

# **Varietal Diversity of Rice in India**

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# Global Rice area: 2007 ( FAO)

Continents	Area ( Mha)	% of Total
Asia	140.0	90
Africa	9.3 +	6
South America	4.8 -	3
North & Central America	1.8 -	1
Europe	0.6	<1
Oceania	0.1-	<1
<b>Total</b>	<b>156.6</b>	<b>100</b>

# Rice Area in Indian Subcontinent ( FAO)

<b>Countries</b>	<b>Area ( Million ha)</b>	<b>Milled rice Production ( Million tons)</b>	<b>Rice Yield ( t /ha)</b>
<b>India</b>	<b>44.6</b>	<b>94.1</b>	<b>2.1</b>
<b>Bangladesh</b>	<b>11.2</b>	<b>29.0 +</b>	<b>2.6</b>
<b>Myanmar</b>	<b>8.2 +</b>	<b>21.7 +</b>	<b>2.8 +</b>
<b>Pakistan</b>	<b>2.6 +</b>	<b>5.5 +</b>	<b>2.1</b>
<b>Nepal</b>	<b>1.4 -</b>	<b>2.5-</b>	<b>1.7</b>
<b>Sri Lanka</b>	<b>0.8</b>	<b>2.1</b>	<b>2.6</b>
<b>Bhutan*</b>	<b>27,000 ha</b>	<b>46,000 tons</b>	<b>1.8</b>
<b>Total</b>	<b>68.8 ( 45%)</b>	<b>154.9 ( 37%)</b>	<b>2.2 (-)</b>

# Major rice ecologies

<b>Rice Ecologies</b>	<b>Area ( Mha)</b>	<b>% rice area</b>	<b>Production ( M tons)</b>	<b>% of total production</b>	<b>Grain Yield ( t /ha)</b>
<b>Irrigated</b>	<b>78</b>	<b>50</b>	<b>300</b>	<b>70</b>	<b>3.6</b>
<b>Rainfed lowland</b>	<b>54</b>	<b>35</b>	<b>93</b>	<b>20</b>	<b>2.0</b>
<b>Uplands</b>	<b>16</b>	<b>10</b>	<b>20</b>	<b>5</b>	<b>1.2</b>
<b>Deepwater &amp; Flood prone</b>	<b>5</b>	<b>3</b>	<b>12</b>	<b>3</b>	<b>0.8</b>
<b>Coastal Wetlands</b>	<b>3</b>	<b>2</b>	<b>8</b>	<b>2</b>	<b>1.5</b>
<b>Total</b>	<b>156</b>	<b>100</b>	<b>433</b>	<b>100</b>	<b>2.6</b>



# History of Systematic Rice Research in the south Asia

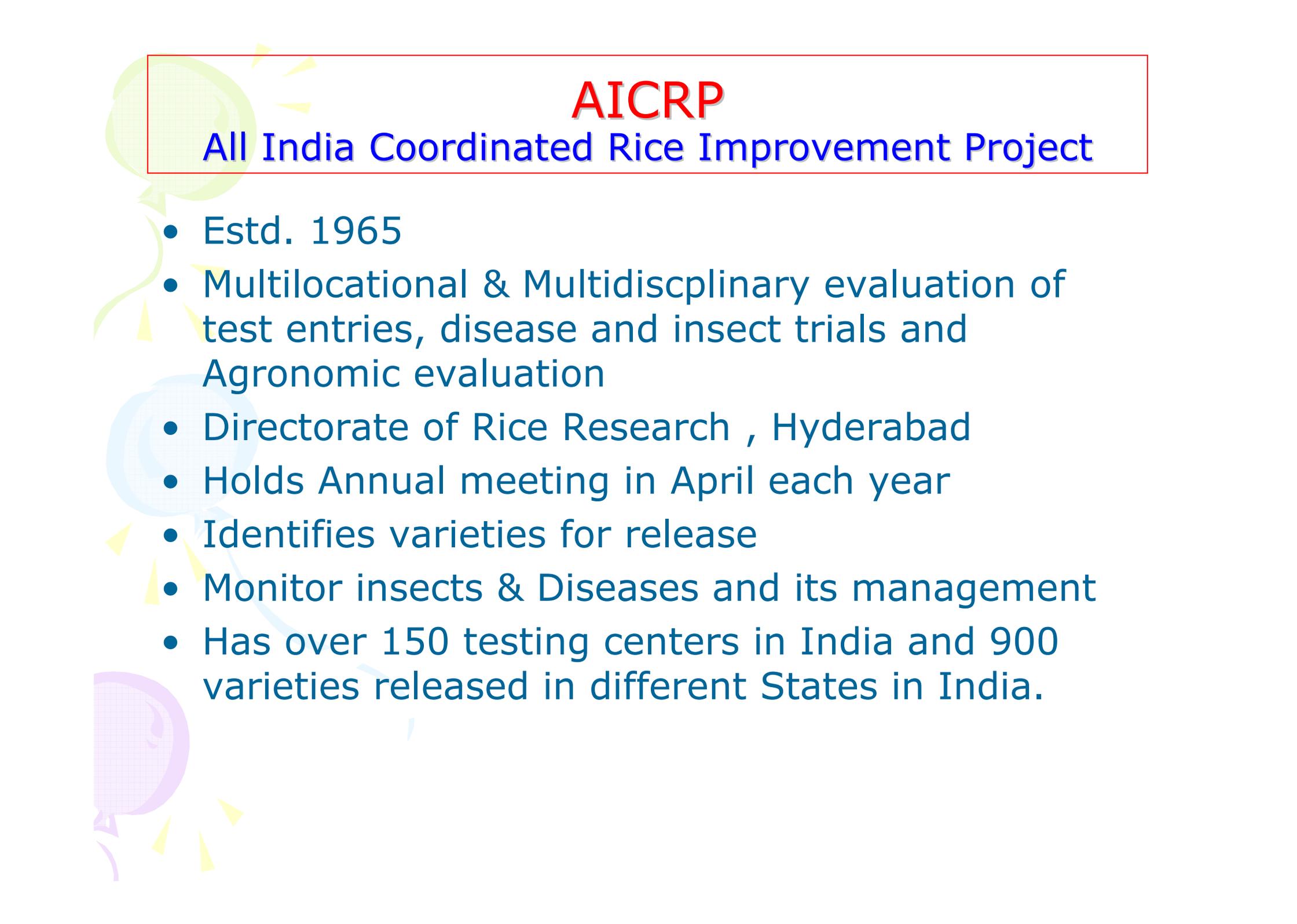
Year	Establishment of Research Station
1907	Rice Research Station at Mandalay in upper region of Burma ( Now Myanmar) was established
1911	Rice Research station was established at Dhaka ( now in Bangladesh)
1912	Rice Research Station Was established at Coimbatore ( Madras, now Tamil Nadu), India
1913	Rice research station was established at Karimganj , Assam India
1914	Rice research station at Hmawbi in lower region of Myanmar was established
1919	Rice research started at karjat in Kolaba in Maharashtra State, India

