Dissemination of Hybrid Rice Seed Production Technology

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Hybrid rice history & current activities in Myanmar
Hybrid rice production was conducted for domestic food security due to insufficient cultivated areas, high population.

Hybrid rice cultivation was started in 1974, from 1976 to 1999 total area of hybrid rice cultivation was (233) million hectors and produced more than (350) million tons.

The news of Hybrid rice scientist Professor Yuan Longping tested Super Hybrid rice DH2525 (Y two superior No.2) in Hunan province, China produced 13.9 tons/hacter (280 baskets/acre) published in 20-9-2011 China Daily Newspaper.

<table>
<thead>
<tr>
<th>HYBRID RICE</th>
<th>CHINA</th>
<th>INDIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acreage</td>
<td>18.6 million ha (60%)</td>
<td>1.4 million ha (3%)</td>
</tr>
<tr>
<td>Irrigated area</td>
<td>90%</td>
<td>52%</td>
</tr>
<tr>
<td>1st hybrid released</td>
<td>1976</td>
<td>1994</td>
</tr>
</tbody>
</table>

Refer:  - [http://www.hybridriceindia.org.china.htm](http://www.hybridriceindia.org.china.htm)
IRRI Annual Report (2009)
It is aimed to breed super hybrid rice varieties that can yield 15 tons/ha (300 basket per acres) in year 2020.

China hybrid rice cultivated areas is 18 millions hacter whilst world hybrid rice cultivated area is 20 million hacters.

The main theme of successful story of hybrid rice in China is Political Will.

(Systematically research and development, Enhancing Private sectors role, demonstration, practicing and provide awards)

Refer: - http://www.hybridriceindia.org.china.htm
IRRI Annual Report (2009)
Hybrid Rice Production in Asian countries

Vietnam- In 1991, hybrid rice cultivated areas was 100 ha, in 2001 it was extended to 480000 ha. China export volume of hybrid rice is 7 millions tons per year.

Indonesia- In 2003, hybrid rice cultivated areas was 0.2 million ha, in 2007 it was extended to 0.3 million ha.

Philippines- In 2002, hybrid rice cultivated areas was 135 ha, in 2007 it was extended to 0.3 million ha.

Sri Lanka- In 1994, hybrid rice research experiments to in 2008 cultivated areas was extended to 160 ha.

India- Hybrid rice cultivation was started in 1989. And total rice cultivated area was 45 million ha, out of this hybrid rice cultivated areas was 0.2 million ha, Hybrid seed production is 4000 tons per year, 95% of it produced by private sectors.

Korea, Russia, Japan, Iran and Bangladesh countries produce hybrid rice seeds production as well.

Refer: Hybrid Rice Achievement and Development in Asia (1998-2007)
International hybrid rice development

- American, Egypt and North Africa countries (China Investments)
- In Asian Countries such as China, India, Thailand, Vietnam, Indonesia, Cambodia, Philippines, Laos, Sri Lanka, Pakistan, Bangladesh are drastically developing hybrid seed production and technology development research.

Pollination by human in China

Hybrid seed production in China

Hybrid seed production in America

Pollination by Helicopter
Currently, Thailand produces 150 basket/acre quality hybrid rice "PTT 06001H" and attempt to export more than 15% in 2015

Hybrid Rice Development Consortium (HRDC) was organized by International Rice Research Institute (IRRI).

Myanmar is one of the member countries of HRDC.
Successful production and marketable Hybrid rice and high yielding varieties in farmers communities, Philippines

Mobile Internet Bus in Philippines

Mobile Internet Bus

equipped with 10 notebook computers with Wi-Fi, TV, VCD, LCD, public address system and 2-way VHF speakers.
Myanmar and Hybrid rice production

- Myanmar and hybrid rice production are familiar for 2 decades
- From 2003 to up to now, farmers from Northern Shan state grow hybrid rice successfully
- Conducting the seed industry development for hybrid rice
- At present, new government laid down the guide line to produce 100 acres hybrid seed production in each region

10 days after seeding (Shwe Taung Farm)

Seed bed was covered by cow dung and compost
Objectives;

(a) To changing Hybrid rice varieties, enhancing yield per acres and increasing farmers’ income

(b) To distribute hybrid rice seed production technology to farmers and Agriculture production companies and to support for the formation of the private seed production companies.

(c) To provide access to purchase Hybrid seed in cheap price by farmers by extension of the hybrid seed production in Myanmar

(d) To extend hybrid rice growing areas, for getting the domestic food security and increase foreign income by exporting.
By the development of hybrid rice seed production

- save the seed per acre, increase yield 2-3 times, farmers get cost-effective
- Increased employment opportunities
- Rise of technology based new professional jobs
- Can earn foreign income by hybrid rice production through domestic food surplus, and export to other countries
- Increase involvement and investment by private sector
- Development of hybrid rice, its related technologies and agri-business
- Emerging new era of Myanmar Rice Sector
Hybrid rice can overcome agricultural resources limitation

Hybrid rice production system development is historical obligations

Investment in Hybrid rice production system development provides high return of investment.

