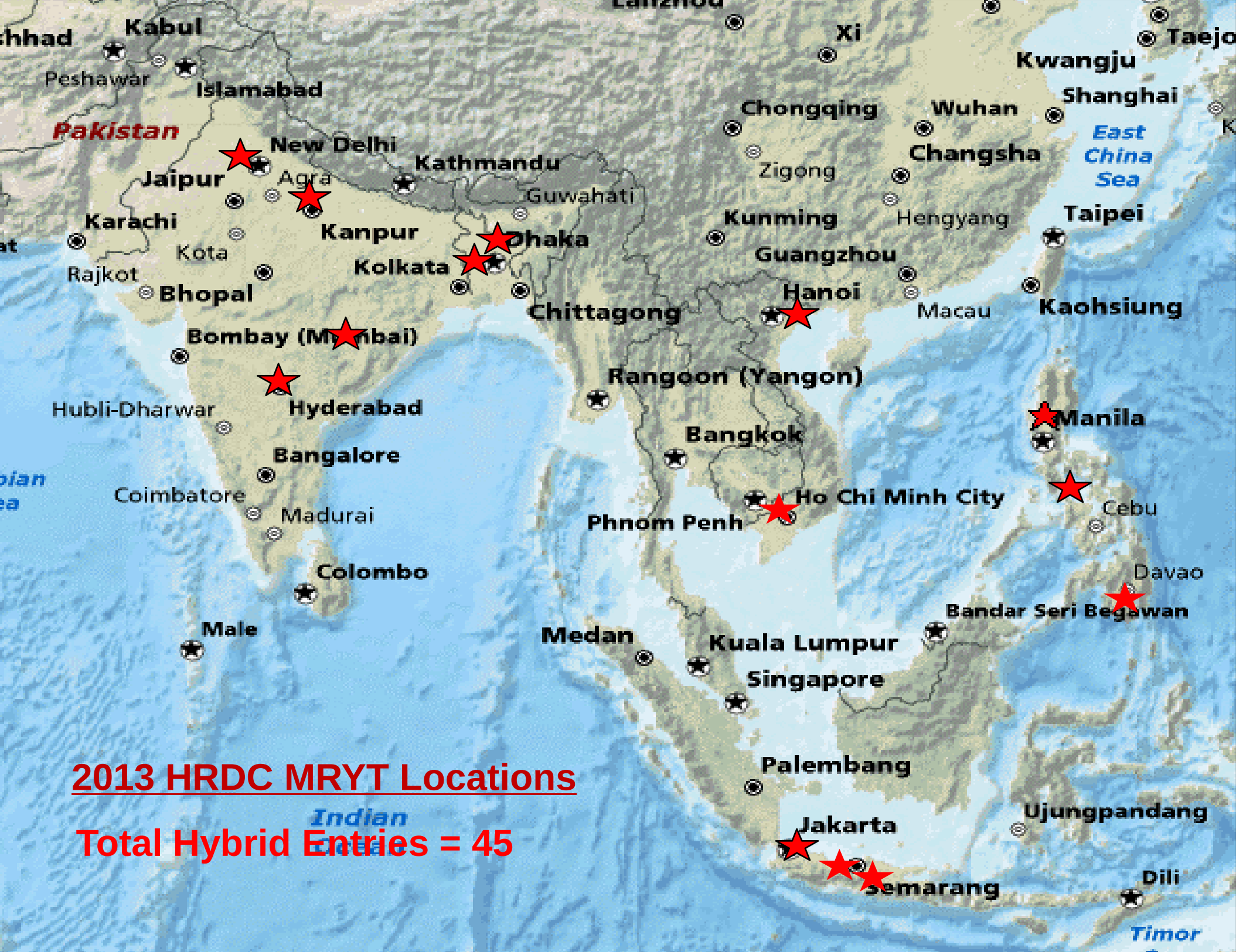
Locations for 2013 HRDC MRYT

#	Location	Country	Site Provider	DS	WS
1	Pabna	Bangladesh	BRAC	Yes	High CV, data dropped
2	Gazipur	Bangladesh	BRAC	Yes	Yes
3	Haryana	India	Syngenta	**No**	Yes
4	Lucknow	India	Nuziveedu Seeds	**No**	Yes
5	Raipur	India	JK Agri Genetics	Yes	Yes
6	Hyderabad	India	Indo American	Yes	Yes
7	Kediri	Indonesia	BISI	Yes	Data Pending
8	Malang	Indonesia	Pioneer	Yes	Data Pending
9	Sukamandi	Indonesia	ICRR	Yes	Data Pending
10	Nueva Ecija	Philippines	PhilRice	Yes	High CV, data dropped
11	Los Baños	Philippines	IRRI	Yes	Yes
12	General Santos	Philippines	Bioseed	Yes	Yes
13	Hanoi	Vietnam	FCRI	Yes	Yes
14	Long An	Vietnam	Bioseed	Yes	Yes

Thanks for Location Sponsors for Providing Services for Other Members



2013 HRDC MRYT Locations

Total Hybrid Entries = 45

Combined ANOVA for Yield over Sites and Seasons for 2013 HRDC MRYT

(excluding two Sites/Season with high CV)

Site	Country	Yield (kg/ha)	t Grouping	N
Munoz *	Philippines	10,223	A	128
Hyderabad	India	8,627	B	255
LongAn	Vietnam	8,597	B	246
Malang	Indonesia	8,172	C	135
General Santos	Philippines	7,422	D	270
Raipur	India	6,942	E	262
Sukamandi	Indonesia	6,509	F	135
Haryana	India	6,347	G	79
LosBanos	Philippines	6,257	GH	267
Kediri	Indonesia	6,170	HI	120
Pabna *	Bangladesh	6,020	IL	135
Gazipur	Bangladesh	5,906	LK	261
Hanoi	Vietnam	5,762	K	207
Lucknow	India	4,461	L	132
		p<0.001		*N=2,632*

* *WS data dropped due to high CV*

ANOVA for Yield over Seasons in 2013 HRDC MRYT

Season	Yield (kg/ha)	t Grouping	N
2013DS	7,327	A	1538
2013WS	6,588	B	1094
Pr > F	*0.0044*		

Combined Yield Analysis over Sites, Seasons for 2013 HRDC MRYT (Excluding two SITES with

Entry	Yield	> PSBRC82	> IR75217H	t Grouping																		N
HRDC1340	7912	18.8	10.1	A																		59
HRDC1345	7683	15.3	6.9	A	B																	48
HRDC1328	7617	14.4	6.0		B	C																62
HRDC1341	7615	14.3	5.9		B	C																59
HRDC1301	7572	13.7	5.3		B	C	D															62
HRDC1327	7562	13.5	5.2		B	C	D															62
HRDC1314	7498	12.6	4.3		B	C	D	E														59
HRDC1313	7449	11.8	3.6		B	C	D	E														62
HRDC1329	7397	11.1	2.9		B	C	D	E	F													61
HRDC1330	7318	9.9	1.8			C	D	E	F	G												59
HRDC1338	7277	9.3	1.2				D	E	F	G												60
HRDC1304	7249	8.8	0.8					E	F	G	H											62
HRDC1310	7211	8.3	0.3					E	F	G	H	I										59
HRDC1336	7203	8.1	0.2					E	F	G	H	I										56
HRDC1342	7189	7.9	0.0					E	F	G	H	I										59
HRDC1335	7187	7.9	0.0					E	F	G	H	I										62
HRDC1348	7187	7.9	0.0					E	F	G	H	I										45
HRDC1316	7092	6.5	-1.3						F	G	H	I	J									62
HRDC1325	7084	6.4	-1.5						F	G	H	I	J									59
HRDC1303	7077	6.3	-1.5						F	G	H	I	J	K								62
HRDC1344	7077	6.3	-1.5						F	G	H	I	J	K								52
HRDC1339	7045	5.8	-2.0							G	H	I	J	K	L							62
HRDC1333	7030	5.5	-2.2							G	H	I	J	K	L	M						59
HRDC1306	7015	5.3	-2.4							G	H	I	J	K	L	M						62
HRDC1309	7005	5.2	-2.6							G	H	I	J	K	L	M	N					59
HRDC1312	6991	5.0	-2.8							G	H	I	J	K	L	M	N					62
HRDC1318	6988	4.9	-2.8							G	H	I	J	K	L	M	N					59
HRDC1350	6986	4.9	-2.8							G	H	I	J	K	L	M	N					56
HRDC1334	6931	4.1	-3.6								H	I	J	K	L	M	N	O				62
HRDC1331	6899	3.6	-4.0									I	J	K	L	M	N	O				45
HRDC1346	6890	3.4	-4.2									I	J	K	L	M	N	O				47
HRDC1315	6782	1.8	-5.7										J	K	L	M	N	O	P			62
HRDC1326	6775	1.7	-5.8										J	K	L	M	N	O	P			62
HRDC1324	6751	1.4	-6.1											K	L	M	N	O	P			62
HRDC1308	6741	1.2	-6.2												L	M	N	O	P			62
HRDC1307	6736	1.1	-6.3												L	M	N	O	P			62
HRDC1305	6719	0.9	-6.5												L	M	N	O	P			62
HRDC1347	6708	0.7	-6.7													M	N	O	P			52
HRDC1332	6679	0.3	-7.1														N	O	P			62
HRDC1343	6660	0.0	-7.3															O	P			62
HRDC1311	6557	-1.6	-8.8																P	Q		62
HRDC1349	6532	-1.9	-9.1																P	Q		53
HRDC1319	6284	-5.6	-12.6																	Q		62
HRDC1317	5911	-11.2	-17.8																		R	62
HRDC1337	5474	-17.8	-23.8																		S	41

Hybrid CK

Inbred CK

Mean	7020
R^2	0.90
CV%	10.42

Hybrid Yield in 2013 DS over SITES

Site	Yield	t Grouping	N
Munoz	10,223	A	128
Malang	8,172	B	135
Raipur	8,013	BC	132
LongAn	7,960	C	135
Hyderabad	7,313	D	132
LosBanos	7,175	DE	135
Gazipur	7,028	E	135
General Santos	6,799	F	135
Sukamandi	6,509	G	135
Kediri	6,170	H	120
Hanoi	6,085	H	81
Pabna	6,020	H	135
MEAN	***7,289***		

Hybrid Yield in 2013 WS over SITES

Site	Yield	t Grouping	N
Hyderabad	10,038	A	123
LongAn	9,371	B	111
General Santos	8,045	C	135
Haryana	6,347	D	79
Raipur	5,855	E	130
Hanoi	5,555	F	126
LosBanos	5,317	G	132
Gazipur	4,704	H	126
Lucknow	4,461	I	132
MEAN	***6,632***		