# History of Rice Research in the South Asia

<b>Year</b>	<b>Establishment of Research Stations</b>
<b>1923</b>	Rice research station was established at Titabar, Assam and Ratnagiri, Maharashtra State, India
<b>1924</b>	Rice research station at Kanpur was established in Uttar Pradesh, India
<b>1929</b>	Rice Research station was established at Kala Shah Kaku, ( Now in Pakistan)
<b>1929</b>	Imperial ( now India) Council of Agricultural Research was established at New Delhi as an apex body for Agricultural Research in India
<b>1932</b>	Rice research station at Nagina ( Uttar Pradesh), Chinsurah( West Bengal), Sabour ( Bihar), Raipur ( Madhya Pradesh) were strengthened
<b>1934</b>	Rice research station for deep water rice research was established at Habiganj , Assam ( now in Bangladesh)
<b>1937</b>	Rice research station at Dokri ( now in Pakistan) was established

# History of Rice Research in the South Asia

<b>Year</b>	<b>Establishment of Research Stations</b>
<b>1943</b>	<b>Bengal Famine occurred due to poor rice harvest in which 2 million people died due to cyclone, flood and brown spot disease in rice</b>
<b>1945</b>	<b>FAO was established at Rome, Italy as UN agency to reduce global hunger through Agricultural development in 90 countries of world</b>
<b>1946</b>	<b>Central Rice Research Station was established at Cuttack, Orissa, India</b>
<b>1947</b>	<b>Rice Research was established at Parwanipur in Nepal</b>
<b>1954</b>	<b>Rice Research station was established at Batalagoda in Sri Lanka</b>
<b>1960</b>	<b>International Rice Research Station was established at Los Banos Philippines</b>
<b>1965</b>	<b>Establishment of All India Coordinated Research Project ( AICRP) at Hyderabad Andhra Pradesh India</b>



# AICRP

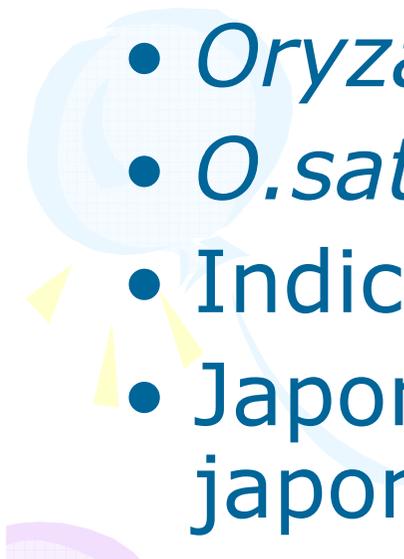
## All India Coordinated Rice Improvement Project

- Estd. 1965
- Multilocational & Multidisciplinary evaluation of test entries, disease and insect trials and Agronomic evaluation
- Directorate of Rice Research , Hyderabad
- Holds Annual meeting in April each year
- Identifies varieties for release
- Monitor insects & Diseases and its management
- Has over 150 testing centers in India and 900 varieties released in different States in India.



# *Oryza* and related species

Two cultivated spp.

- *Oryza sativa* (Globally)
  - *Oryza glaberrima* ( Africa)
  - *O. sativa* : three subspp.
  - Indica (eotypes aus & aman)
  - Japonica ( tropical & temperate japonica)
  - Indica-japonica
- 
- 

# Taxa in Genus *Oryza* in South Asia:5

## *O.sativa* complex

Taxon	Genome	2n	Distribution
<i>O.sativa</i> L.	AA	24	Asia
<i>O.nivara</i>	AA	24	Annual wild rice: South Asia
<i>O.Spontanea</i> ( <i>O.fatua</i> )	AA	24	India
<i>O.rufipogon</i>	AA	24	South asia

## Taxa in Genus *Oryzain South Asia*:5 *O. officinalis* complex

Taxon	Genome	2n	Distribution
<i>O.officinallis</i>	CC	24	Tropical Asia
<i>O.rhizomatis</i>	CC	24	Sri Lanka
<i>O.malampuzh aensis</i>	BBCC	48	Kerala, India

# Taxa in Genus *Oryzain South Asia*:5 *O. meyeriana* complex

Taxon	Genome	2n	Distribution
<i>O. granulata</i>	GG	24	South & South east Asia

# Taxa in Genus *Oryza* in South Asia: Unknown

Taxon	Genome	2n	Distribution
<i>Porteresia</i> ( <i>Oryza</i> ) <i>coarctata</i>	?	48	Bangladesh & India (Tolerant to coastal salinity)



# NBPGR

## National Bureau of Plant Genetic Resources

- New Delhi
  - 87, 000 collections of traditional varieties of rice from India
  - 1000 wild rices
  - Long term conservation
- 
- 

# Landmarks in Varietal selection from land races and traditional rice gerplasm in South Asia

<b>variety</b>	<b>Germplasm and land race and area of Adaptaion</b>
Basmati 370	Punjab( India and Pakistan). Selection from Basmati collections at Kalashah kaku, Scented, long grain, and good kernel elongation of cooked rice, good eating quality
Type 3	Selection from Dehradun Basmati, at Nagina Western Uttar Pradesh, LS grains, scented and good eating qulity
Taraori Basmati	Selection from Basmati colections from Haryanaat village Taraori. Extra LS grains, scented good eating quality
N22	Selection from Rajbhog, drought and heat tolerant, early maturing upland rice variety
Safri 17	Rainfed lowland drought tolerant selection from safari land races collection from Madhya Pradesh and Chhattisgarh

# Landmarks in Varietal selection from land races and traditional rice gerplasm in South Asia

<b>variety</b>	<b>Germplasm and land race and area of Adaptaion</b>
PTB 33	Collections at Pattambi, Kerala. Multiple resistant Resistant donor for BPH, WBPH, BLB & Thrips. Parent of IR 56 and IR 62, ADT 37
TKM6	Donor for multiple resistance for BLB and Stem borers.Parent of IR 20, IR 26, Ratna, Vices etc
GEB24	Donor for good grain quality. Parent of ADT 27, Sona, Sambha Mahsuri
T 141	Donor for high photosynthetic efficiency. Parent of Jaya.
Kalakeri	Drought tolerant donor from Orissa, India. Parent of Vandana
H5	Donor for BPH from Sri Lanka

# Landmarks in Varietal selection from land races and traditional rice germplasm in South Asia

<b>variety</b>	<b>Germplasm and land race and area of Adaptaion</b>
Vytilla 1	Selection from Pokkali, tolerance to Coastal salinity and water logging in Kerala, India
CSR 1	Selection from Damodar land races collection . Tolerance to coastal salinity
Nona Bokra	Selection from Land races, tolerance to coastal salinity in West Bengal, India
Br8	Selection from Kessore land races collection from Bihar, India
Sudha	Selection from Deep water rice collection from Bihar, India
Sugandha	Selection from photosensitive land races collection of scented rice in Bihar, India

