 2014 HRDC MRYT				
Entry	Yield	>PCBRC82 %	>IR75217H %	
HRDC1440	8596	17	13.5	IR90875H
HRDC1406	8098	10	6.9	
HRDC1443	8041	10	6.2	IR96441H
HRDC1431	8030	10	6.0	
HRDC1423	8006	9	5.7	
HRDC1415	7953	8	5.0	
HRDC1414	7940	8	4.8	
HRDC1438	7934	8	4.8	IR81955H
HRDC1422	7793	6	2.9	
HRDC1436	7715	5	1.9	
HRDC1402	7677	5	1.4	
HRDC1439	7662	5	1.2	IR90872H
HRDC1429	7650	4	1.0	
HRDC1405	7627	4	0.7	
HRDC1421	7626	4	0.7	
HRDC1437	7611	4	0.5	
HRDC1407	7607	4	0.4	
HRDC1404	7604	4	0.4	
HRDC1445	7573	3	0.0	IR75217H
HRDC1427	7533	3	-0.5	
HRDC1420	7511	2	-0.8	
HRDC1403	7507	2	-0.9	
HRDC1434	7506	2	-0.9	
HRDC1428	7486	2	-1.2	
HRDC1426	7434	1	-1.8	
HRDC1444	7411	1	-2.1	IR98054H
HRDC1416	7399	1	-2.3	
HRDC1409	7392	1	-2.4	
HRDC1419	7375	1	-2.6	
HRDC1401	7364	0	-2.8	
HRDC1410	7344	0	-3.0	
HRDC1446	7330	0	-3.2	PSBRc82
HRDC1441	7320	0	-3.3	IR96392H
HRDC1417	7311	0	-3.5	
HRDC1430	7300	0	-3.6	
HRDC1432	7256	-1	-4.2	
HRDC1442	7234	-1	-4.5	IR96391H
HRDC1425	7048	-4	-6.9	
HRDC1408	6996	-5	-7.6	
HRDC1424	6974	-5	-7.9	
HRDC1433	6954	-5	-8.2	
HRDC1418	6875	-6	-9.2	

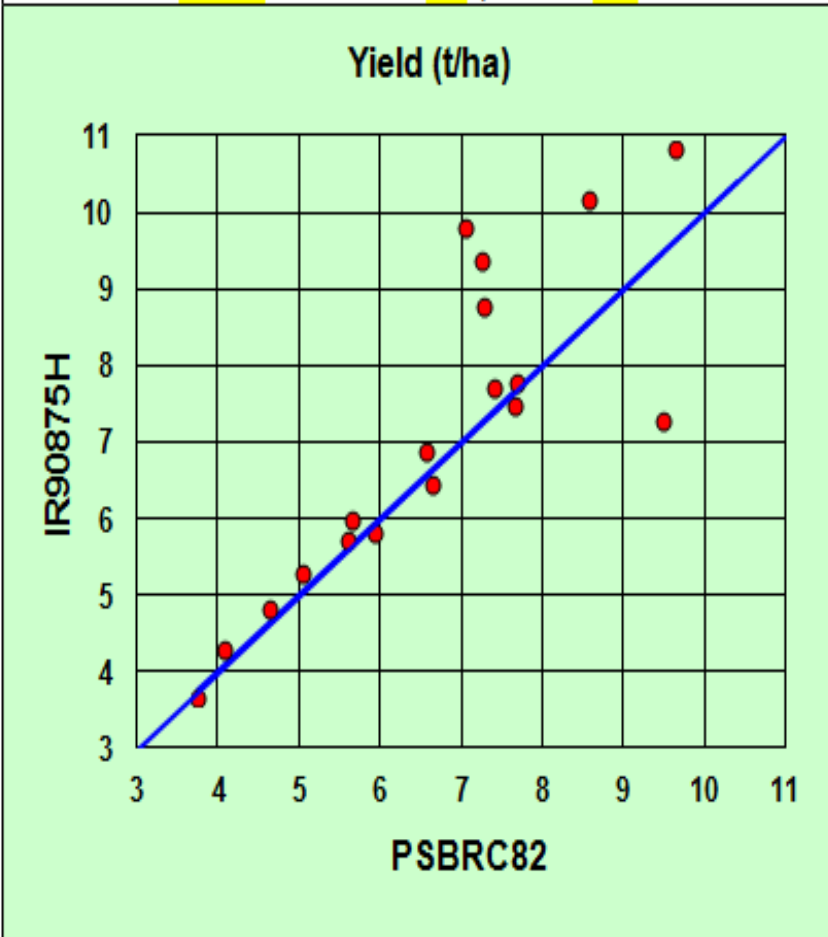
Hybrid Performance in WS, 2014 HRDC MRYT				
Entry	Yield	>PCBRC82 %	>IR75217H %	
HRDC1435	7358	16.2	31.4	
HRDC1415	7225	14.1	29.0	
HRDC1431	7113	12.3	27.0	
HRDC1422	6799	7.3	21.4	
HRDC1439	6769	6.9	20.9	IR90872H
HRDC1440	6736	6.3	20.3	IR90875H
HRDC1409	6732	6.3	20.2	
HRDC1419	6636	4.8	18.5	
HRDC1443	6613	4.4	18.1	IR96441H
HRDC1426	6573	3.8	17.4	
HRDC1407	6530	3.1	16.6	
HRDC1429	6518	2.9	16.4	
HRDC1406	6473	2.2	15.6	
HRDC1417	6464	2.1	15.5	
HRDC1438	6361	0.4	13.6	IR81955H
HRDC1433	6357	0.4	13.5	
HRDC1446	6334	0.0	13.1	PSBRc82
HRDC1403	6328	-0.1	13.0	
HRDC1414	6317	-0.3	12.8	
HRDC1434	6306	-0.4	12.6	
HRDC1427	6274	-1.0	12.1	
HRDC1401	6267	-1.1	11.9	
HRDC1432	6259	-1.2	11.8	
HRDC1444	6207	-2.0	10.9	IR98054H
HRDC1405	6187	-2.3	10.5	
HRDC1423	6162	-2.7	10.1	
HRDC1421	6155	-2.8	9.9	
HRDC1404	6135	-3.1	9.6	
HRDC1428	6105	-3.6	9.0	
HRDC1436	6061	-4.3	8.3	
HRDC1420	5959	-5.9	6.4	
HRDC1416	5939	-6.2	6.1	
HRDC1442	5921	-6.5	5.7	IR96391H
HRDC1418	5895	-6.9	5.3	
HRDC1437	5840	-7.8	4.3	
HRDC1430	5813	-8.2	3.8	
HRDC1425	5775	-8.8	3.1	
HRDC1410	5674	-10.4	1.3	
HRDC1408	5664	-10.6	1.2	
HRDC1441	5659	-10.7	1.1	IR96392H
HRDC1445	5599	-11.6	0.0	IR75217H
HRDC1424	5509	-13.0	-1.6	
HRDC1402	5382	-15.0	-3.9	