If hybrid rice production technologies can be distributed to the farmers’ hands, it will be easy and quick adoptable agricultural production methods.
Climate change, affect food security

Myanma Rice Production was affected by Cyclone Nargis in 2008

In 2010, Giri Cyclone affected food security

Hybrid rice can support to emergency rice
## Hybrid Seed Production from 2011-2016

<table>
<thead>
<tr>
<th>No</th>
<th>Year</th>
<th>Seed Production Area (Acre)</th>
<th>Yield (Kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Department</td>
<td>Farmers</td>
</tr>
<tr>
<td>1</td>
<td>2011-2012</td>
<td></td>
<td>498</td>
</tr>
<tr>
<td></td>
<td>Wet Season</td>
<td></td>
<td>180</td>
</tr>
<tr>
<td></td>
<td>Dry Season</td>
<td></td>
<td>318</td>
</tr>
<tr>
<td>2</td>
<td>2012-2013</td>
<td>1206</td>
<td>631</td>
</tr>
<tr>
<td></td>
<td>Wet Season</td>
<td>595</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>Dry Season</td>
<td>611</td>
<td>586</td>
</tr>
<tr>
<td>3</td>
<td>2013-2014</td>
<td>762</td>
<td>550</td>
</tr>
<tr>
<td></td>
<td>Wet Season</td>
<td>532</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Dry Season</td>
<td>230</td>
<td>530</td>
</tr>
<tr>
<td>4</td>
<td>2014-2015</td>
<td>367</td>
<td>1787</td>
</tr>
<tr>
<td></td>
<td>Wet Season</td>
<td>230</td>
<td>660.0</td>
</tr>
<tr>
<td></td>
<td>Dry Season</td>
<td>137</td>
<td>1126.5</td>
</tr>
<tr>
<td>5</td>
<td>2015-2016</td>
<td>100</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>Wet Season</td>
<td>41</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>Dry Season (Planned)</td>
<td>59</td>
<td>40</td>
</tr>
</tbody>
</table>
# The situation of Scientists of Palethwe Hybrid Rice Seed Production according to the state and region from 2011-12 to 2015-16

<table>
<thead>
<tr>
<th>No.</th>
<th>State &amp; Region</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Head Quarter/Extension</td>
<td>16</td>
<td>51</td>
<td>67</td>
</tr>
<tr>
<td>2.</td>
<td>Nay Pyi Taw</td>
<td>32</td>
<td>38</td>
<td>70</td>
</tr>
<tr>
<td>3.</td>
<td>Kachine</td>
<td>4</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>4.</td>
<td>Kayah</td>
<td>5</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td>5.</td>
<td>Kayin</td>
<td>3</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>6.</td>
<td>Chin</td>
<td>5</td>
<td>-</td>
<td>5</td>
</tr>
<tr>
<td>7.</td>
<td>Sagaing</td>
<td>12</td>
<td>22</td>
<td>34</td>
</tr>
<tr>
<td>8.</td>
<td>Taningthari</td>
<td>6</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>9.</td>
<td>Bago</td>
<td>32</td>
<td>18</td>
<td>50</td>
</tr>
<tr>
<td>10.</td>
<td>Magwe</td>
<td>15</td>
<td>15</td>
<td>30</td>
</tr>
<tr>
<td>11.</td>
<td>Mandalay</td>
<td>50</td>
<td>37</td>
<td>87</td>
</tr>
<tr>
<td>12.</td>
<td>Mon</td>
<td>9</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>13.</td>
<td>Rakhine</td>
<td>5</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>14.</td>
<td>Yangon</td>
<td>4</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>15.</td>
<td>Shan</td>
<td>16</td>
<td>18</td>
<td>34</td>
</tr>
<tr>
<td>16.</td>
<td>Ayeyarwaddy</td>
<td>12</td>
<td>9</td>
<td>21</td>
</tr>
<tr>
<td>17.</td>
<td>DAR</td>
<td>4</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>230</strong></td>
<td><strong>238</strong></td>
<td><strong>468</strong></td>
</tr>
</tbody>
</table>
Hybrid Rice Seed Production Technology
## Hybrid rice Breeding

<table>
<thead>
<tr>
<th>Hybrid Breeding</th>
<th>Inbred Breeding (OPV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(3- Line Hybrid, A,B,R)</td>
<td>- Indigenous selection</td>
</tr>
<tr>
<td>(2- Line Hybrid, S,R)</td>
<td>- Introduction selection</td>
</tr>
<tr>
<td>(1- Line Hybrid, Apomixis)</td>
<td>- Hybridization selection</td>
</tr>
<tr>
<td></td>
<td>- Mutation breeding and selection</td>
</tr>
<tr>
<td></td>
<td>- Tissue culture breeding selection</td>
</tr>
<tr>
<td></td>
<td>- Molecular breeding (DOA)</td>
</tr>
</tbody>
</table>
Hybrid rice seed production technology

- Hybrid rice is the commercial rice crop grown from F1 seeds of a cross between two genetically dissimilar parents.