# Outstanding donor for resistance to biotic and abiotic resistance from rice germplasm in South Asia

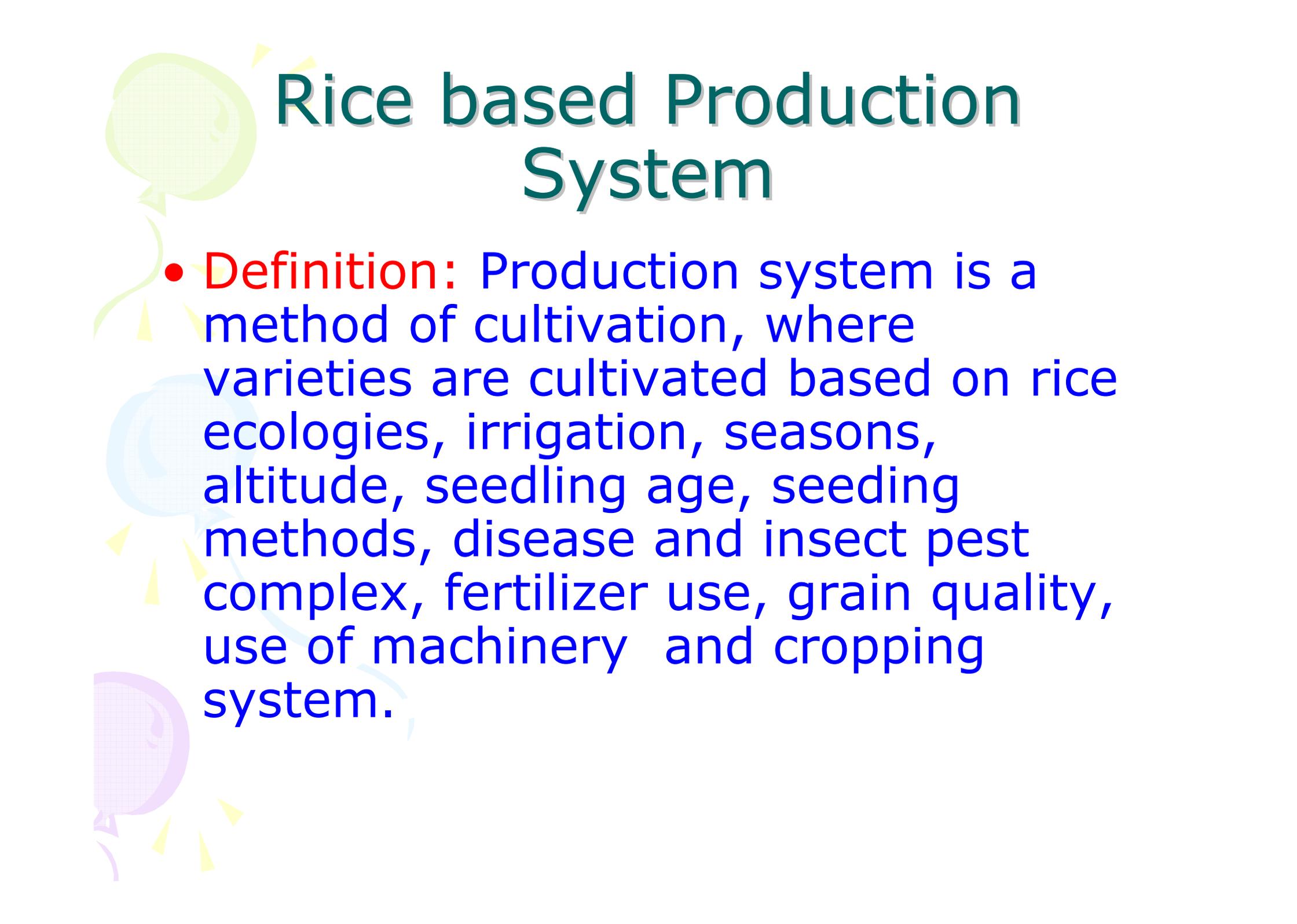
<b>variety</b>	<b>Germplasm and land race and area of Adaptaion</b>
PTB 2	PLS from Ponnaryan. Resistance to RTD. Parent for Vikramarya
PTB 10	PLS from Thekkancheera. Resistant to gall midge. Parent of variety Jyothi, Annapurna, Abhaya, Triveni and Rohini
PTB 21	PLS from Thekkan. Resistance to gall midge, GLH, RTD, BPH, and Ragged stunt virus. Parent of CR 94-13, PR 108
Vellathucherra	Donor for resistance to gall midge from Kerala
ARC 10773	Assam Rice collections. Resistance to RTD and GLH
FR13A	Land race from Orissa. Donor for submergence tolerance.

# Landmarks in utilization of wild genetic resources

Genetic resources	origin	Gene source	Utilization
<i>O.nivara</i> Acc 101508	Uttar Pradesh, India	Resistance to Grassy stunt virus	23 IR varieties released after IR 28 onwards, and almost all IR lines carry this gene
<i>O.officinallis</i> Acc. 100896	India	Resistant to BPH	Three varieties: MTL 98, MTL 103, and MTL 105 released in Vietnam
<i>O.rufipogon</i>	India	Resistance to BLB, blast, gall midge, tolerance to acid sulphat soils, salinity and yield QTL ( Yld1& Yld2)	AS 1007 released in Vietnamas Acid sulphate tolerant variety. Dhanrasi relased in India with multiple disease resistance

# Landmarks in Varietal Development in South Asia

<b>Year</b>	<b>Cultivar</b>	<b>Origin</b>	<b>Major traits</b>
<b>1965</b>	<b>Mahsuri</b>	<b>CRRI( IxJ program) &amp; Malaysia</b>	<b>Good grain quality, Widely grown in 10 mha in 1970's &amp; 1980's</b>
<b>1968</b>	<b>Jaya</b>	<b>DRR Hyderabad</b>	<b>Widely grown variety ( 5 mha in 1970's &amp; 1980's</b>
<b>1978</b>	<b>BG 90-2</b>	<b>Sri Lanka</b>	<b>Widely grown variety ( 5 mha in 1980's &amp; 1990's</b>
<b>1982</b>	<b>Swarna</b>	<b>Maruteru, Andhra Pradesh</b>	<b>Widely grown variety ( 6.5 mha ) in India, Nepal, &amp; Bangladesh in 1990's &amp; 2000's</b>
<b>1982</b>	<b>BR 11</b>	<b>Bangladesh</b>	<b>3 mha in 1980's&amp; 1990's</b>
<b>1985</b>	<b>Samba Mahsuri</b>	<b>Baptala, Andhra Pradesh</b>	<b>3 mha, good grain quality in 1990's &amp;2000's</b>
<b>1989</b>	<b>Pusa Basmati</b>	<b>IARI, New Delhi</b>	<b>1 mha, good grain, export quality in 1990's</b>



# Rice based Production System

- **Definition:** Production system is a method of cultivation, where varieties are cultivated based on rice ecologies, irrigation, seasons, altitude, seedling age, seeding methods, disease and insect pest complex, fertilizer use, grain quality, use of machinery and cropping system.