More and detail data

http://hrdc.irri.org/

HRDC MRYT for 6 Years
(since 2008WS)

Questions:

1. Have we made progress for improving hybrid yield over years?

2. Where is the best location for hybrid yielding among testing locations?

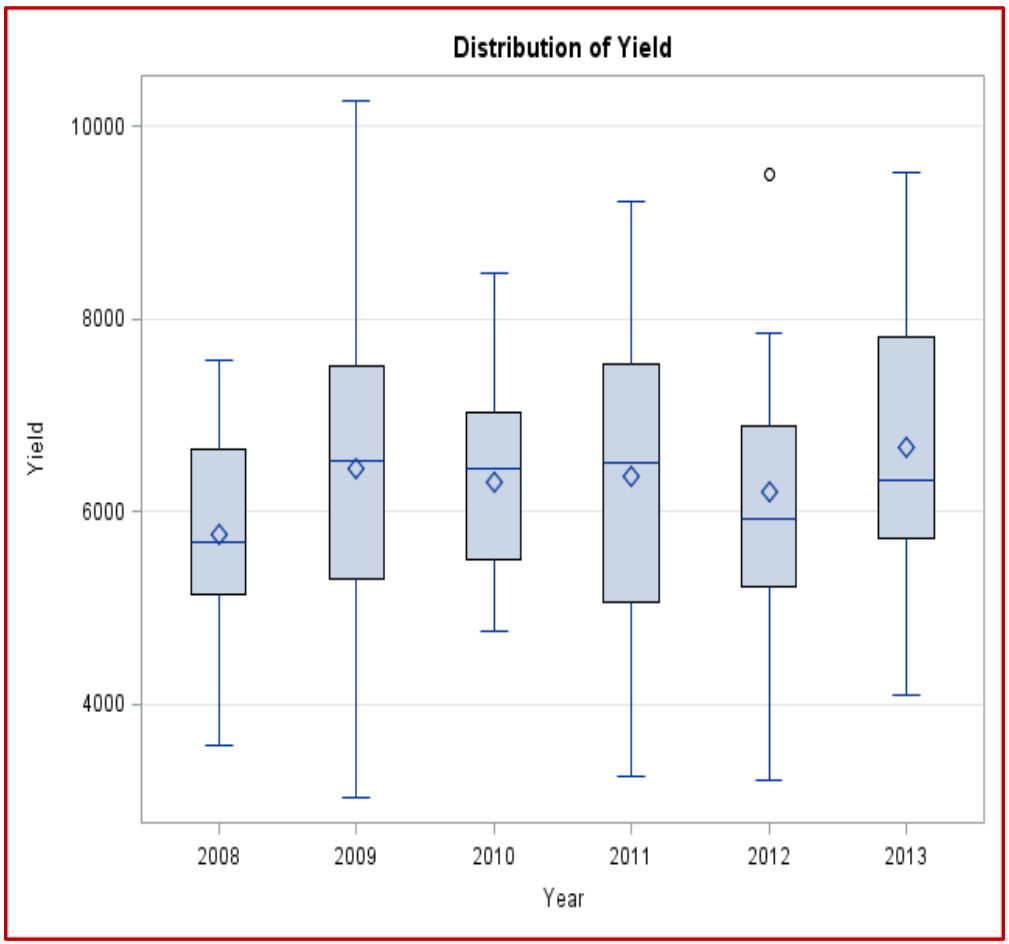
Caution:

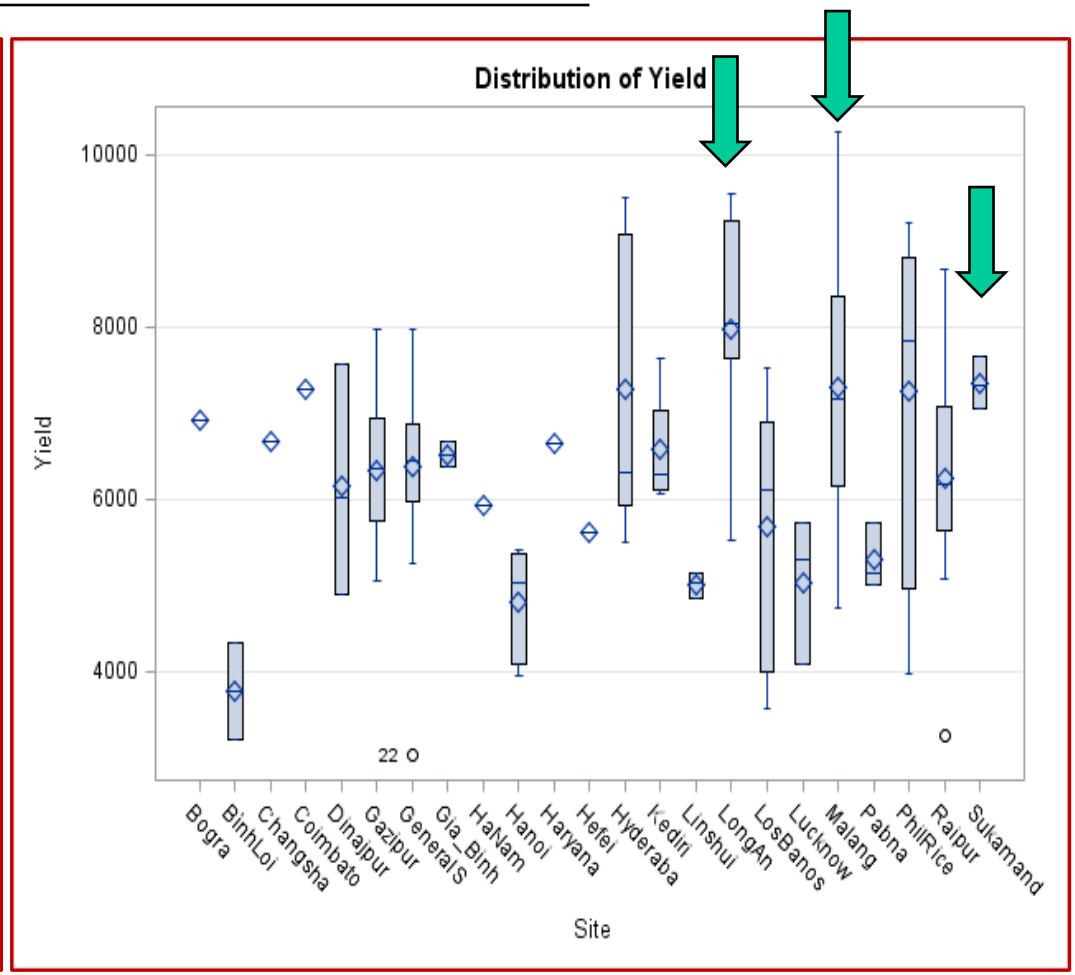
1. Limited Entries of Hybrids

2. Limited Period of Testing

Yield of PSBRC82 (Inbred CK) in HRDC MRYT

	Source	*Mean (kg/ha)*	*Pr > F*
N = 120	Year	6289	*0.8219*
	Site	6262	*0.0058*





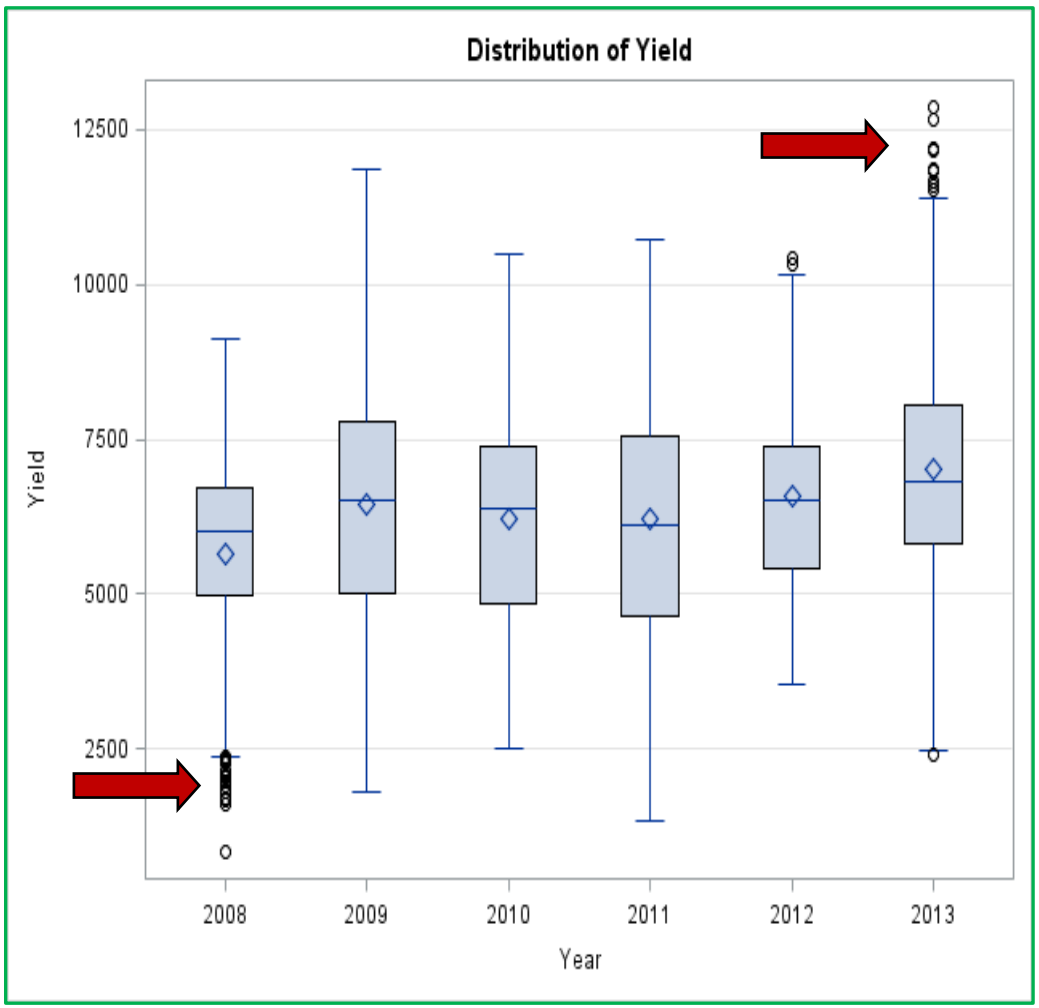
No significant difference among years

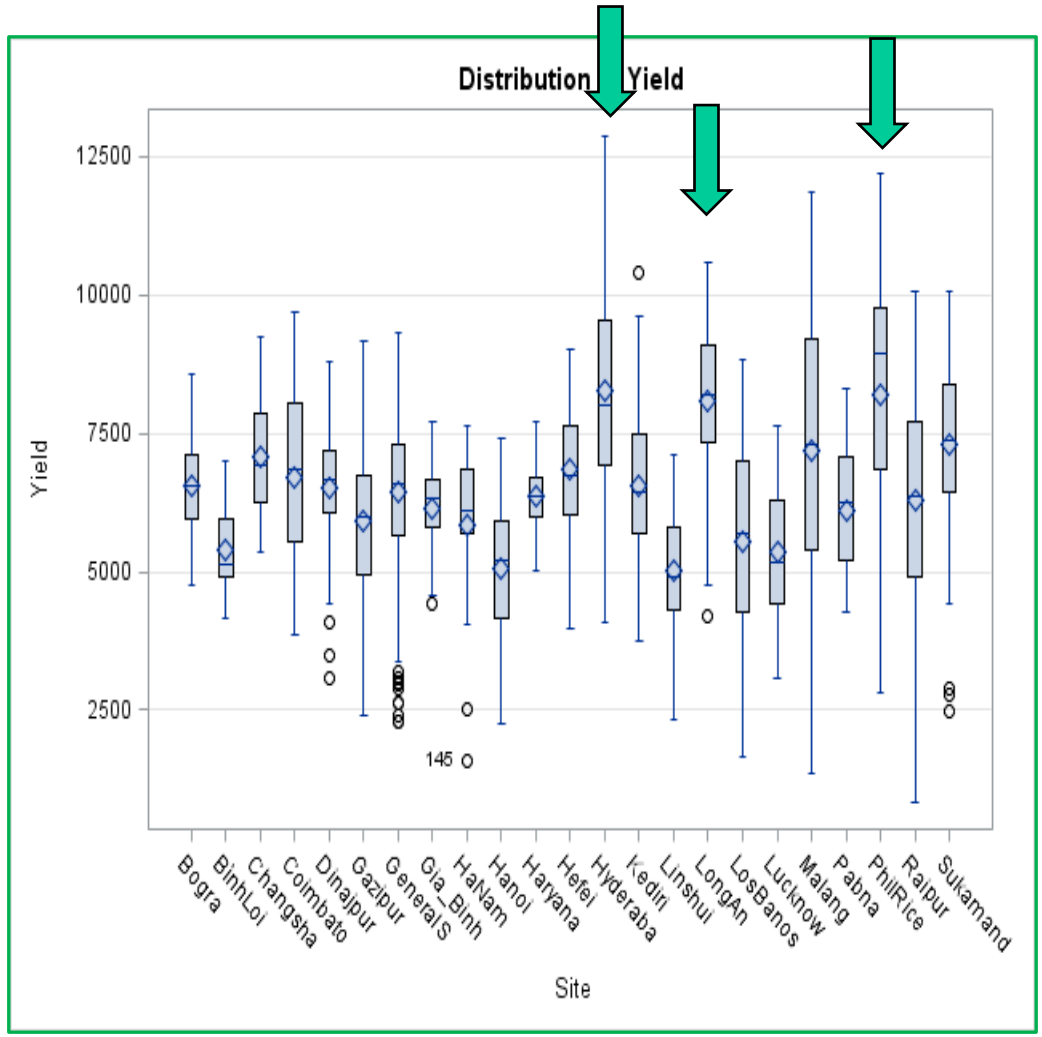
Significant difference among Sites

Highest	**LongAn**	**Sukamandi**	**Malang**
Lowest	**BìnhLoi**	**Hanoi**	**Linshui**

Yield of ALL Hybrids in HRDC MRYT

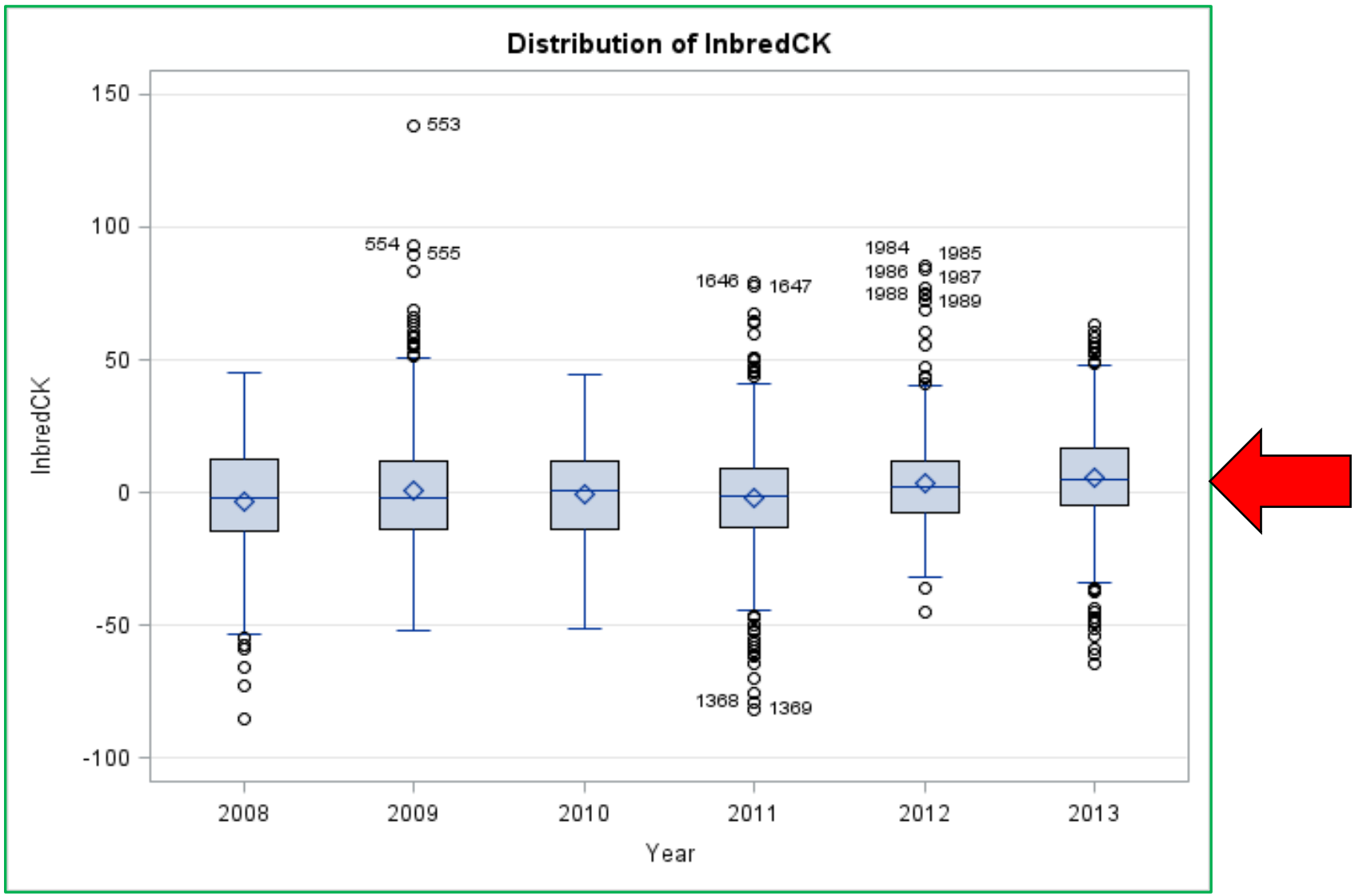
Source	Mean (kg/ha)	*Pr > F*
Year	6475	*0.7476*
Site	6468	*0.0632*





Yield Heterosis (%) of ALL Hybrids over Inbred CK in MRYT

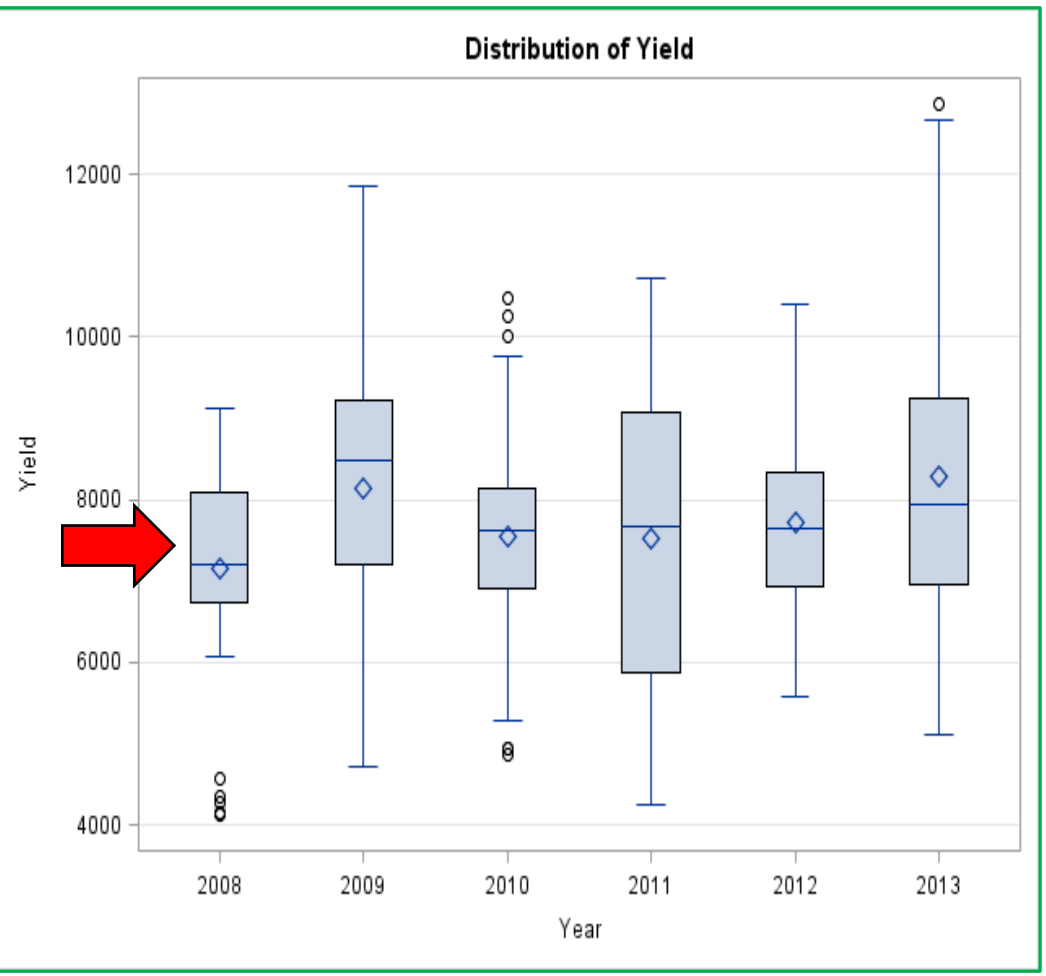
Source	Mean (%)	*Pr > F*
Year	0.65	*0.3992*
Site	3.76	*0.7669*