Combined ANOVA over sites & Seasons of 2014 HRDC MRYT Hybrids (excluding 3 sites w/ high CV)

Entry	Yield (kg/ha)	> PSBRC 82 (%)	> IR75217H (%)	Duncan Grouping		N	Hybrid
HRDC1440	7686	13.4	19.6	A		47	IR90875H
HRDC1415	7581	11.8	17.9	AB		49	
HRDC1431	7561	11.5	17.6	ABC		43	
HRDC1435	7358	8.5	14.5	BCD		5	
HRDC1422	7307	7.8	13.7	BCDE		47	
HRDC1443	7285	7.5	13.3	CDE		51	IR96441H
HRDC1439	7225	6.6	12.4	DEF		47	IR90872H
HRDC1406	7155	5.5	11.3	DEFG		50	
HRDC1414	7112	4.9	10.6	DEFGH		49	
HRDC1438	7087	4.5	10.2	DEFGHI		52	IR81955H
HRDC1409	7056	4.1	9.8	EFGHIJ		49	
HRDC1429	7031	3.7	9.4	EFGHIJK		53	
HRDC1407	7018	3.5	9.2	EFGHIJKL		53	
HRDC1423	7013	3.5	9.1	EFGHIJKL		52	
HRDC1419	6971	2.8	8.4	FGHIJKLM		53	
HRDC1426	6963	2.7	8.3	FGHIJKLM		53	
HRDC1434	6882	1.5	7.1	GHIJKLMN		50	
HRDC1405	6878	1.5	7.0	GHIJKLMN		50	
HRDC1417	6848	1.0	6.5	HIJKLMN		53	
HRDC1427	6844	1.0	6.5	HIJKLMN		53	
HRDC1403	6823	0.6	6.1	HIJKLMNO		50	
HRDC1421	6821	0.6	6.1	HIJKLMNO		53	
HRDC1436	6810	0.5	5.9	HIJKLMNO		53	
HRDC1446	6779	0.0	5.5	IJKLMNO		47	PSBRc82
HRDC1444	6774	-0.1	5.4	IJKLMNO		51	IR98054H
HRDC1404	6752	-0.4	5.0	JKLMNC		50	
HRDC1428	6742	-0.5	4.9	JKLMNC		52	
HRDC1401	6728	-0.8	4.7	KLMNC		50	
HRDC1432	6704	-1.1	4.3	LMNC		47	
HRDC1420	6662	-1.7	3.6	MNC		53	
HRDC1437	6642	-2.0	3.3	NC		53	
HRDC1433	6624	-2.3	3.0	NC		47	
HRDC1416	6613	-2.5	2.9	NC		52	
HRDC1442	6527	-3.7	1.5	C		52	IR96391H
HRDC1430	6477	-4.5	0.8			47	
HRDC1410	6430	-5.1	0.0			53	
HRDC1445	6428	-5.2	0.0			50	IR75217H
HRDC1441	6412	-5.4	-0.3			53	IR96392H
HRDC1425	6386	-5.8	-0.7			50	
HRDC1418	6347	-6.4	-1.3	MEAN	6822	52	
HRDC1402	6346	-6.4	-1.3	R2	0.96	50	
HRDC1408	6267	-7.5	-2.5	CV	8.69	53	
HRDC1424	6173	-8.9	-4.0			53	

Performance of IR90875H – the highest yielding hybrid in 2014 MRYT

IR90875H **74%** of the times Won over **PSBRC82**
 in **7** seasons of **3** years at **17** environments



Side-By-Side Comparison of IR90875H with PSBRC82

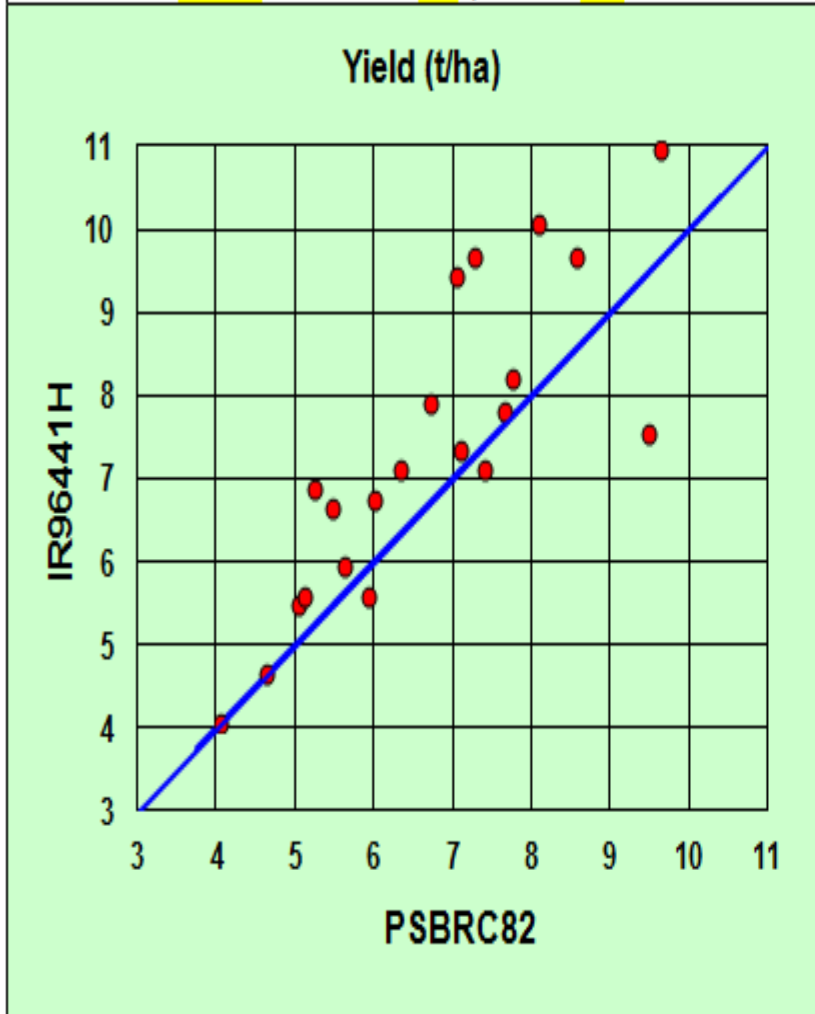
	IR90875H	n	PSBRC82	n	Difference	GAIN (%)
Yield (kg/ha)	7,648	20	6,894	20	754	* 10.94
Days to Heading	91	17	92	17	0	
Maturity (d)	122	16	121	16	1	
Height (cm)	106	17	104	18	2	
Productive Tiller# / hill	14	16	14	16	0	
Total Spikelets / panicle	168	14	133	14	34	
Seed Set (%)	77.0	14	79.8	14	-3	
1000-grain Weight (g)	24.8	14	24.8	14	0	
Total Milled (%)	67.3	4	68.2	4	-1	
Head Rice (%)	49.5	4	47.4	4	2	
Chalk (%)	6.0	4	17.8	4	-12	
Amylose (%)	23.9	4	20.6	4	3	
Grain Length (mm)	6.64	4	6.75	4	0	
Grain Width (mm)	2.05	4	2.04	4	0	
L/W	3.23	4	3.31	4	0	