# Rice Ecologies and Production Systems( REPS) in South Asia: 32

SN	REPS	Area Mha	varieties
1	Irrigated-Wet season	15	Swarna, IR 64,IR 36,Lalat, sarjoo 52, NDR 359
2	Irrigated – Hybrid rice	1.5	PA 6444, PHB 71, KRH 2, Pusa RH 10
3	Irrigated : Dry season/ T.Ahu	1.0	Tella Hamsa, IR 64, MTU 1010, Luit, Lachit,
4	Irrigated – Boro rice	4.0	Khitish, IR 64, Krishna Hamsa, satabdi,BRRI Dhan 28, BRRI 29
5	Irriagated- high altitude	0.2	CH 1039, CH 988, VLK 39, Jhelum, Shalimar rice 1, Kohsar, Barakat, Khumal 2, Khmal3, Khuamal4
6	Irrigated- Mid altitude Indica rice	0.5	Pant Dhan 6, Pant Dhan 10, Himali

# Rice Ecologies and Production Systems( REPS) in South Asia

SN	REPS	Area Mha	varieties
7	Irrigated gall midge biotype 1	2.0	Phalguna, varalu, IR 36, Surekha, Danteswari, Uma, Pavithra
8	Irrigated gall midge biotype 2	1.0	Lalt, Shaktiman, Meher, Manika
9	Irrigated gall midge biotype 3	1.0	Srikakullam sannalu, vasubdhara, Vibhava, Abhaya
10	Irrigated gall midge biotype 4	1.0	Srikakullam sannalu, vasubdhara, Vibhava, Abhaya, ratnagiri 3
11	Irrigated gall midge biotype 5	0.5	Panchami, Pavitra, Uma
12	Irrigated gall midge biotype 6	0.5	Tempha phou, Sona phou, Priphou

# Rice Ecologies and Production Systems( REPS) in South Asia

SN	REPS	Area	varieties
13	Irrigated : Inland saline and Sodic ( WS)	2.0	CSR 13, CSR 27, CSR 30, narendra Usar 3
14	Irrigated: Coastal saline ( DS)	0.5	Khandagiri, Parijat, BR 40, BR 41
15	Irrigated: Scented rice	1.0	Pusa Basmati 1, Pusa 1121, Kasturi, vasumati,
16	Rainfed uplands: favourable	2.5	Annada, Birsa Dhan 110, Anjali, vanaprabha, rasi, JR 75
17	Rainfed upland drought prone/ B.ahu/ Bhata	4.0	Kalinga 3, Vandana, Birsa Dhan 111, VLK Dhan 221, Dumai, Dr 92

# Rice Ecologies and Production Systems( REPS) in South Asia

SN	REPS	Area	varieties
18	Rainfed upland: Hills ( Jhum cultivation)	1.0	Garo malati, Jhum Maloti, Bhalum 1, Bhalum 2, RCM 9, RCM 10, Aghoni Bora
19	Rainfed lowlands:Shallow favorable	3.0	Swarna, BR 11,Ranjit, Mahsuri, Samba Mahsuri, Savitri, Intan, Rajshree,Mandya Vijaya
20	RL: Drought Prone	7.0	Sagri 17, Gurmatia, vaidehi, Swarna
21	RL: Scented	2.0	Sugandha, Keteki Joha, Kamini, Dubhraj, Kalanamak, BR 5( Dulha bhog), kala Joha
22	RL: Medium deep/ Chauri	3.0	Gayatri, Sarla, C 14-8, Savita, Basudeo, Panchanan

# Rice Ecologies and Production Systems( REPS) in South Asia

SN	REPS	Area	varieties
23	RL- Flood prone During flood	2.0	Swarna-Sub, Janaki ( 64-117), FR 13A
24	RL: post flood	0.6	Manohar Sali, Andrewsali, CR 1014, Durga, Prafulla, janaki
25	Deepwater rice/ Asra/ Chaur	3.0	Chakia 59, Sudha, Durga, Savita, panindra, Rayada,
26	Very Deep water/ Floating/ Bao	1.0	Kartiksail, Shadapankaj, Varidhi, Jalnidhi, Dinesh , Panikekwa
27	Coastal salinity wet season	1.0	Lunishree, SR 26B, Pokalli, Vylitta 1, Vytilla 2, Panvel 2, Jarana

# Rice Ecologies and Production Systems( REPS) in South Asia

SN	REPS	Area Mha	varieties
28	Medicinal rices	0.1	Navara rices ( Kerala)
29	Iron toxicity	0.2	Mahsuri, Parijat
30	SRI method of Cultivation	0.5	Pro Agro 6444, Swarna, Samba Mahsuri
31	Use of machine	1.0	Pusa 44 ( for combine harvesting & reapers),
32	Aged seedlings	4.0	Swarna, Manoharsali, Prafulla

# Upland rice cultivation



# Sowing by Oxen/ Buffalo



# Puddling by Oxen for transplanted rice cultivation



# Seedlings uprooting and Transplanting manually



# Women for paddy transplanting



# Drudgery for women: Need for innovative methods



# Upland direct seeded rice

## Yield Potential: 3 t/ha



# Fertilizer Use in Upland rice

- 40:20:10 kg NPK + Lime 4 quintals / ha in acid upland soils and FYM/Organic manure @ 5 t ha<sup>-1</sup> Organic manure, P and K+ Lime as Basal

**N as top dressing** , 15 and 30 days after germination: 20 kg N each, after weeding

Growing Sun hemp with upland rice and incorporating in between rows increases yield and n availability

# Insects : Gall Midge Tolerance

## On-farm trial : Kolebera, Simdega

<i>Variety</i>	<i>SS</i>	<i>Hill infestation</i>	<i>Yield Q/ha</i>
• IR 64	44.5%	96.7%	16.7
• <b>Lalat</b>	<b>6.4 %</b>	<b>30.0%</b>	<b>29.2</b>
• PA 6444	19.5%	73.3 %	26.0
• KRH-2	13.4%	56.7 %	21.5
• Swarna	18.8%	63.3%	14.9