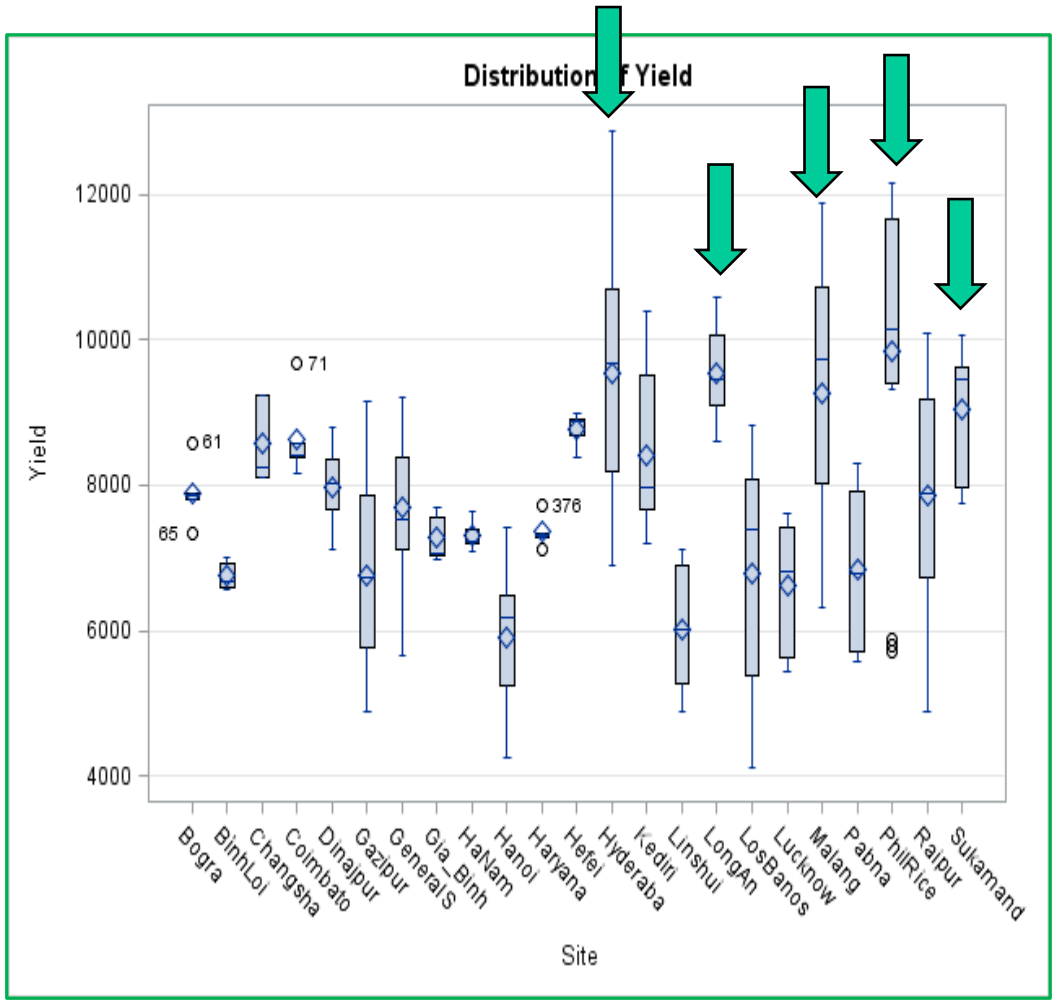


No significant increase on average hybrid yield and yield advantage over inbred CK in last 5 years!!!

Yield Top 5 Hybrids in HRDC MRYT

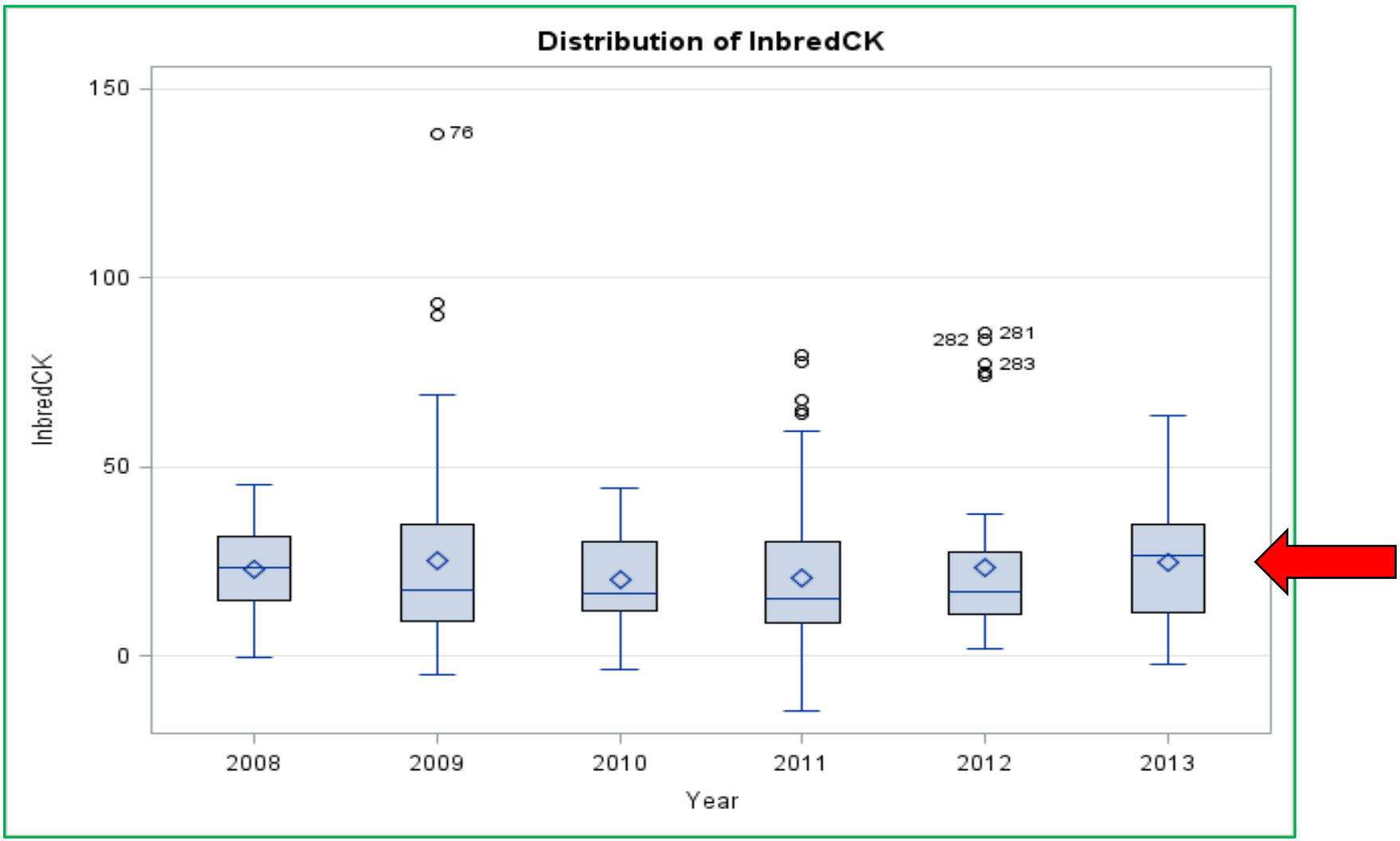
Source	Mean (kg/ha)	Pr > F
Year	7730	*0.6190*
Site	7856	*0.0048*





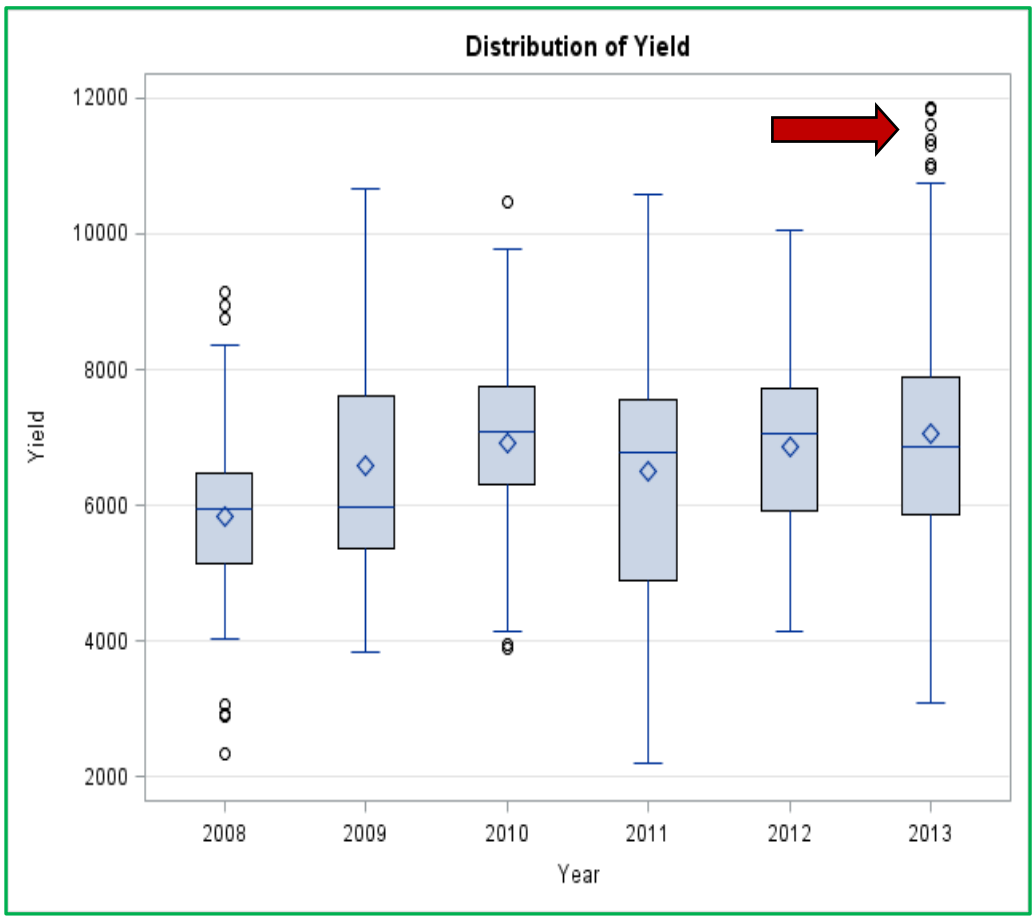
Yield Heterosis (%) of Top 5 Hybrids over Inbred CK in MRYT