Performance of IR96441H in 2014 MRYT

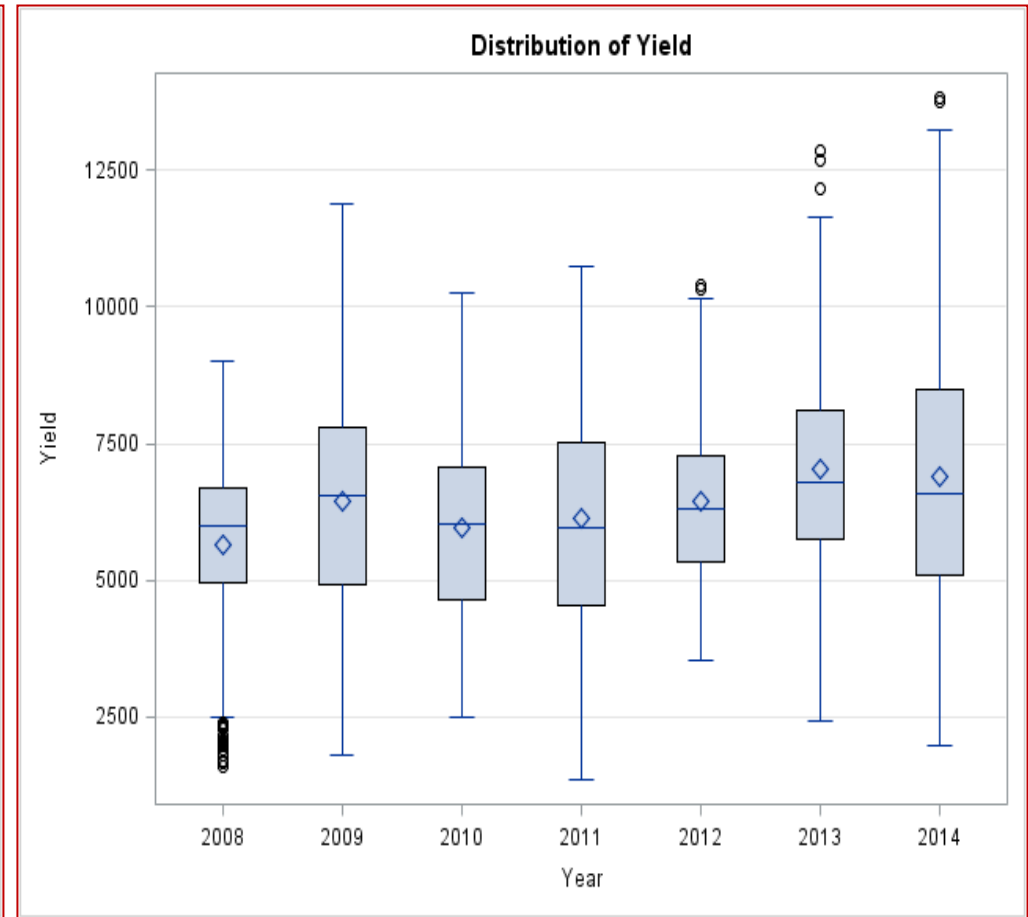
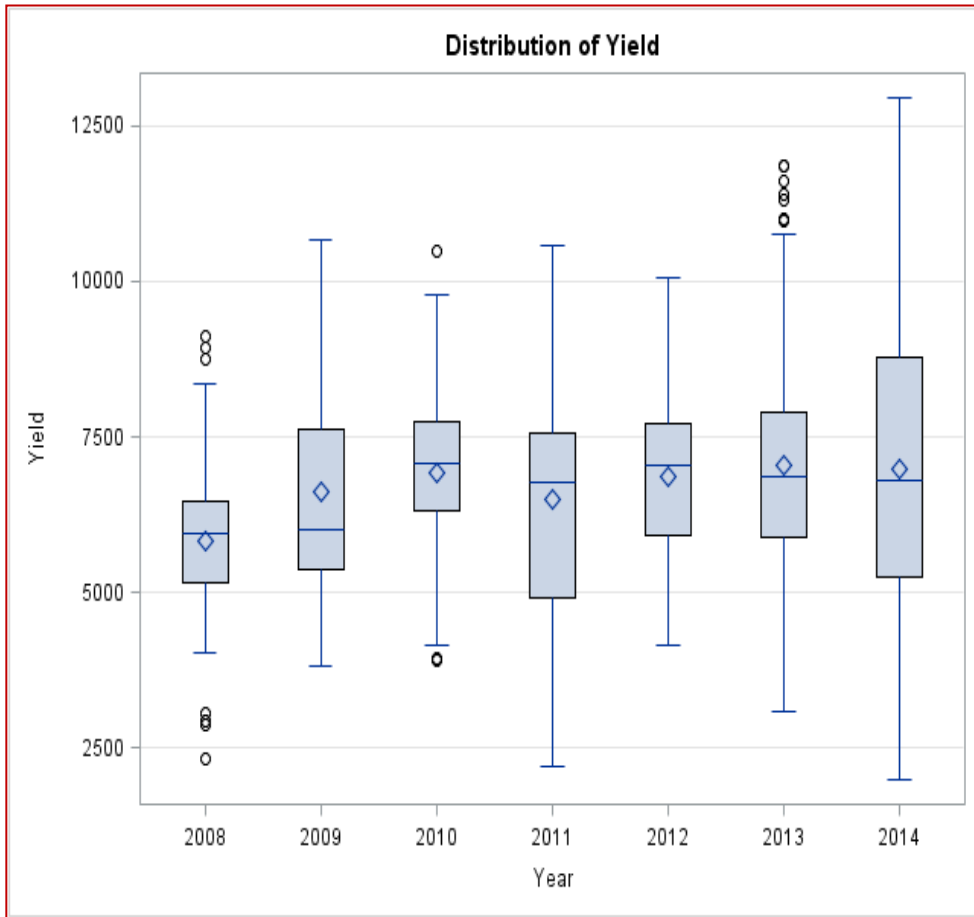
IR96441H **82%** of the times Won over **PSBRC82**
 in **23** seasons of **#** years at **13** environments