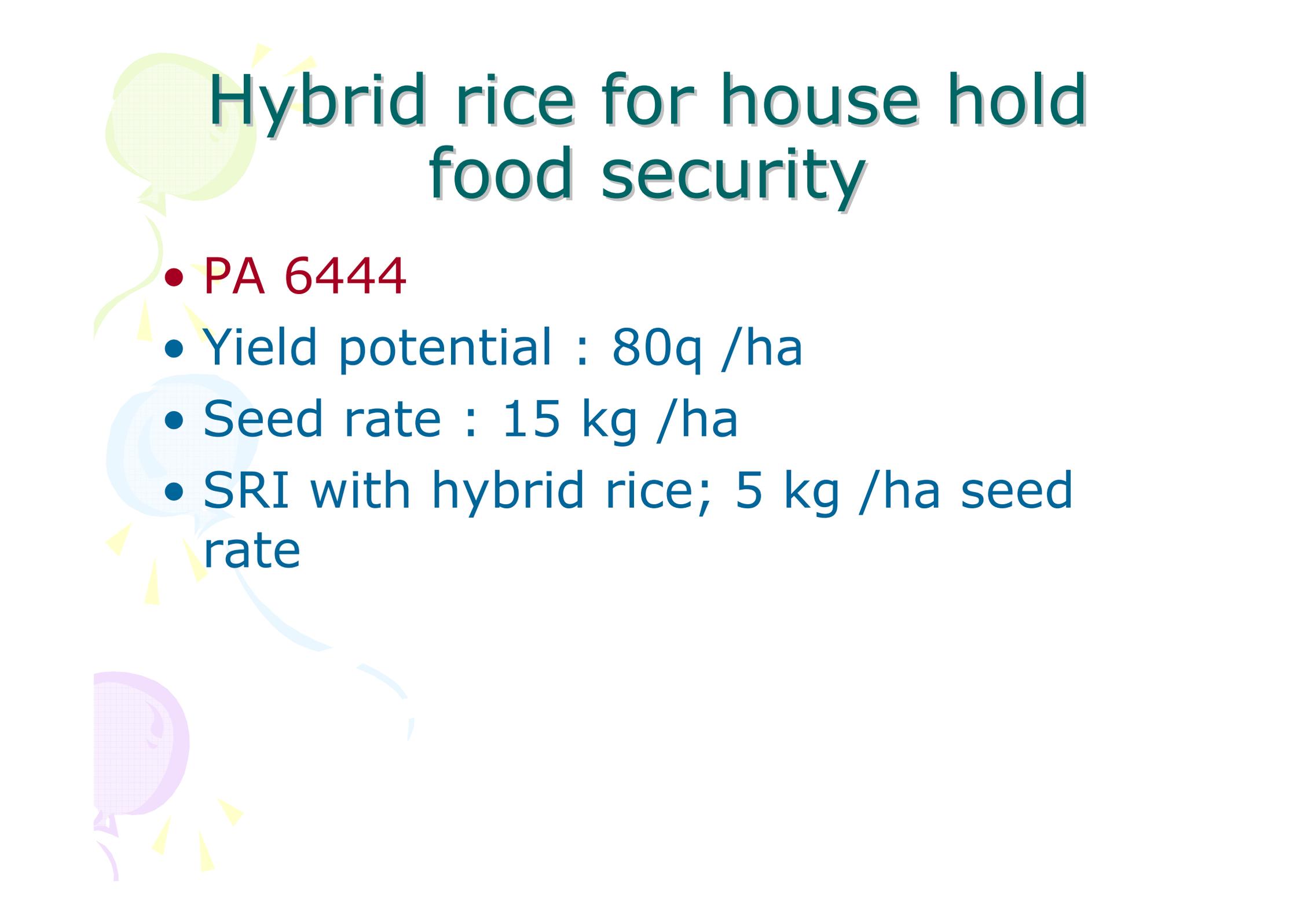


Gall Midge Resistant  
variety (Lalat)

**LALAT**

# Naveen : a new rice variety tolerant to gall midge for lowlands





# Hybrid rice for house hold food security

- PA 6444
- Yield potential : 80q /ha
- Seed rate : 15 kg /ha
- SRI with hybrid rice; 5 kg /ha seed rate



# Technology for Hybrid Rice

## Yield Potential : 12 tons / ha

PA 6444 for Irrigated/ Rainfed Lowland - 140 days  
Pusa RH 10 : Scented rice

- Fertilizer: 150 kg N: 75 Kg P<sub>2</sub>O<sub>5</sub>:90 Kg K<sub>2</sub>O/ ha
- FYM/ Compost : 5 tons /ha; Vermicompost : 1.5 t/ha  
Neem/Karanj cake (5 quintal/ha)

N in 4 splits: basal 30 kg: 40 kg each at 3,6 & 9 WAT

P Basal : Use SSP. If DAP Use Sulphur( 25 Kg Gypsum) or  
IFFCO:20:20:0:13

K : 60 kg basal : 30 kg topdressing at flowering stage



# SRI ( System of Rice Intensification)

- Both in Hybrid rice and conventional varieties
- 10 days old seedlings
- 25 x 25 cm transplanting of single seeding
- 10 tons organic manure
- Drainage channel, each after 2 meters
- Use of cono / rotary weeders : 5 times

**15-20% yield advantage**



# Seed Rate in Rice

- 100 Kg for Direct Seeding in upland as broadcast
  - 80 kg in line sowing behind plough
  - 70 Kg by seed drill
  - 50 Kg ( Bold seed) for transplanting / ha
  - 40 Kg for medium/ slender rice
  - 15 for Hybrid rice
  - 5 kg for SRI
- 

A decorative sun icon with a green and yellow grid pattern, positioned in the top left corner of the slide.

# Seedling age

- Earlier 21 days old
  - Now reduced to 15 days
  - In SRI : 10-12 days
- 
- A decorative sun icon with a blue and yellow grid pattern, positioned in the middle left of the slide.
- 
- A decorative sun icon with a purple and yellow grid pattern, positioned in the bottom left of the slide.

**Wet Bed Nursery :  
Conventional 50 gm / m<sup>2</sup>**





# Seed rate and Seed Bed area

- 50 kg seed : 1000 @ 50 gm per m<sup>2</sup>
  - 15 Kg Seed Hybrid rice @ 20 gm per m<sup>2</sup> : 750 m<sup>2</sup>
  - 5 Kg for SRI : 15 gm per m<sup>2</sup>: 300 m<sup>2</sup> area in seed bed
- 
- 

**WET NURSERY: fertilizer  
use & Seeding 20 gm / m<sup>2</sup>**



# 12 days old seedlings from SRI and traditional (right side) nursery





# Seedlings uprooting





# Drainage channel



02.08.2005



Photo: Transplanting

# Criss cross Weeder Use

02.08.2005





SRI technology in hybrid rice  
(Use of rotary weeder)