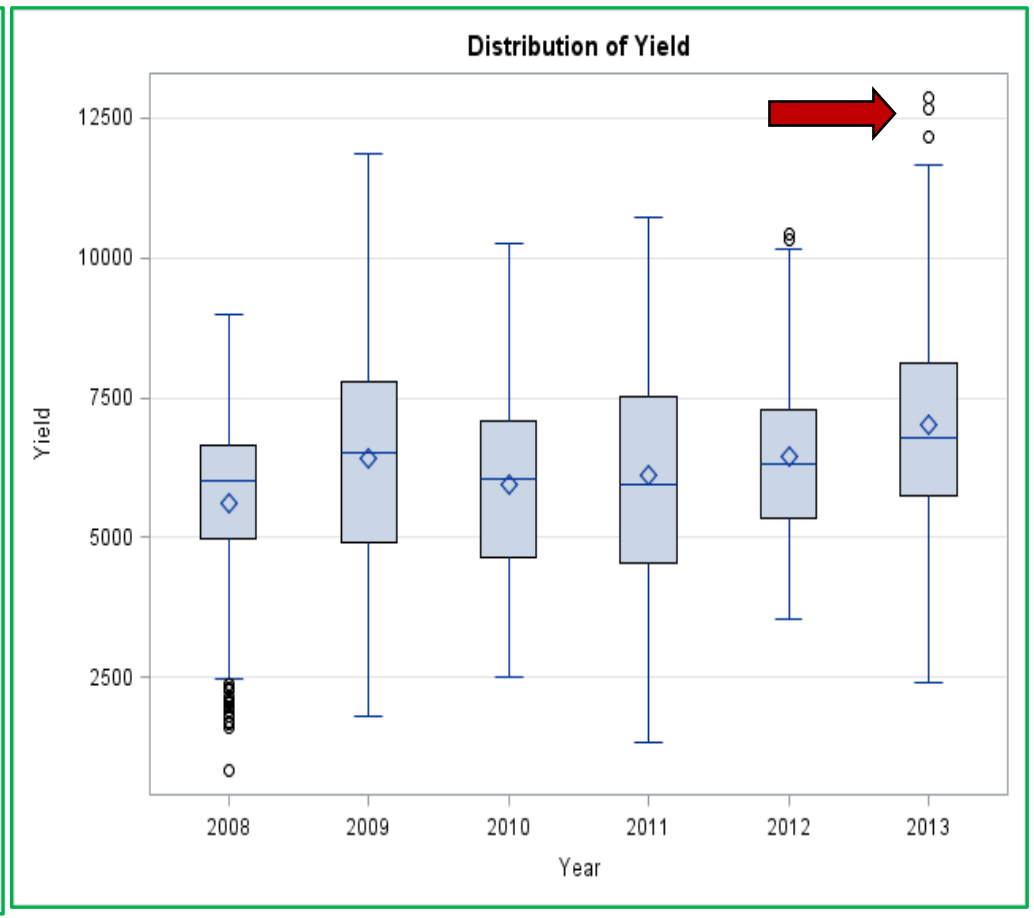
Source	Mean (%)	*Pr > F*
Year	22.9	*0.6481*
Site	26.3	*0.3688*



No significant increase for the best hybrid yield and yield advantage over inbred CK in last 5 years!!!

What is the yielding difference between IRRI and Non-IRRI hybrids?





IRRI Hybrid

MEAN = 6764

Non-IRRI Hybrid

MEAN = 6405

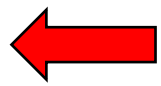
Yield gap = 359 kg/ha, (5.6%)

Caution:

1. Limited entries of hybrids;
2. Limited period of testing;
3. Interactions (year, site, season, genotype)

HRDC 1337 Ranking in 2013 MRYT (Environment X Genotype Interaction)

Location	2013DS	2013WS
Pabna	47/47	
Gazipur	44/48	37/45
Karnal (Haryana)		**1/40**
Lucknow		22/44
Raipur	42/44	43/44
Hyderabad	43/44	
Malang	26/48	
Sukamandi	45/45	
Los Baños	45/45	
General Santos	45/45	44/45
Binh Thanh, Long An	36/45	34/37



What we learned from the MRYT yield data:

1. No significant progress on improving hybrid yield and yield heterosis in the last 5 years
2. Give your best, latest hybrids for the testing
3. Manage MRYT field carefully to reduce the variation
4. Improve data collection

Issues related to MRYT:

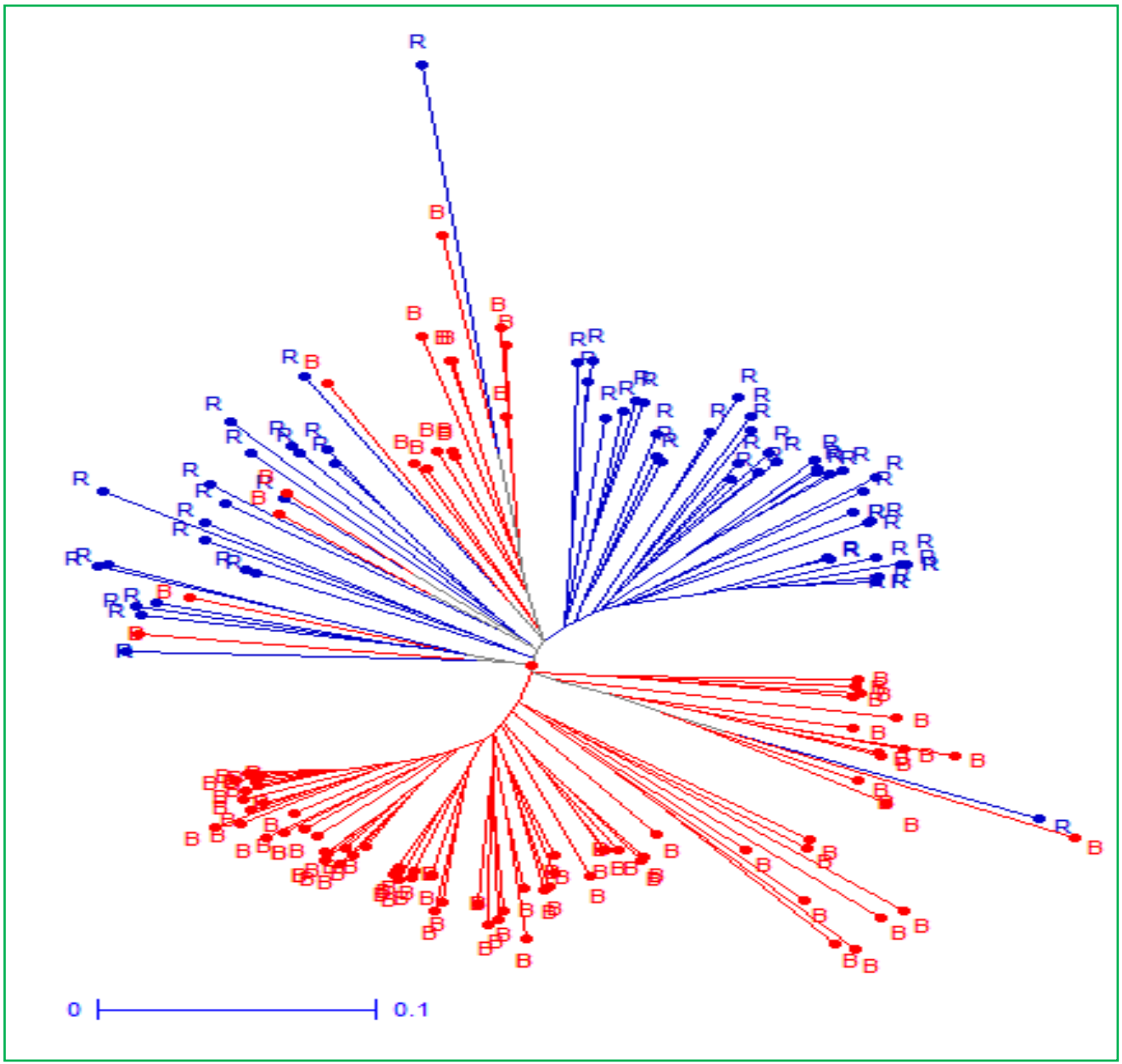
1. Site: Decide and adjust sites w/ members' opinion and performance – *Any adjustment (from 2015)*?
2. Field Management: Standardized protocol provided by HRDC;
3. Traits investigated: Common traits agreed by members w/ a list provided by HRDC;
4. Seed quality and shipment: High quality & timing;
5. Communication: Frequently with assigned contact persons;
6. Start "Breeding for Season"?
7. High-yielding potential: Find best location / field management for Maximum Yield

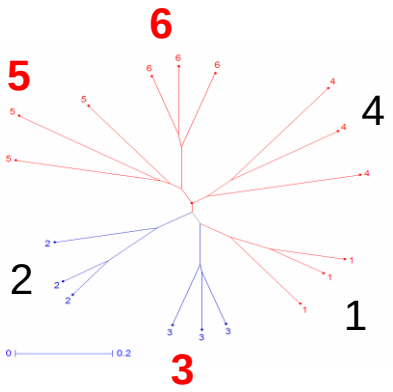
More and detail data http://hrdc.irri.org/