Side-By-Side Comparison of IR96441H with PSBRC82

	IR96441H	n	PSBRC82	n	Difference	GAIN (%)
Yield (kg/ha)	7,362	23	6,708	23	655	** 9.76
Days to Heading	89	21	91	21	-2	
Maturity (d)	121	19	121	19	0	
Height (cm)	102	22	104	22	-3	
Productive Tiller# / hill	13	18	14	18	-1	
Total Spikelets / panicle	166	16	131	16	35	
Seed Set (%)	73.7	16	77.7	16	-4	
1000-grain Weight (g)	25.8	16	24.9	16	1	
Total Milled (%)	65.0	5	67.8	8	-3	
Head Rice (%)	36.6	5	37.1	8	0	
Chalk (%)	11.1	5	17.2	8	-6	
Amylose (%)	22.8	5	21.3	8	1	
Grain Length (mm)	6.88	5	6.76	8	0	
Grain Width (mm)	2.03	5	2.03	8	0	
L/W	3.40	5	3.33	8	0	



The yield difference between IRRI and Non-IRRI hybrids? (2008 – 2014)



IRRI Hybrid

MEAN = 6812

N = 598

Non-IRRI Hybrid

MEAN = 6501

N = 3010

Yield gap = 311 kg/ha, (4.8%)

More Data
(Agronomic and Grain Quality)

<http://hrdc.irri.org>

Observation from HRDC MRYT and Questions:

1. What plant type required for tropical environments?

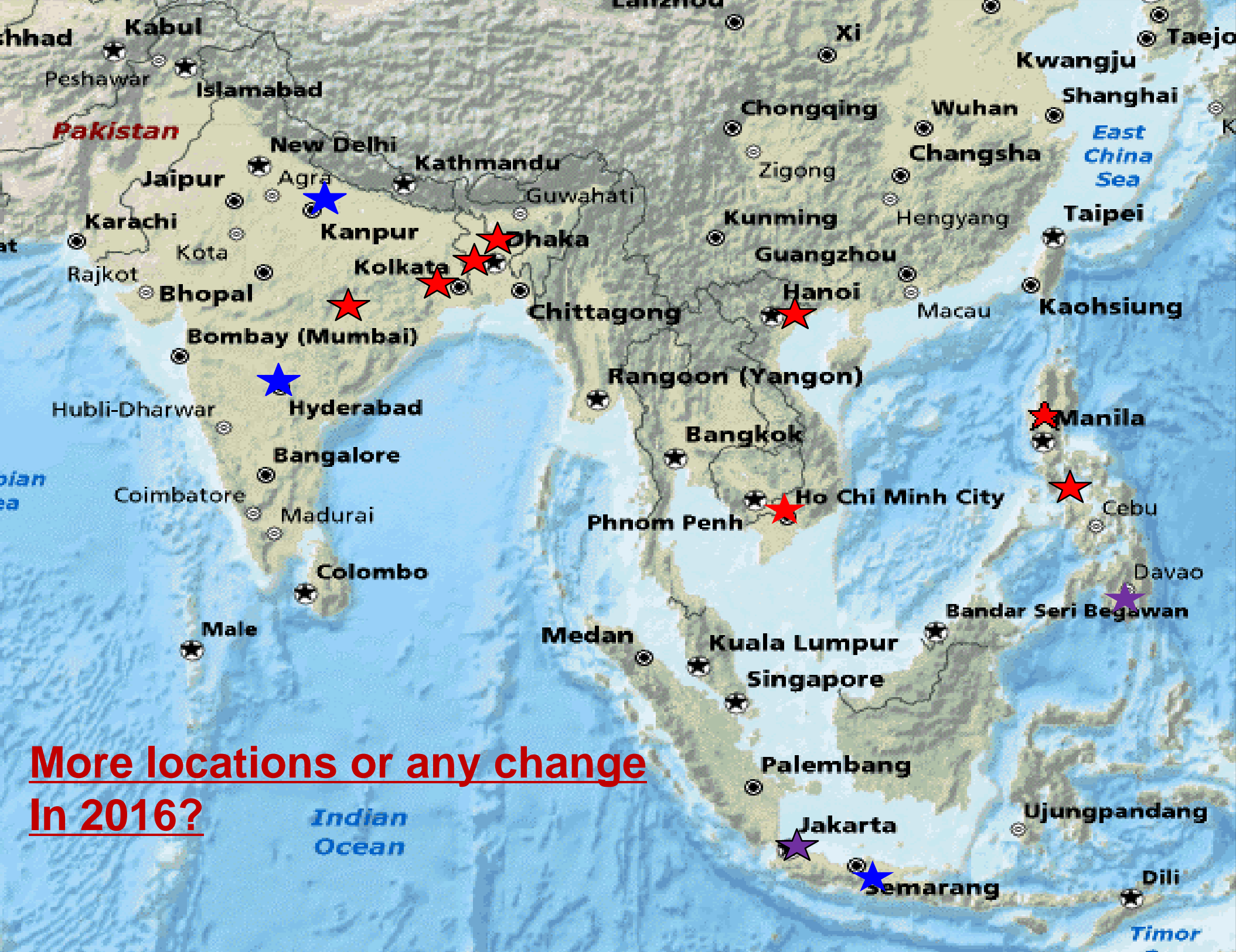


Observation from HRDC MRYT and Questions:

2. Agronomic traits and yield components?

Agronomic trait and yield component of HRDC hybrids in 2014										
	DTH (d)	Maturity (d)	Height (cm)	No. of Productive Panicle / plant	No. of Spikelet / panicle	Filled grain / panicle	Unfilled grain / panicle	Seedset (%)	1000-Grain weight (g)	Yield (Kg/ha)
Min	84	107	94	10	126	98	28	61	20	6173
Max	102	132	136	15	256	176	90	79	29	7686
Difference	19	25	41	4.3	131	78	62	18.1	9.2	1513

3. Grain quality.....?



More locations or any change
In 2016?