25/08/2006

**10 day old seedling: 30  
days after transplanting**



06/09/2006





**variety, Yunnan, 2004 – 18 t  
ha<sup>-1</sup>**



# Plastic Drum Seeder for direct seeding in wetland rice





# Plastic Drum Seeder for seeding sprouted seeds



# PLASTIC DRUM SEEDER



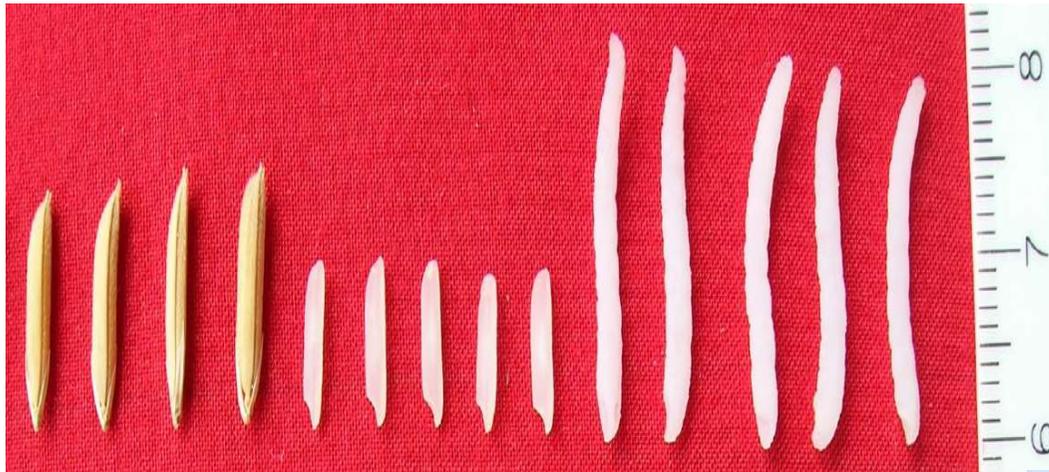
# SUBABOOL : in Alley Cropping with Upland rice & other crops



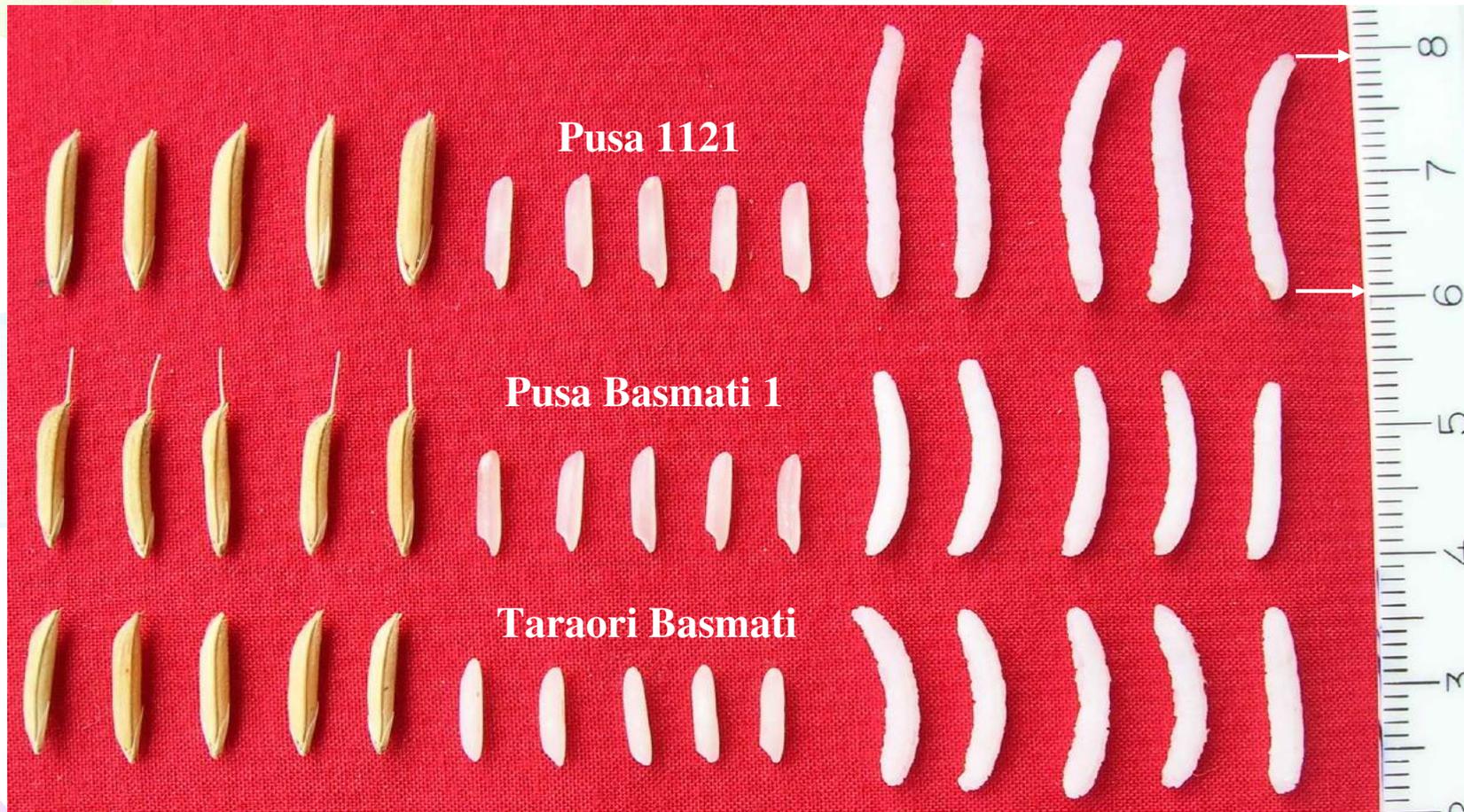
## Basmati Rice Export from India

Year	Basmati	
	Quantity (Million tons)	Value (Rs. millions)
1990-91	0.23	2,940
1995-96	0.37	8,500
2000-01	0.84	21,480
2005-06	1.16	30,300
2006-07	1.04	27,920
2007-08	1.18	43,440