Research on Hybrid Rice Heterotic Groups

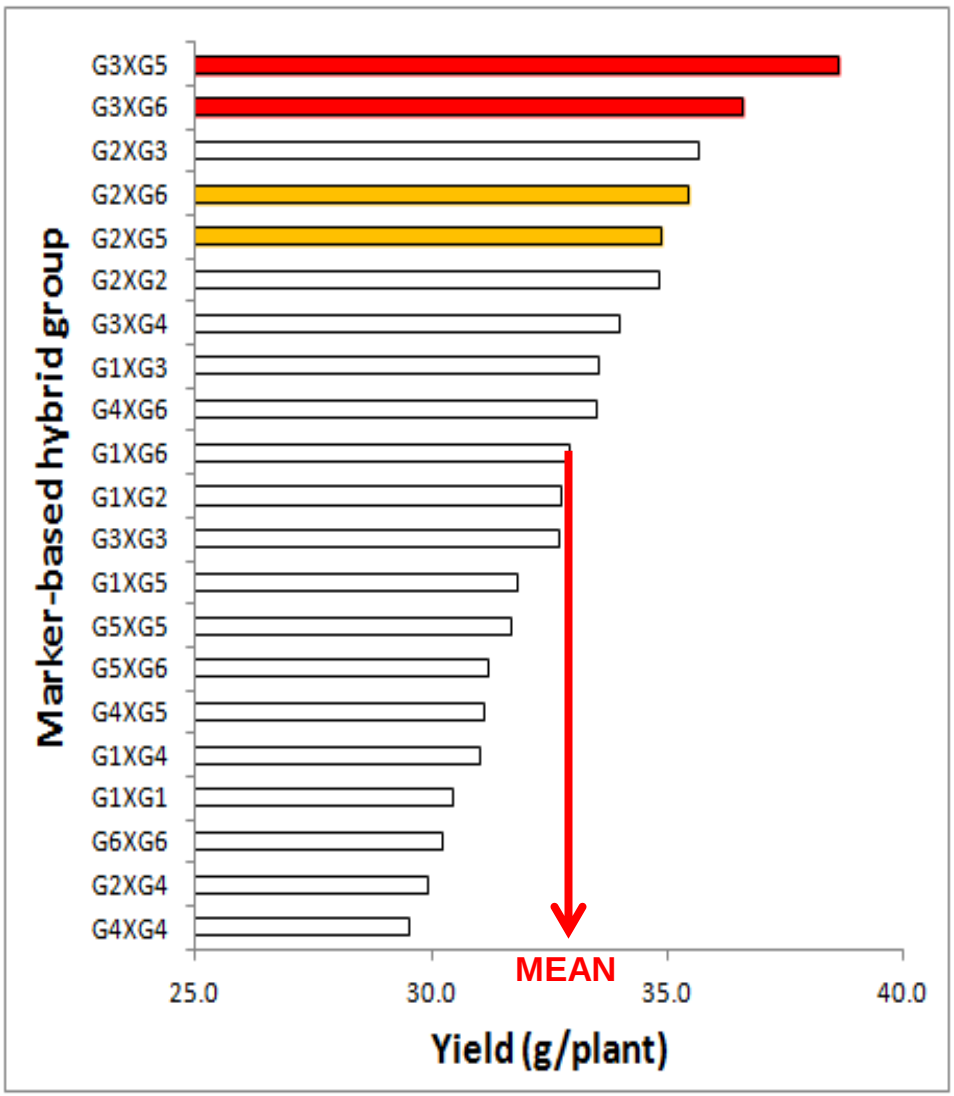
168 IRRI Hybrid Rice Parents Groups by Markers

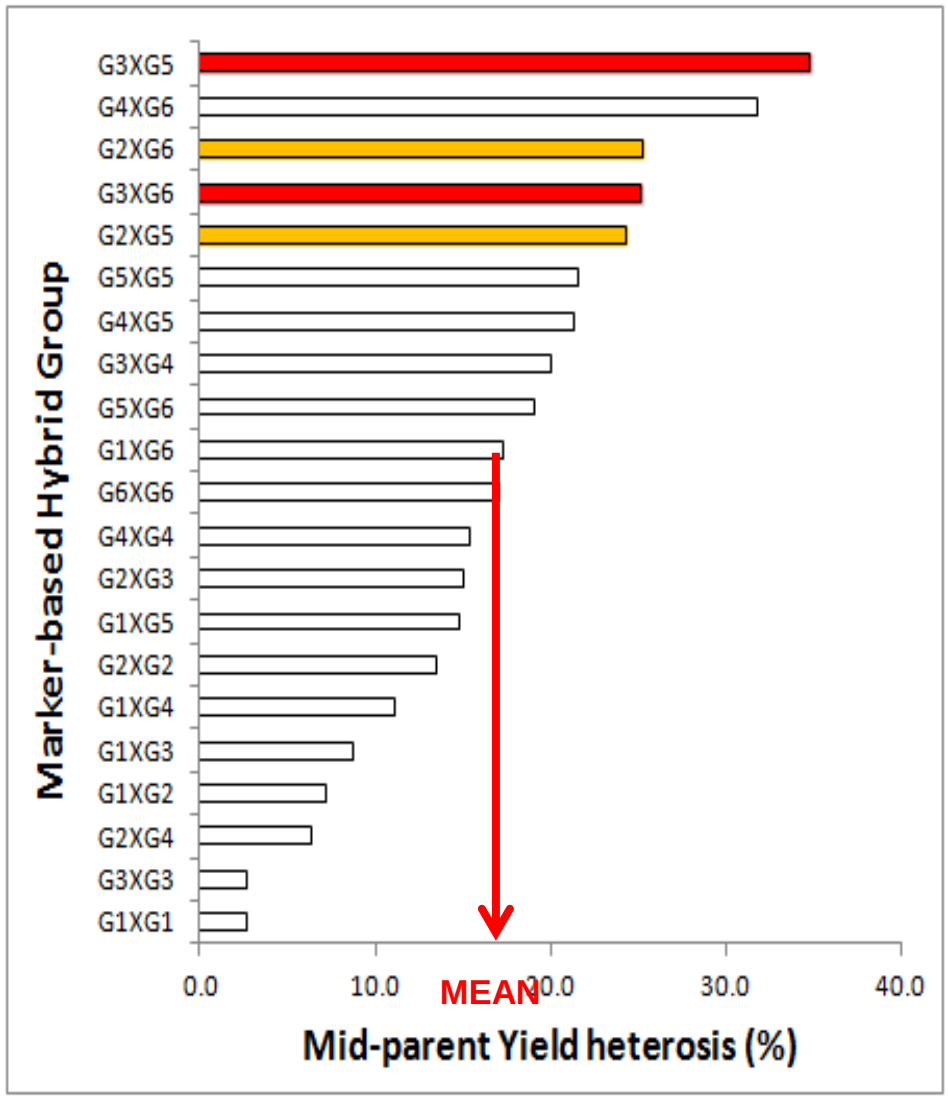
(Pioneer-IRRI SKEP)