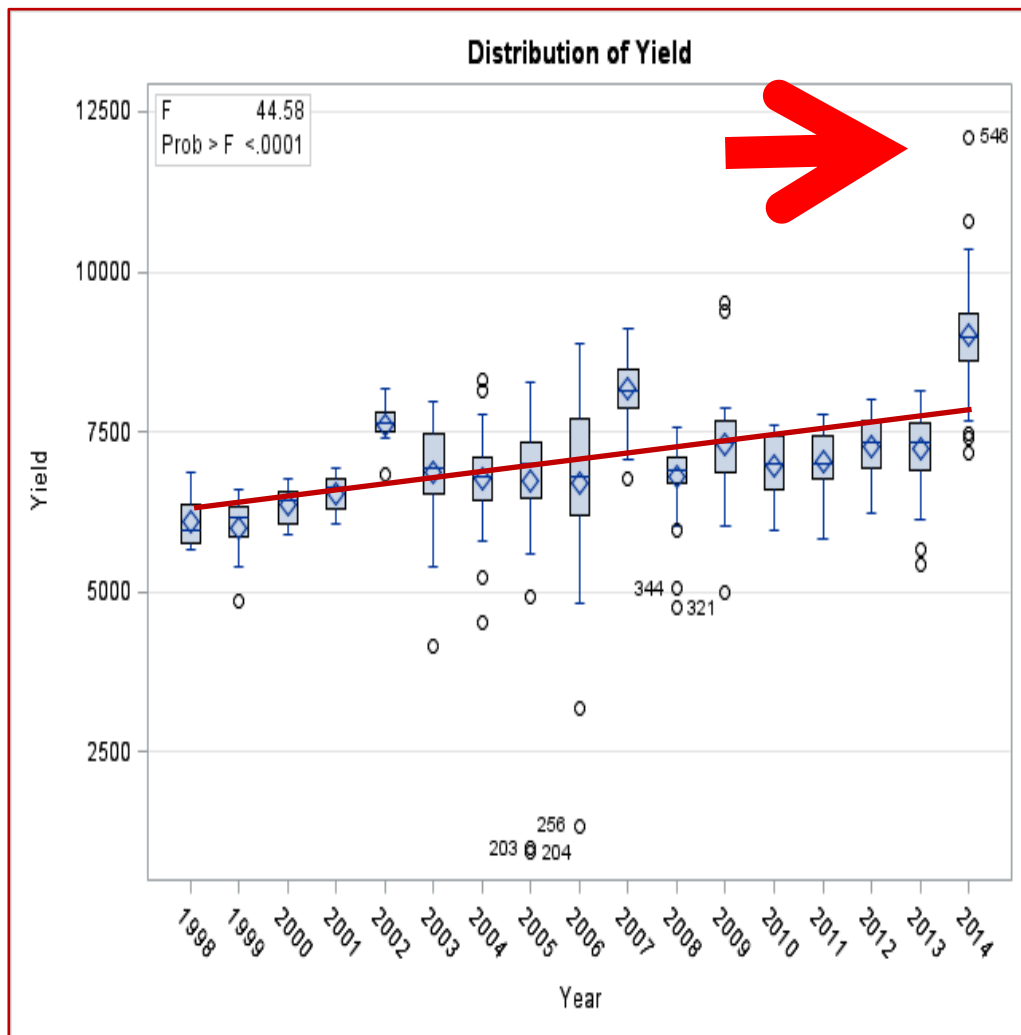
IRRI Hybrid Rice Group in Each Season

IRRI Hybrid Rice R & D Group	
Product	Season
Regular Staff	15
Land used @ Los Banos	12 -13 ha
Breeding lines	~ 12,000
Parent and hybrid seed production	50 - 100 field blocks (25x25 m ²)
Hybrids tested	3000 - 4000

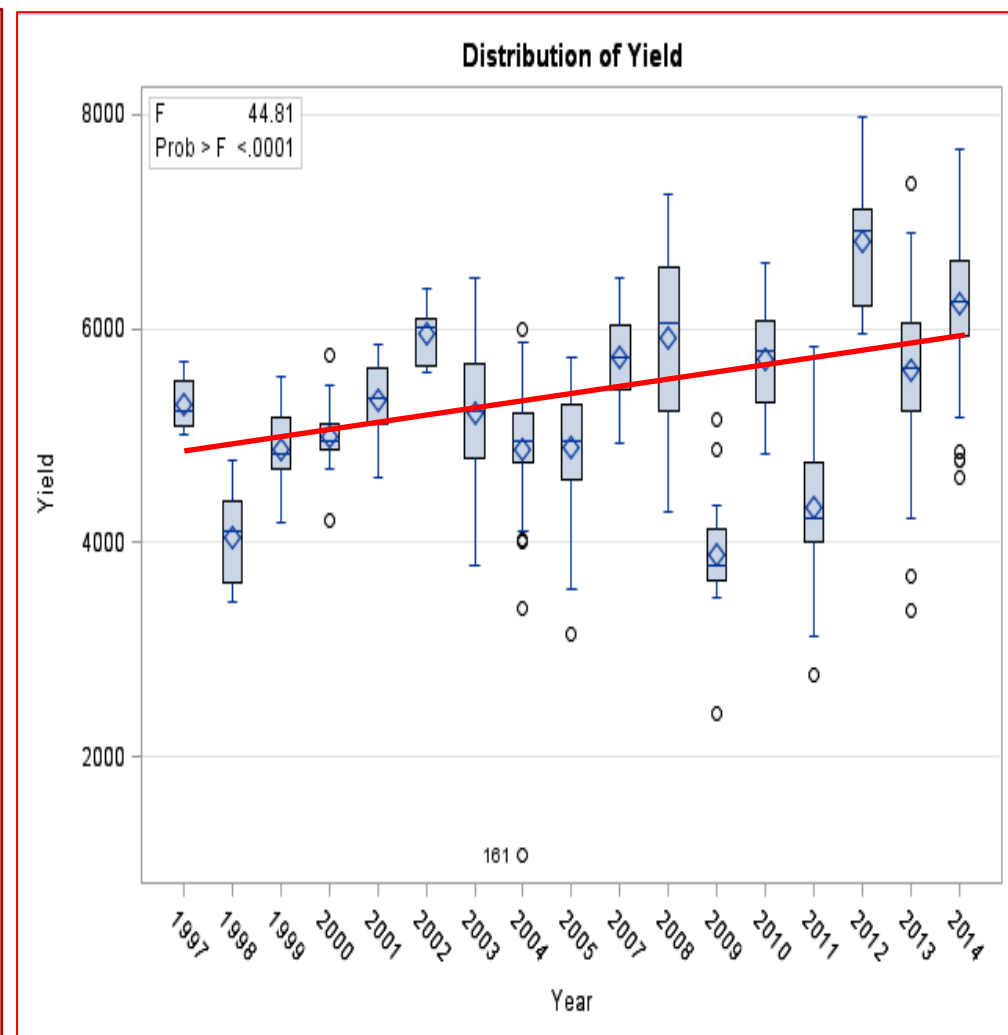
New Hybrids Yield Increased in both Seasons