# Pusa Suandh 4 (Pusa 1121)



**Pusa 1121 covered >60% of Basmati rice area during *Kharif* 2007**

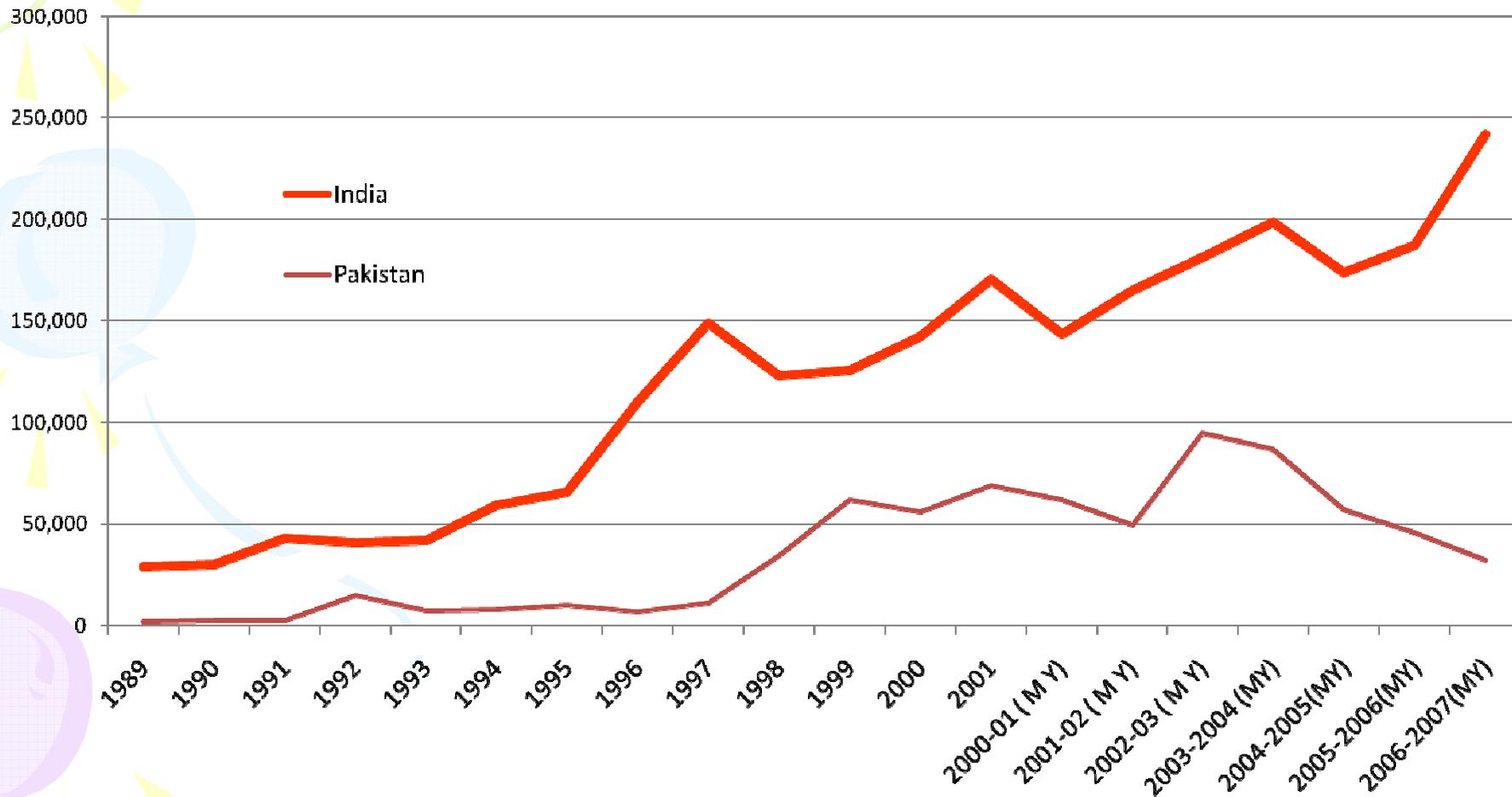


**Pusa 1121 sales \$ 100/ton more than Taraori Basmati in the International market: Current price \$ 1800/ton**

## Basmati Rice Export from India

Year	Basmati	
	Quantity (Million tons)	Value (Rs. In millions)
1990-91	0.23	2,940
1995-96	0.37	8,500
2000-01	0.84	21,480
2005-06	1.16	30,300
2006-07	1.04	27,920
2007-08	1.18	43,440

# Basmati Exports to the EU-India and Pakistan



# Area and total production and quality traits of Aromatic Short grain Rices

No concrete information on the exact area cultivation under aromatic short grain rice. The aromatic short grain rices grown in small pockets practically in every state of India. It is estimated about 1 percent of total rice area.

Varieties/landraces	Adapted area	Estimated area (acre)	Average yield (q/acre)	Expected Total Production (ton)	Plant height (cm)	Durati(days)			
<b>UTTAR PRADESH</b>									
Kalanamk	Siddharthnagar, Basti, Maharajganj, Gonda, Balrampur, Gorakpur, Santkabir nagar, Mau	70,000	6.00	42,0000	155-160	160-165			
<b>Quality traits</b>									
Hulling	Milling	HRR	KL	KB	L/B	KLAC	KBAC	ER	Aroma
76.40	65.32	62.0	4.47	2.00	2.24	10.0	2.87	2.42	3