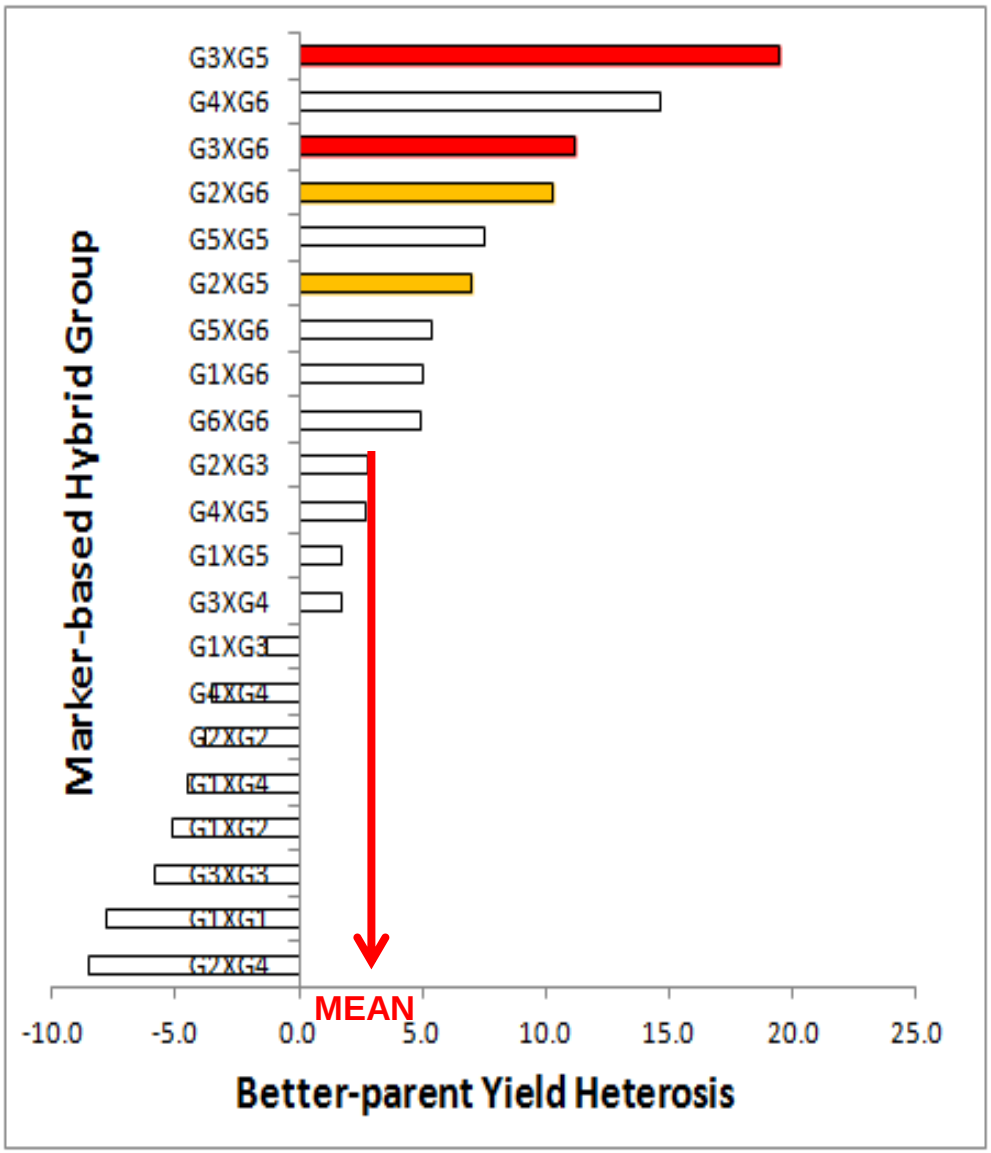


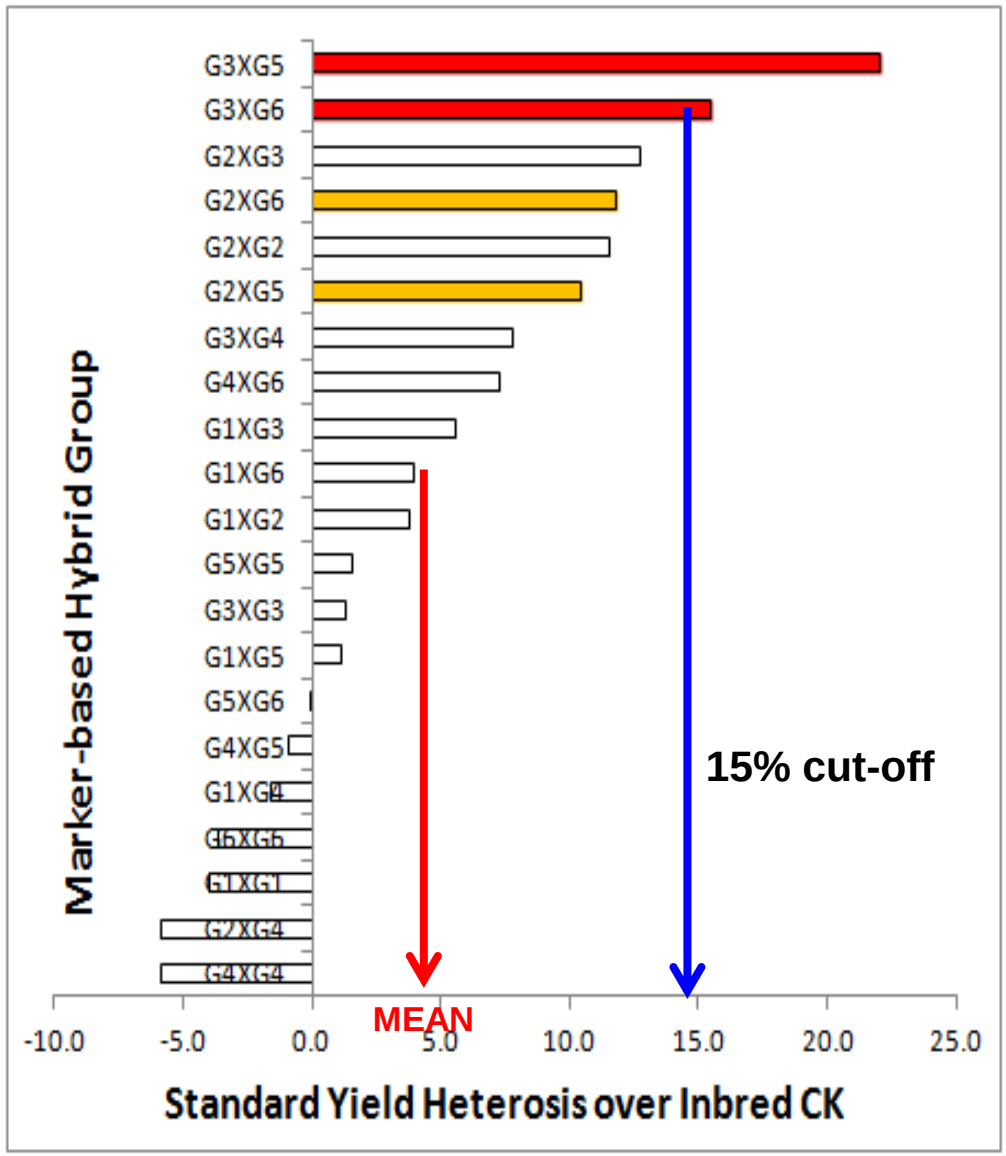
Hybrid Performance on Marker-based Groups





Hybrid Performance on Marker-based Groups



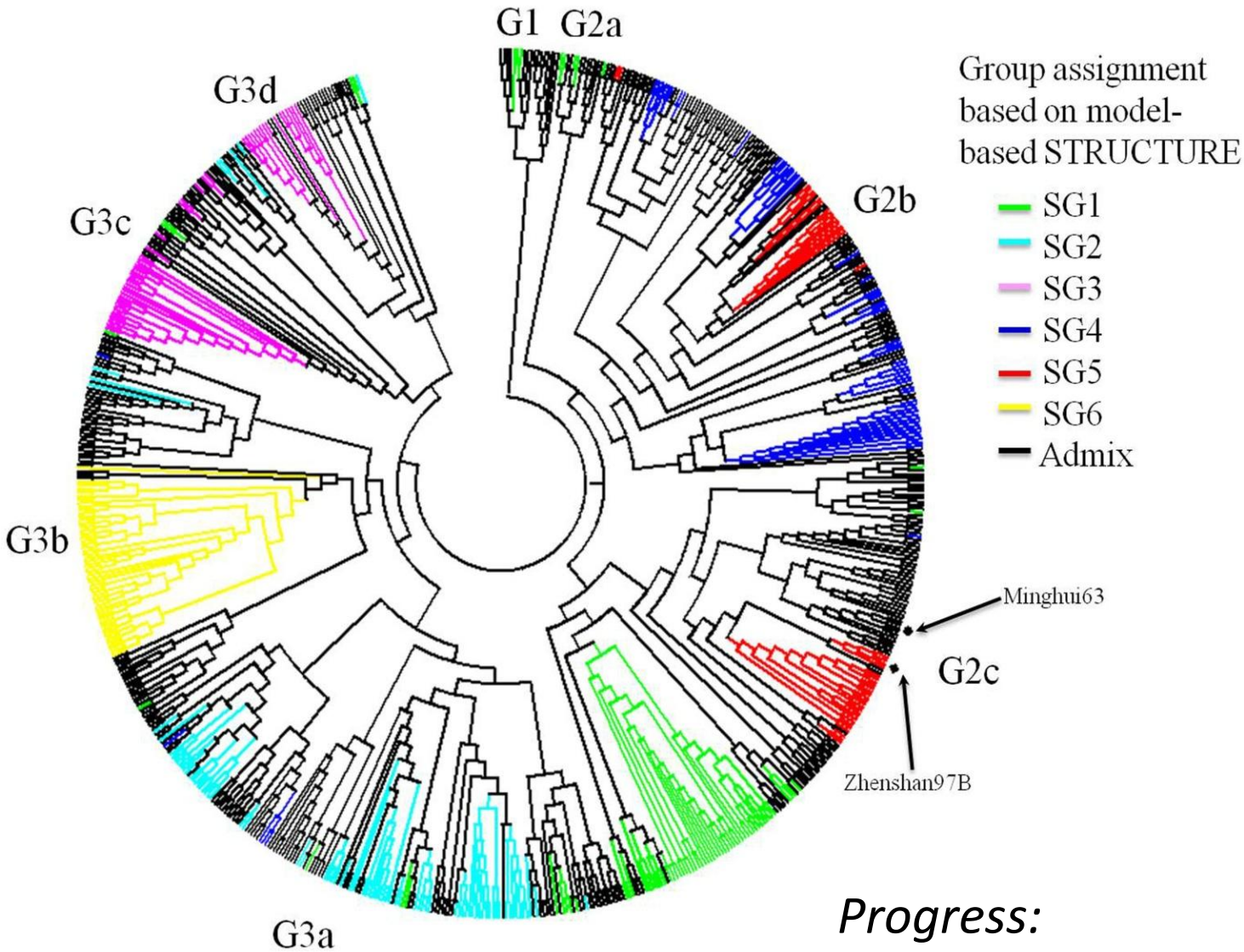


1. G3 X G5 is the preferred hybrid combination;
2. G3 X G6 is the 2nd choice, and then are G2 X G5 or G6;
3. Markers can help to identify heterotic groups

ID	Line	Subgroup	ID	Line	Subgroup	ID	Line	Subgroup	ID	Line	Subgroup
1	IR62829B	1	32	INTANR	2	161	IR73320B	3	75	IR80149B	6
2	IR78369B	1	33	IR73004-130-1-2-1R	2	122	IR68075-81-3-2-1-3-3R	4	76	IR68897B	6
3	IR80561B	1	34	IR72860-98-3-2-1R	2	123	IR70369B	4	77	IR78378B	6
4	IR64R	2	35	IR73717-46-1-3-3R	2	124	IR69625B	4	78	IR78375B	6
5	IR72102-4-159-1-3-3R	2	36	IR71137-328-2-3-3-2R	2	125	IR77805B	4	79	IR79124B	6
6	IR72998-78-1-3-2R	2	37	IR72889-98-2-2-3R	2	126	IR78359B	4	80	IR69627B	6
7	IR69712-154-2-3-1-3R	3	38	IR73012-120-2-3-3	2	127	IR78361B	4	81	IR75603B	6
8	IR71921-4B-B-23-2-1R	3	39	IR72894-35-2-2-2	2	128	IR77809B	4	82	IR75608B	6
9	IR73971-87-1-1-1-1	3	40	IR71138-49-2-2-1-2R	2	115	IR68275B	5	83	IR69628B	6
10	IR70368B	4	41	IR60199-B-B-2-1R	2	116	YTB	5	84	IR78372B	6
11	IR72793B	4	42	IR59606-119-3R	2	117	IR73328B	5	85	IR76766B	6
12	V20B	4	43	IR71604-4-1-4-4-4-2-2-2R	2	118	IR73793B	5	86	IR78370B	6
13	IR68280B	5	44	IR59673-93-2-3R	2	119	IR75243-15-13-1R	5	87	IR79126B	6
14	IR72795B	5	45	IR62037-129-2-3-3-3R	2	120	IR73384-31-9-10-16R	5	88	IR79127B	6
15	IR73323B	5	46	IR59624-34-2-2R	2	121	IR73678-6-9R	5	89	IR80562B	6
16	IR58025B	6	47	IR73885-1-4-3-2-1-4R	2	140	IR72081B	5	90	IR80564B	6
17	IR79156B	6	48	IR71146-287-3-3-2-1R	2	149	IR78364B	5	91	IR68899B	6
18	IR80151B	6	49	SRT3R	2	164	IR70370B	5	92	IR80553B	6
129	IR72078B	1	50	IR72997-159-2-2-1	2	51	IR80154B	6	93	IR76767B	6
130	IR73327B	1	144	IR58082-126-1-2R	2	52	IR78365B	6	94	IR78366B	6
131	IR75595B	1	145	IR63896-60-3-1-2R	2	53	IR83284B	6	95	IR80560B	6
132	IR68885B	1	146	IR69701-C5-22-2-2R	2	54	IR68896B	6	96	IR78371B	6
133	IR73467-3-2-2-2	1	150	IR57298-174-2-2R	2	55	IR80155B	6	97	IR80554B	6
134	IR80555B	1	151	IR35366-28-31-2-2-2R	2	56	IR70960B	6	98	IR75601B	6
135	IR72794B	1	152	IR73759-128-1-3-3-1-1	2	57	IR80153B	6	99	IR78373B	6
136	IR76770B	1	155	IR65912-90-1-6-3-2-3R	2	58	IR68893B	6	100	IR78374B	6
137	IR72791B	1	156	BG300R	2	59	IR69622B	6	101	IR78376B	6
138	IR78354B	1	157	IR72869-11-1-3-3	2	60	IR79155B	6	102	IR78377B	6
139	IR80158B	1	158	IR23352-7R	2	61	IR80558B	6	103	IR79121B	6
19	IR75282-58-1-2-3R	2	160	IR69726-29-1-2-2-2R	2	62	IR80152B	6	104	IR79123B	6
20	IR59548-122-1-4-1R	2	162	IR72869-52-1-1-1	2	63	IR79125B	6	105	IR79128B	6
21	IR72903-131-1-2-3R	2	163	IR69707-10-2-2-3-3R	2	64	IR68902B	6	106	IR79157B	6
22	C4842-2-3-2-1-1R	2	168	IR62161-184-3-1-3-2R	2	65	IR80559B	6	107	IR80157B	6
23	IR76447-65-2-2-1R	2	108	IR69714-28-1-2-6-2R	3	66	IR79158B	6	142	IR67684B	6
24	IR57301-158-1R	2	109	IR73337-44-1-1R	3	67	IR69618B	6	143	IR75606B	6
25	IR71146-122-1-1-2-1R	2	110	IR69713-43-1-3-2-3	3	68	IR71563B	6	147	IR76768B	6
26	IR72875-94-3-3-2R	2	111	IR60819-34-2-1R	3	69	IR78368B	6	148	IR80156B	6
27	BR28R	2	112	IR69715-123-1-3R	3	70	IR83283B	6	153	IR68886B	6
28	IR73330-83-1-2R	2	113	IR65623-94-3-1-3-3R	3	71	IR69626B	6	154	IR68892B	6
29	IR62653-8-3-3	2	114	IR69721-68-1-2-1R	3	72	IR72789B	6	165	IR73318B	6
30	IR63877-43-2-1-3-1R	2	141	IR78367B	3	73	IR83285B	6	166	IR77801B	6
31	IR72R	2	159	IR65622-151-2-2-2R	3	74	IR79122B	6	167	IR68888B	6