Average yield of IRRI hybrids in Advanced Yield Trials at Los Banos

Dry Season



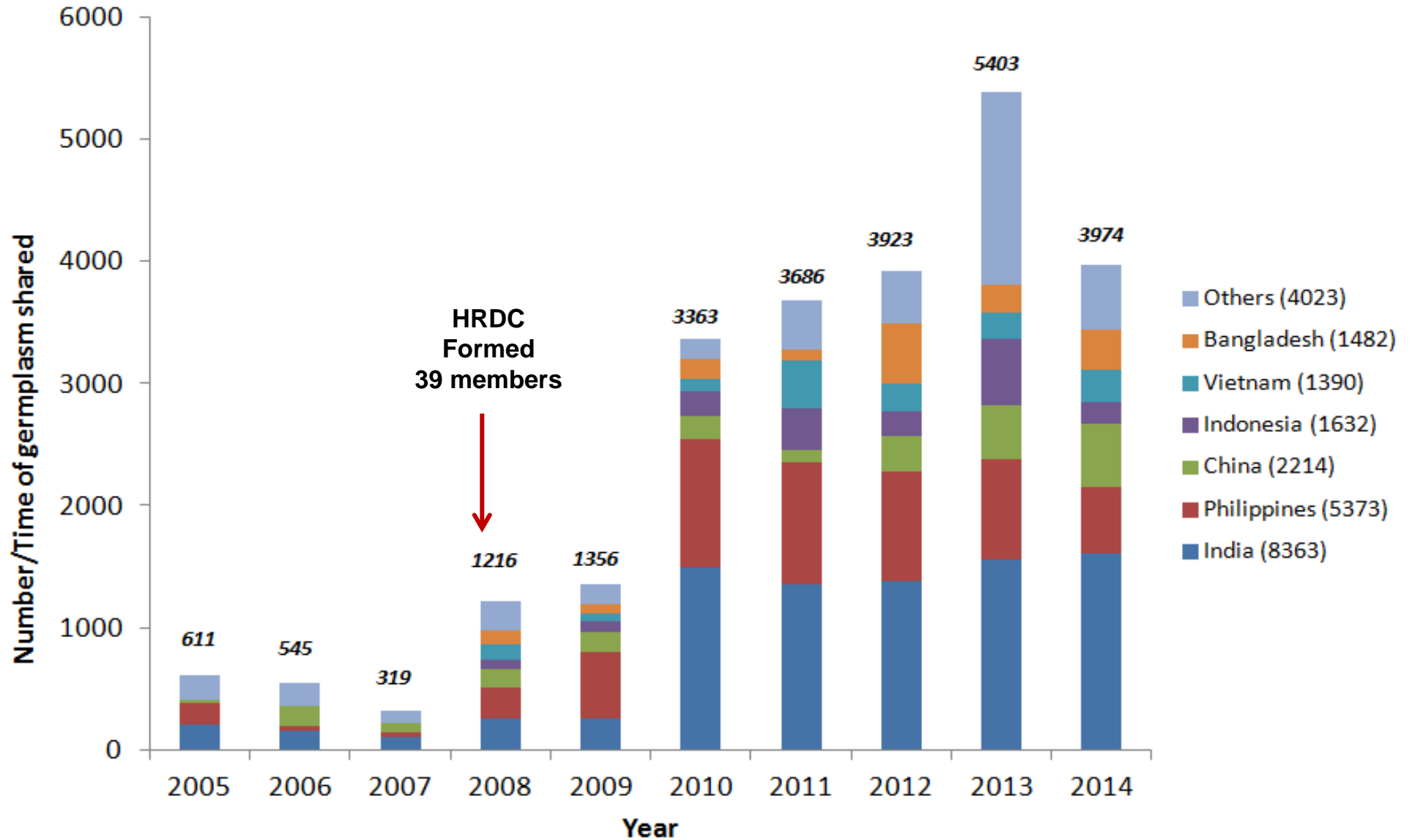
Wet Season



Hybrid Rice Released in the Philippines for Commercial Production

	Hybrid	Commercial Name	IRRI Name	Year Released *
1	Magat	PSB Rc26H	IR64616H	1994
2	Mestizo 1	PSB Rc72H	IR68284H	1997
3	Mestizo 2	NSIC Rc114H	IR75207H	2002
4	Mestizo 3	NSIC Rc116H	IR75217H	2002
5	Mestizo 7	NSIC Rc136H	IR78386H	2006
6	Mestiso 21	NSIC Rc206H	IR83199H	2009
7	Mestiso 25	NSIC Rc230H	IR82363H	2010
8	Mestiso 26	NSIC Rc232H	IR82372H	2010
9	Mestiso 30	NSIC Rc246H	IR84714H	2011
10	Mestiso 31	NSIC Rc248H	IR80637H	2011
11	Mestiso 32	NSIC Rc250H	IR81949H	2011
12	Mestiso 56	NSIC 2014 Rc370H	IR81955H	2014
13	Mestiso 61	NSIC 2014 Rc380H	IR81265H	2014

IRRI Hybrid Rice Germplasm shared with Partners



IRRI hybrid Rice Materials Available for Sharing

1. Hybrids - NCT released hybrids & AYT Hybrids developed from new parents
2. New CMS lines with high-outcross
3. BLB and sub-1 B and R lines

SUB1 and BLB * breeding lines in 2015DS **									
Recurrent Parent	F	SUB1	Xa4	Xa7	xa5	xa13	Xa21	Xa23	Rf4
IR58025B	BC3F3							1	
IR58025B	BC3F4		15	33			24	22	
IR68897B	BC1F4		7						
IR68897B	BC2F4		14	13		9	7	7	
IR68897B	BC3F4	1	3	3			1	1	
IR93558B	BC2F3		9		6	1			
IR93559B	BC2F3		8	14	2	5	3	2	
IR93560B	BC3F4	15	5	5	5		1		
IR93561B	BC2F3		12	8	9	11	14	14	
IR93561B	BC3F4	1			8	5	5		
IR93562B	BC2F3		2	7		6	3	3	
IR60912-93-3-2-3-3-3R	BC3F3		1						1
IR71604-4-1-4-4-4-2-2-2R	BC3F3		1	1					1
IR73885-1-4-3-2-1-10R	BC3F3	1	3					2	3
MingHui63	BC3F3				1				1
SRT3R	BC3F4	13	13				13	15	
* Only confirmed with SNP marker, phenotypic selection is on-going									
** 2015DS = making first testcross, 2015WS = confirm B and R									