- Good rice hybrids have the potential of yielding 20-30% more than the best inbred variety grown under similar conditions.

- Why hybrid rice provide increased in yield, because of Heterosis or Hybrid Vigor
Procedure of Hybrid seed production

\[ A \times B \]

\[ A \times R \]

\[ F_1 \]

\( A = \) Cytoplasmic genetic male sterility

\( B = \) Maintainer line

\( R = \) Restorer line

\( F_1 = \) hybrid

Male (2) rows, female (12) rows cultivation

R line and A line, for synchronization of flowering time, R lines (R1, R2) one week interval sowing at 2 difference times
Treatments on synchronization of R line and A line flowering time

(1) date of sowing time depend on R line and A line flowering time

(2) 2-3 times of sowing in R line

(3) synchronization on irrigation and drainage

(4) delay of flowering time by applying urea fertilizer

(5) earlier flowering time by applying of T-super and Potash

(6) Applying hormone

(7) examine on growth development and EPI stage
Flowering Time Synchronization Methods

- Growth Duration Method
- Leaf Number Method
- Effective Accumulated Temperature
Procedure of hybrid rice seed production

- Site selection for hybrid seed production
- Seed sowing
- Fertilizer application on nursery bed
- A: R ratio & cultivation system
- Fertilizer application
- Irrigation and drainage
- Examine on EPI stage
- Flag leaf Clipping
- GA3 application
- Supplementary pollination
- Rouging
- Harvesting
3 parts of Hybrid Rice Technology

1) Breeding of A,B,R Lines and F1 (Breeding Work)

2) F1 seed Production (Seed Production Work)

3) Distribution of F1 Seed and Cultivation (Marketing / Extension Work)
Hybrid rice technology is a kind of Seed Business

- Seed Grantee
- Low cost/more profit
- Quality Control
- Customer Preference/Marketable
## Cost of cultivation and benefit

**Cost of cultivation**
- Parental line cost (A+R) - 0.3 Million
- Input cost - 0.6 M
- Machine/ labour cost - 0.45 M
- cleaning and packaging cost - 0.15 M
- Total cost - 0.15 M

**Yield per acre &Income**
- Yield per acre (Average) - 1000 kg
- price of 1 kg - 3000 ks
- Income - 0.30 M

**Benefit Per Acre** - 0.15 M
Expansion of Hybrid Rice Production Technology

- **Establishment of Own Parental Lines**
  - One combination of A, B, R lines
  - Cross and select 8-10 seasons
  - Attain genetically stable lines
  - Test, produce and expand the HR
  - It can take 8-10 years to get acceptable parental lines

- **F1 Seed Production**
  - Produce seed of market acceptable parental lines
  - Governmental staffs should learn and practice hybrid seed production to be seed production specialists
  - Disseminate the hybrid rice seed production technology and produce HR seed in collaboration with farmers and private seed companies
Expansion of Hybrid Rice Production Technology

- **F1 Hybrid Production**
  - Demonstrate by model farms, training and field discussion to be in line with GAP 14 facts in the adoption of hybrid rice production technology
  - Educate and train the farmers to be familiar with F1 production technology
  - Initiate the contract farming with farmers, millers, brokers and retailers
  - Demonstrate the pre harvest and post harvest technologies for getting market acceptance and high price
  - Sustain the hybrid rice production technology
Hybrid Rice Seed Producing Private Companies and Future Prospects

- Myanmar New Ayar Co. LTD.
- Great Wall Co. LTD.
- Nine Sea Seed Co. LTD.
ဂရိတ်ဝေါကုမ္ပဏီလီမိတက ပုလဲသွယ်စပ်မျိုးစပါး (GW1) ပြည်နယ်ဒေသတွင်;

GREAT WALL & WIN-ALL HI-TECH SEED CO., LTD

GW-1

ကုမ္ပဏီနှင့် ဝေါက်ပေါ်စိုက်ပျိုး;

08.11.2014
ပင်လယ်ကိုးသွယ်မျိုးဝစ့ထုတ်ကုမ္ပဏီ ပုလဲသွယ်စပ်မျိုးစပါးမျိုးဝစ့ထုတ်စိုက်ခင်း
Thank You Very Much