F. Xie etc. 2014. Determination of heterotic groups for tropical Indica hybrid rice germplasm, Theoretical and Applied Genetics. 127:407–417

Expanded study to include all improved indica germplasm

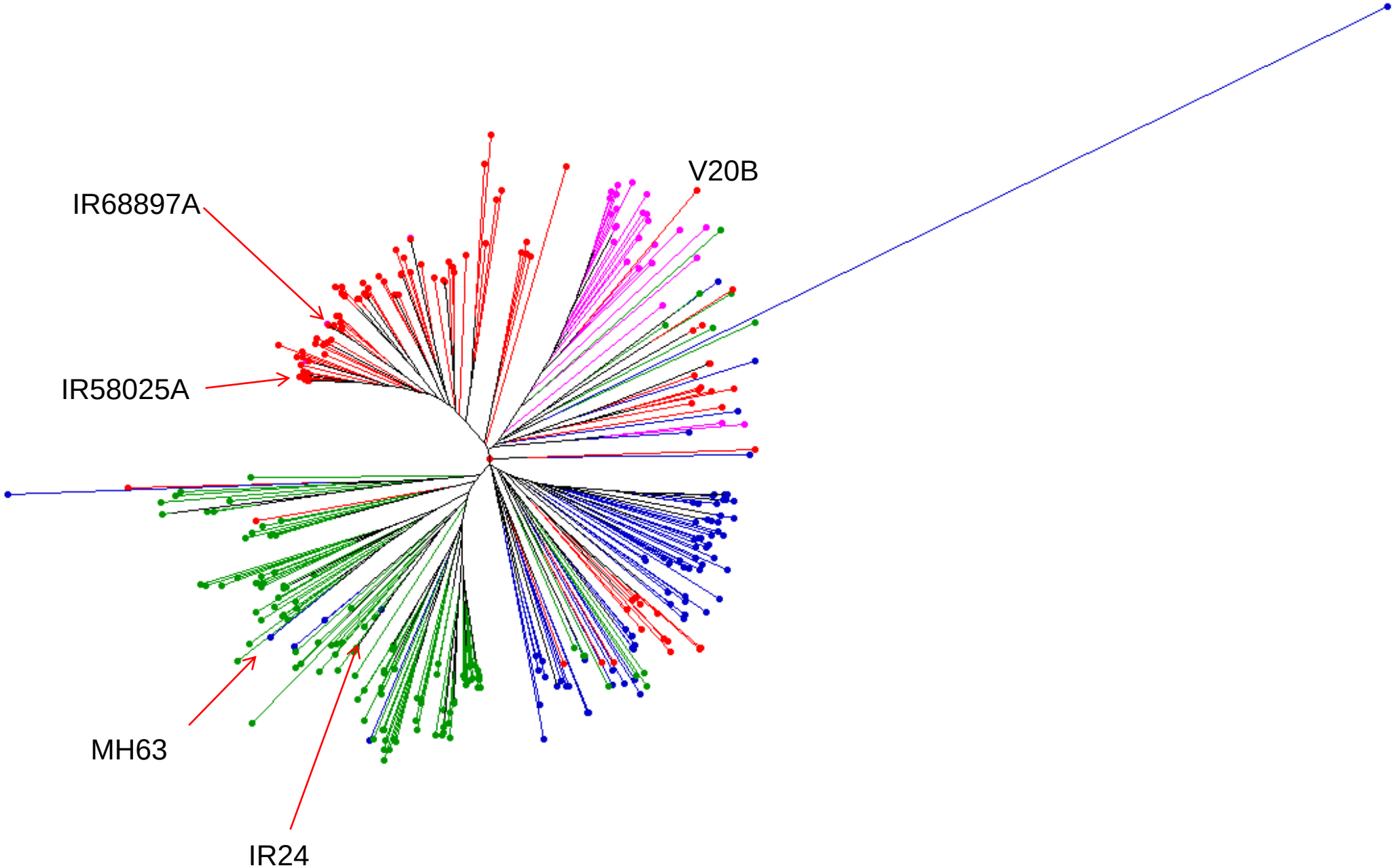


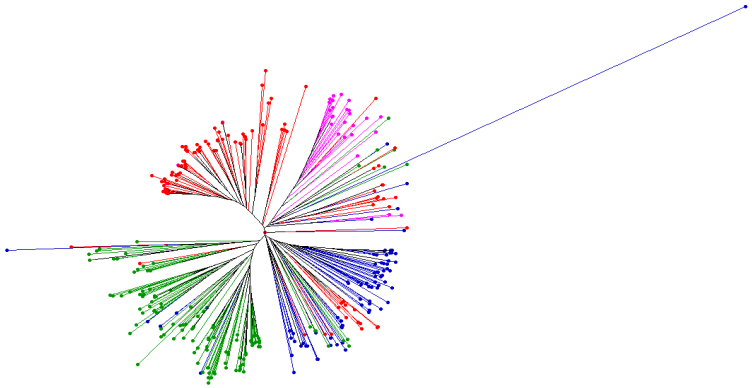
Progress:

1. *Classification published;*
2. *Hybrid phenotypic data collected*
3. *Working on the data & papers*

K. Wang etc. 2013. Genetic diversity and structure of improved indica rice germplasm, Plant Genetic Resources: Characterization and Utilization, doi:10.1017/S1479262113000579

Marker genotyped for IRRI Hybrid Rice Parents (185 Old B & R and 149 New B and R lines)





Proposal for further study

Questions:

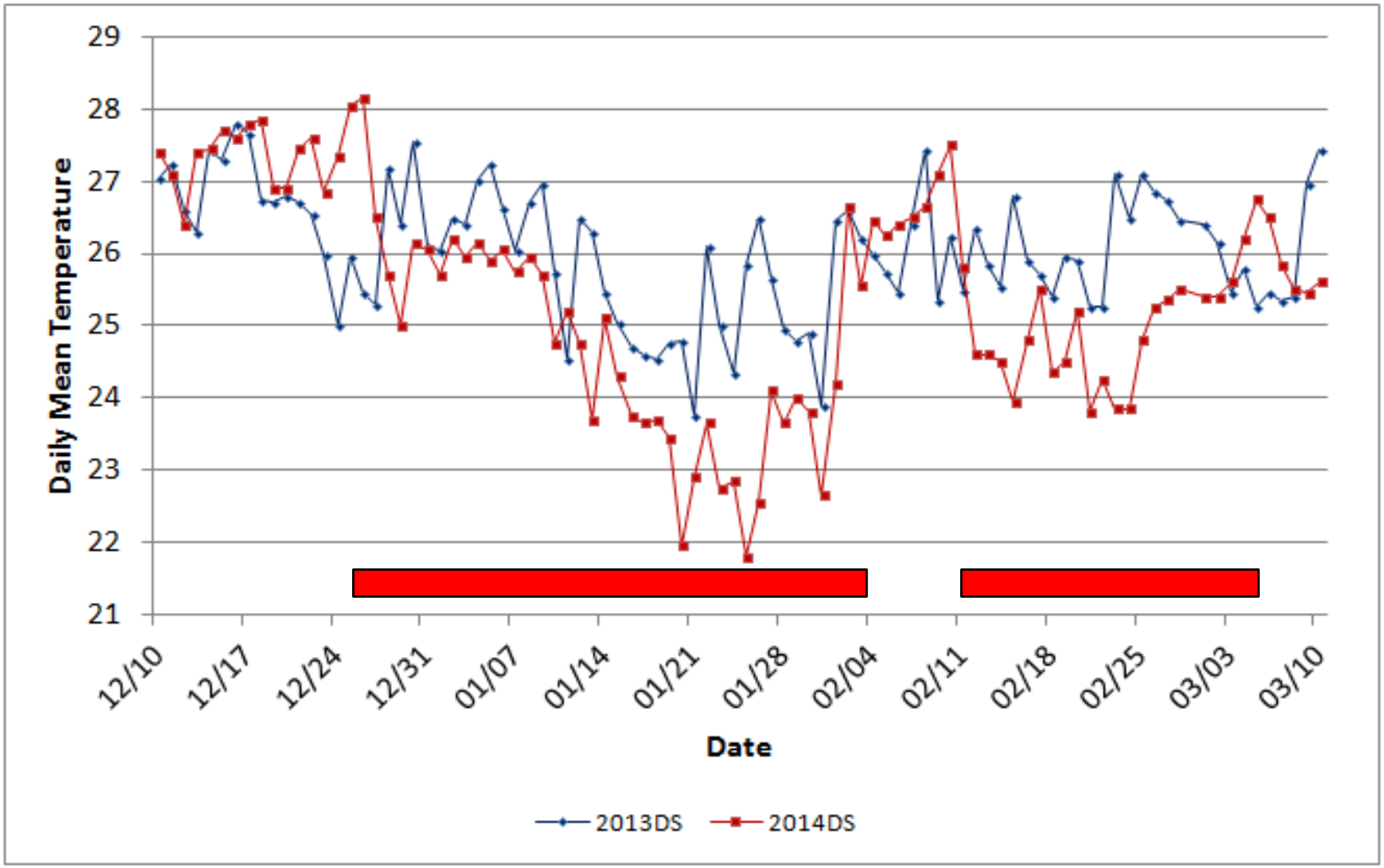
1. What heterotic response in new gemplasm?
2. Which group(s) for your materials & heterosis to fit?
3. What germplasm (groups) to produce the best heterosis?

Advantage:

1. Have a marker database (reference);
2. Divergent IRRI germplasm (hybrid and inbred)

Welcome Joint Study !!!

Daily Mean Temperature at Los Banos for
2013DS and 2014DS Cropping Seasons



	2013DS	2014DS
Accumulated Average Temperature	2370	2314
Difference		-56.2
Difference / day		-0.62


IRRI
IRRI
IRRI
IRRI