How to share:

Remy Bitoun: Head of Public and Private Partnership, r.bitoun@irri.org

New CMS A-lines w/ High Outcross



Keys Recommendations

from the 6th International Hybrid Rice Symposium, 2012, Hyderabad, India

1. Strengthen public-private partnership including sharing of germplasm ++
2. Encourage policy makers to promote hybrid rice -
3. Improve research on heterosis – heterotic groups ++
- 4. Promote and strengthen two-line hybrid rice research +**
5. Develop hybrid rice research in stressed environments, including disease resistance +
6. Enhance the seed production system / technology +
7. Improve grain quality -
8. Conduct training and capacity building ++

Focus on 2-line hybrids based on TGMS:

What we have:

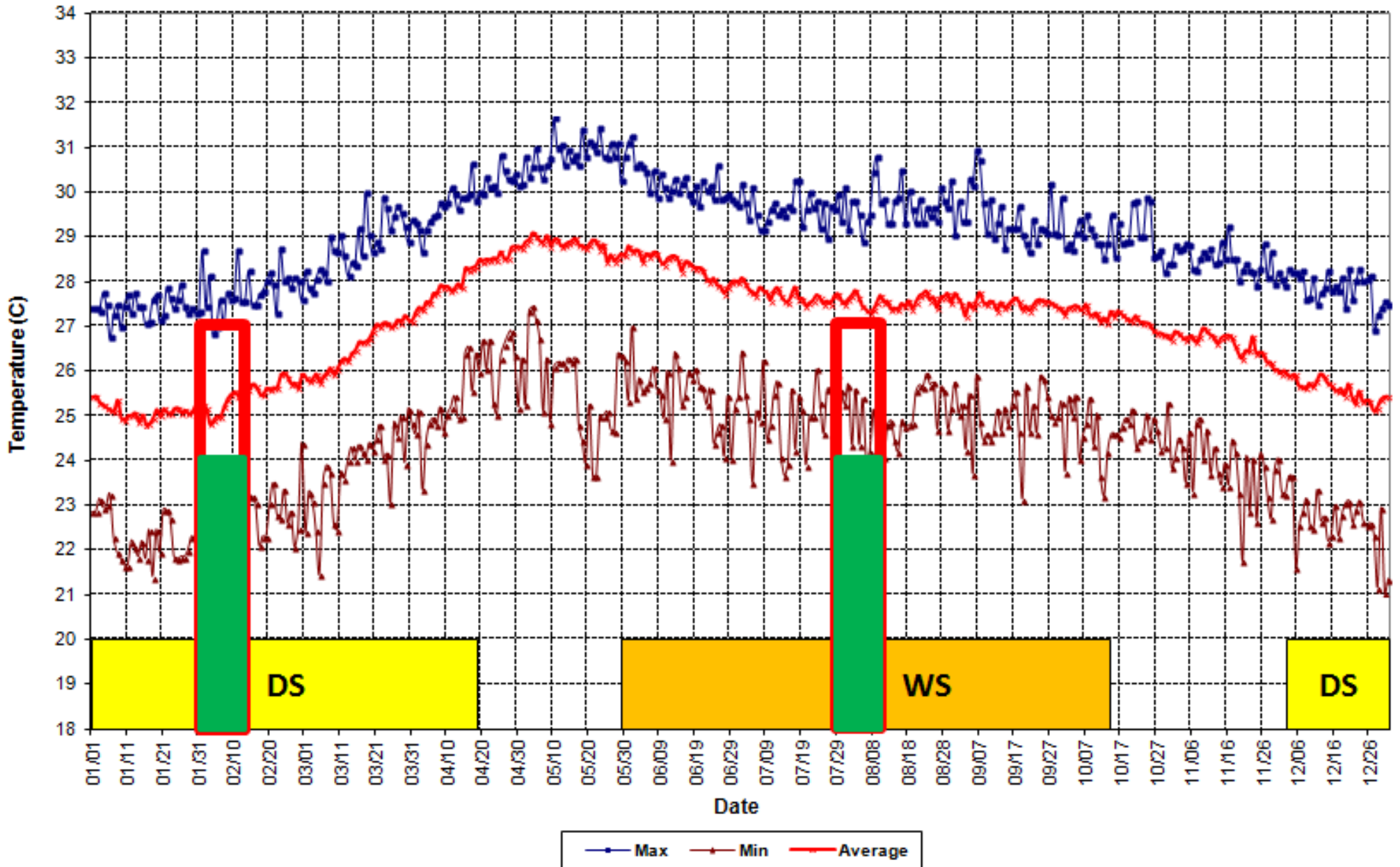
- TGMS lines and competitive hybrids
- Diverse hybrid rice male parents and **inbreds**

What need to be done:

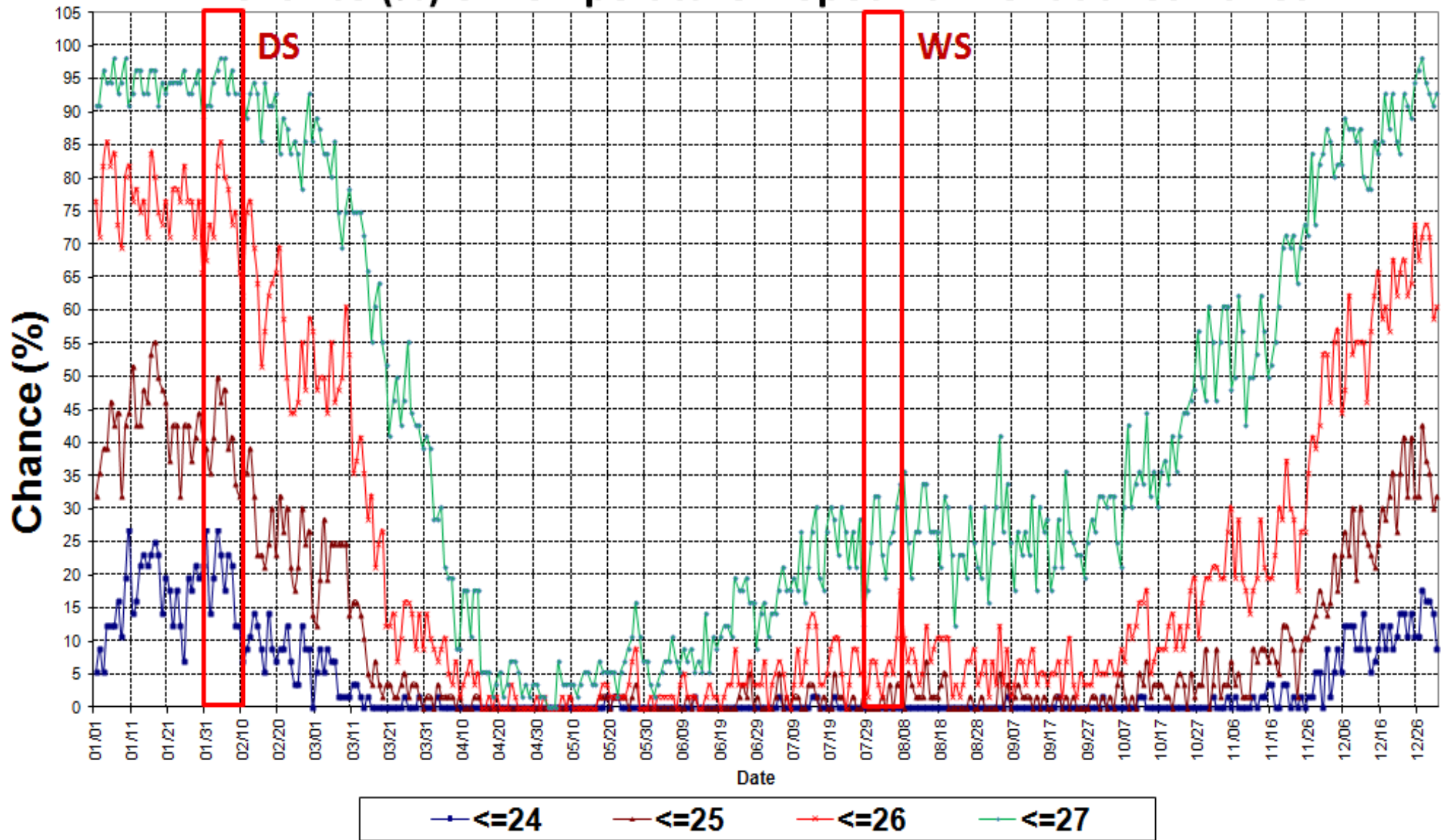
- Breeding for parents based on heterotic groups
- **Reduce critical sterility temperature from 27 °C to 24 °C**

Average Temperature at Los Banos (Wetland, IRRI)

(Min, Max & Mean of Average, 1959 - 2014)



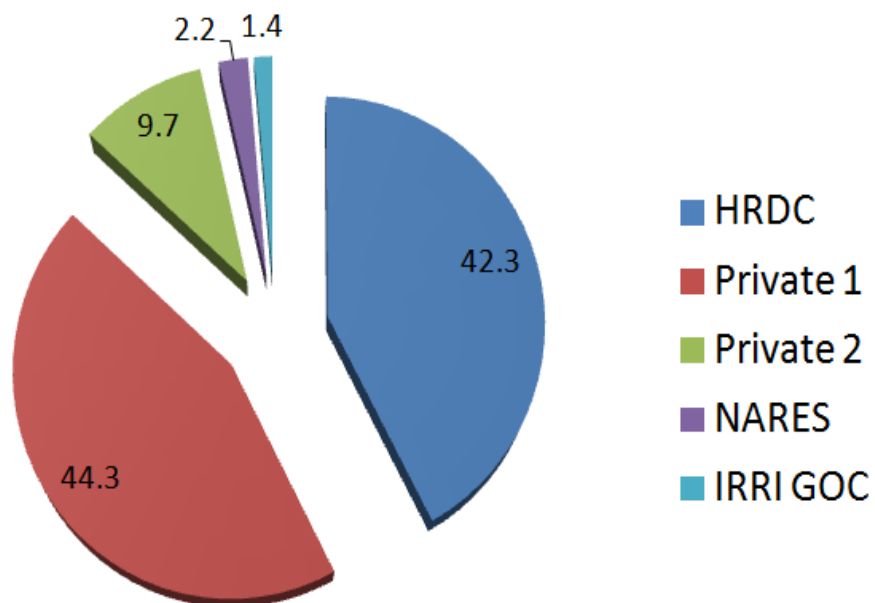
Chance (%) of Temperature < Specific Event at Los Banos



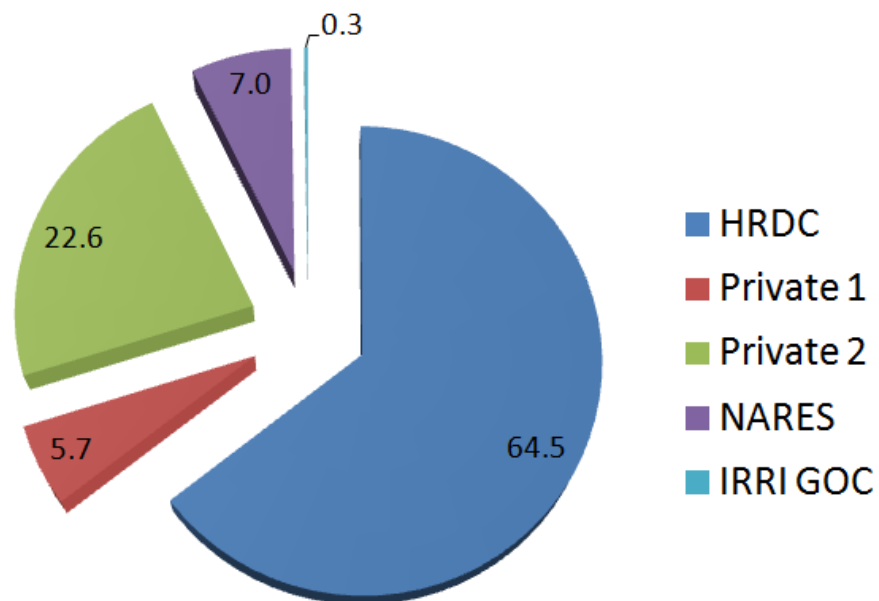


2014 Expense and 2015 Budget IRRI Hybrid Rice R&D

2014 Funding Sources
(IRRI Hybrid Rice Group, total = USD \$991,360)



2015 Expected Funding
(IRRI Hybrid Rice Group, total = USD \$786,742)



\$204,618 less in 2015

Planning:

***The 7th International Hybrid Rice Symposium
Mid 2016, Indonesia***

THANKS