**Tilakchandani 3047**



**Bindli 3133-2**







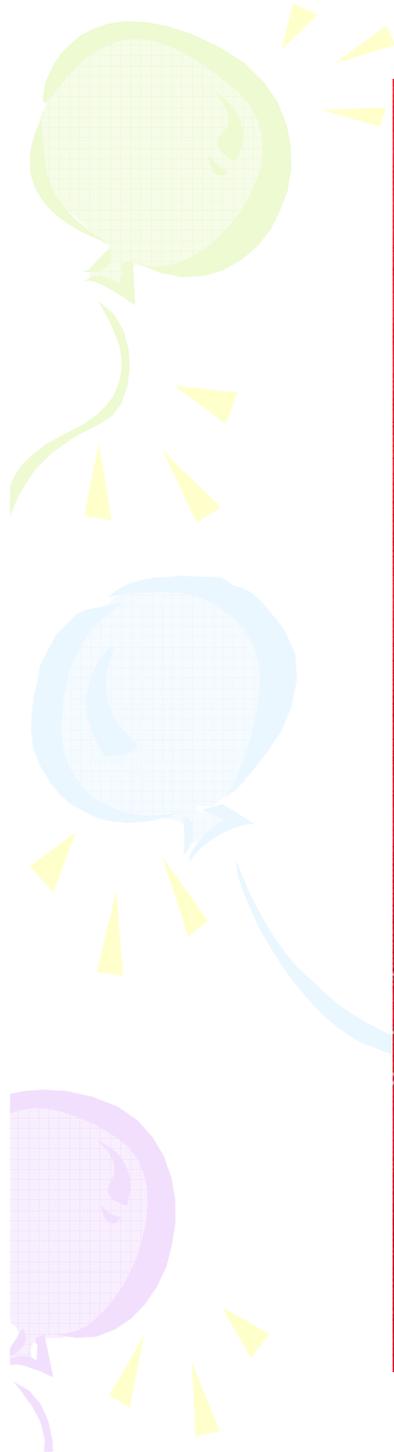
**Govind Bhog**

**Badshah Bhog**



**Tulsi Panji**

**Randhuni Pagal**



**Aanandi**

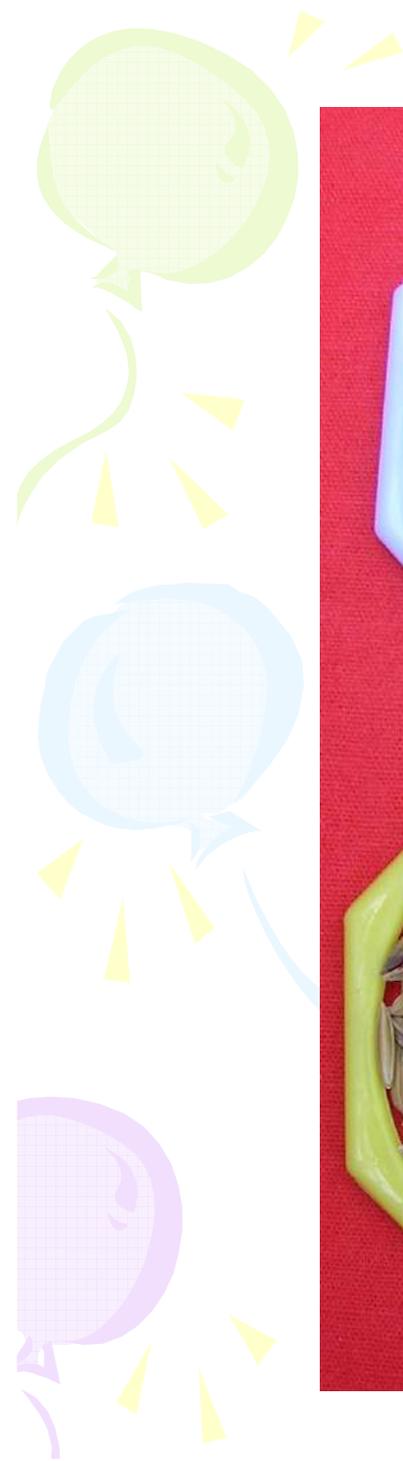
**Badsah Bhog**



**Kanak Choor**

**Dubraj**

03.25.2009



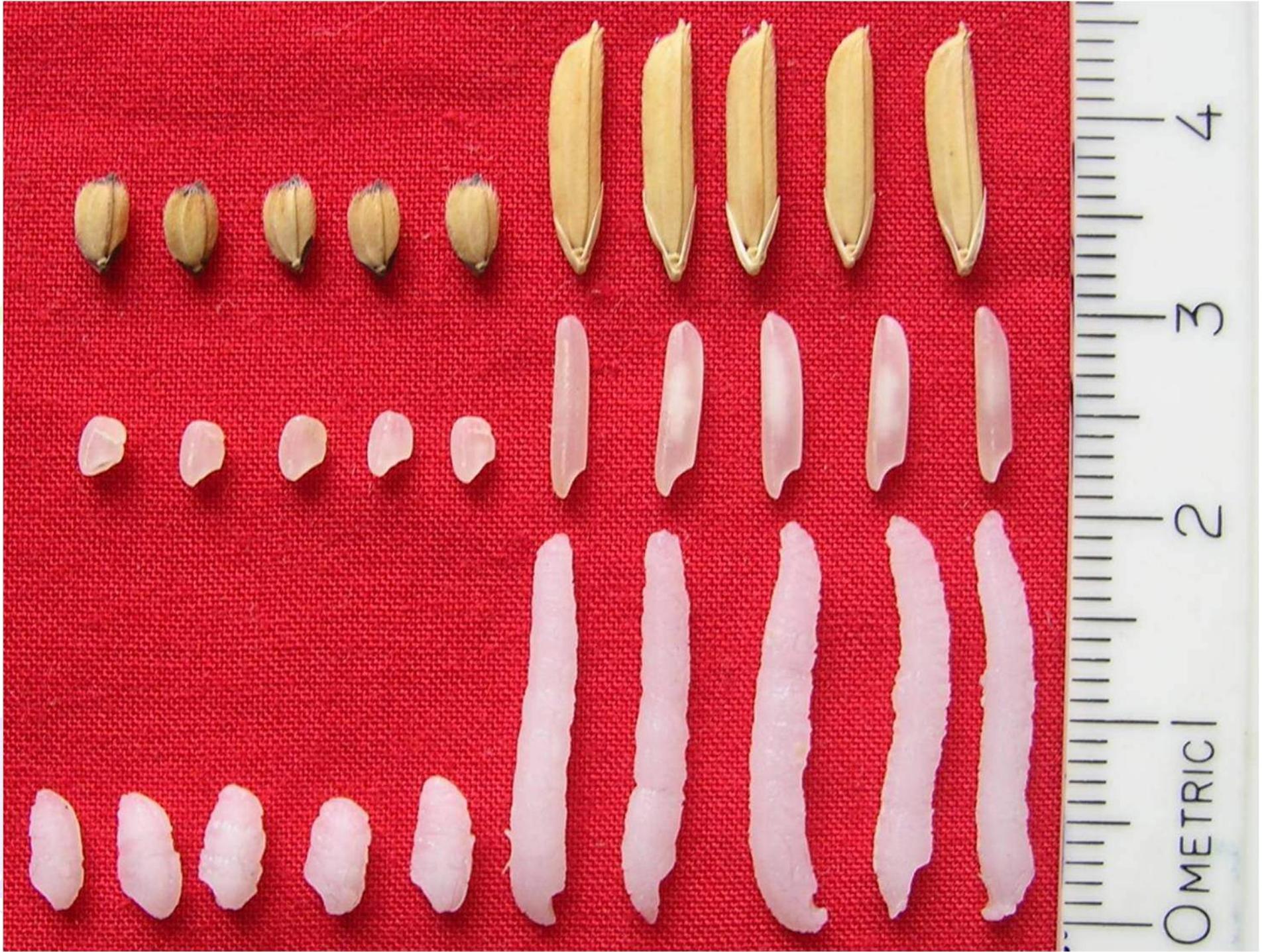
**Champan Basmati**

**Katarni**



**Kala Jeera**

**Mircha**



# Comparative features of basmati and non-basmati scented rice

Characteristics features	Basmati type *	Non-basmati scented rice **
Kernel Length (L)	6.4-7.6	5.4-5.7
L/B ratio	3.5-4.2	3.3-3.35
Lc-Lu/Bc-Bu	8.8-10.6	2.8-4.6
Lc/Bc	4.9-5.6	2.95-3.8
Lc/Lu	1.70-1.83	1.40-1.57
Bc/Bu	1.26-1.33	1.31-1.61

• *Basmati culture: Basmati /Basmati Punjab, Basmati (raw milled)*

*\*\*Non-basmati Scented: Champaran basmati*

**Lc : Length of kernel after cooking**

**Lu : Length of kernel before cooking**

**Bc : Breadth of kernel after cooking**

**Bu : Breadth of kernel before cooking**

# Birsamati: Semidwarf scented variety from Jharkhand





# Birsa Vikas Sugandha 2

## Scented lowland rice





# Basmati: The Existing Definition

**Basmati**



**Traditional  
Basmati**

**Traditional Basmati shall mean land races or varieties of rice of uniform shape, size and colour traditionally recognized as Basmati**

**Evolved  
Basmati**

**Evolved Basmati shall mean a variety whose one parent is a traditional variety and which has been recognized as a Basmati variety under the applicable law**



# Reaper for harvesting rice & Wheat



# Paddy Harvesting by Reaper



# Harvested Paddy Field



# Water harvesting for rainfed rice cultivation





# Conclusions

- Rich genetic diversity in terms of wild rice, land races, traditional varieties , and improved varieties exists in the South Asia region.
- Need to develop better cultivation practices for increased production and reduced human drudgery
- Pusa 1121 as best Basmati rice developed
- Sustainable rice production for future rice farmers and consumers.



Thank You





*Thanks to IRMM  
for their Kind invitation*