Profitable Technologies for Rice Cultivation

ICAR-National Rice Research Institute, Cuttack
Hybrid Rice Seed Production

Ajay –

- This hybrid is medium statured (110 cm), non-lodging with moderate tillering habit and high spikelet fertility (>85%).
- It has non-shattering habit with long slender, non-aromatic translucent grains with good milling (62% HRR), cooking and eating qualities.
- The hybrid matures in 125-130 days and has a yield potential of 6.5 tons (Kharif) to 7.5 tons (rabi) per hectare.
Hybrid Rice Seed Production

Rajalaxmi

- This medium statured (110cm), non-lodging hybrid has moderate tillering habit with high spikelet fertility (>87%).
- The panicles are long with high grain numbers and are of non-shattering type.
- The hybrid has long slender, non-aromatic translucent grains with good milling (60% HRR), cooking and eating qualities.
- The hybrid matures in 125-130 days and has a yield potential of 6.0 tons (Kharif) to 7.0 tons (rabi) per hectare.
Hybrid Rice Seed Production

CR Dhan 701

- This hybrid is suitable for cultivation in irrigated and Shallow lowland areas of Odisha in both *kharif* and *rabi* season.
- It has maturity duration of **142 days**, plant height of **120 cm**, medium slender grain and
- It has average grain yield capacity of **6.0 t/ha.**
Entrepreneurial Opportunity

- creates additional job opportunity (requires 100-105 more man days) and
- more net income (around Rs. 75000/ha net income, 70% more than the unit production cost) as compared to seed production of HYV (Rs. 13000/ha, only 18% more than production cost).
- Based on market price, gross income value of the unit area production of hybrid seed would be approximately triple (market price @ Rs. 250-270/ kg). Price of seed is the price given to the farmer which is only Rs. 80-90/kg.
### Production function analysis of hybrid rice seed

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity/Number (per hectare)</th>
<th>Input per hectare</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Hybrid seed</td>
</tr>
<tr>
<td>Seed cost</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male line</td>
<td>5 kg @ Rs. 50/kg</td>
<td>250</td>
</tr>
<tr>
<td>Female line</td>
<td>15 kg @ Rs.200/kg</td>
<td>3,000</td>
</tr>
<tr>
<td>Labour cost</td>
<td>250/145 @ Rs. 200/labour/day</td>
<td>50,000</td>
</tr>
<tr>
<td>FYM and fertilizer cost</td>
<td>N:P:K (100:50:50) (based on market price)</td>
<td>5,400</td>
</tr>
<tr>
<td>Irrigation</td>
<td>18-20 Irrigation (weekly) (@1500/irri./ha)</td>
<td>30,000</td>
</tr>
<tr>
<td>Gibberellic acid</td>
<td></td>
<td>2,000</td>
</tr>
<tr>
<td>Misc items</td>
<td></td>
<td>15,000</td>
</tr>
<tr>
<td><strong>Total cost</strong></td>
<td></td>
<td>1,05,650</td>
</tr>
<tr>
<td>Average production (t/ha)</td>
<td></td>
<td>2.0</td>
</tr>
<tr>
<td>Gross income</td>
<td>*Price @ Rs. 90/kg for hybrid and Rs. 20/kg for HYV</td>
<td>1,80,000</td>
</tr>
<tr>
<td><strong>Net income</strong></td>
<td></td>
<td>74,350</td>
</tr>
</tbody>
</table>
Protein Rice - CR Dhan 310

- A high-protein rice variety, CR Dhan 310 has been released by CVRC as the first high-protein rice variety in the country.
- Average grain yield of 4.5 t/ha and
- Protein content of 10.2%.
- This has been developed through introgression of high protein content in a popular high yielding variety ‘Naveen’.
- The variety is suitable for irrigated ecosystem in both wet and dry seasons.
- High protein lines in ‘Swarna (MTU 7029)’ background have also been developed and are being evaluated.
## Drought Resistant Varieties

<table>
<thead>
<tr>
<th>Variety Name</th>
<th>Year of Release</th>
<th>CVRC/SVRC</th>
<th>Duration</th>
<th>Grain Type</th>
<th>Yield t/ha</th>
<th>Resistance/ Tolerance to disease and pest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satyabhama</td>
<td>2012</td>
<td>Odisha</td>
<td>110</td>
<td>MS</td>
<td>2.3 - 4.7</td>
<td>R-SB, LF</td>
</tr>
<tr>
<td>Ankit</td>
<td>2014</td>
<td>Odisha</td>
<td>110</td>
<td>MS</td>
<td>3.98</td>
<td>MR-LB, NB, BS, ShR, SB, LF, GLH</td>
</tr>
<tr>
<td>Sahbhagidhan</td>
<td>2009</td>
<td>CVRC (Orissa and Jharkhand)</td>
<td>105</td>
<td>LB</td>
<td>3.5-4</td>
<td>Tolerant to drought. R-LBl, MR-BS, ShR, SB and LF</td>
</tr>
</tbody>
</table>

- **Satyabhama**
  - Year of Release: 2012
  - CVRC/SVRC: Odisha
  - Duration: 110
  - Grain Type: MS
  - Yield: 2.3 - 4.7 t/ha
  - Resistance/Tolerance: R-SB, LF

- **Ankit**
  - Year of Release: 2014
  - CVRC/SVRC: Odisha
  - Duration: 110
  - Grain Type: MS
  - Yield: 3.98 t/ha
  - Resistance/Tolerance: MR-LB, NB, BS, ShR, SB, LF, GLH

- **Sahbhagidhan**
  - Year of Release: 2009
  - CVRC/SVRC: Odisha (Orissa and Jharkhand)
  - Duration: 105
  - Grain Type: LB
  - Yield: 3.5-4 t/ha
  - Resistance/Tolerance: Tolerant to drought. R-LBl, MR-BS, ShR, SB and LF
## Aerobic Rice

<table>
<thead>
<tr>
<th>Variety Name</th>
<th>Year of Release</th>
<th>CVRC/SVRC</th>
<th>Duration</th>
<th>Grain Type</th>
<th>Yield t/ha</th>
<th>Resistance/ Tolerance to disease and pest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pyari</td>
<td>2012</td>
<td>Odisha</td>
<td>115-120</td>
<td>SB</td>
<td>4.5</td>
<td>MR-BL, NBL, BS, SB, GM and LF</td>
</tr>
<tr>
<td>CR Dhan 201</td>
<td>2014</td>
<td>Chhattisgarh and Bihar</td>
<td>118</td>
<td>LS</td>
<td>3.8-4.0</td>
<td>MR-LB, ShR, SB, LF, WM</td>
</tr>
<tr>
<td>CR Dhan 202</td>
<td>2014</td>
<td>Jharkhand and Odisha</td>
<td>115</td>
<td>LB</td>
<td>3.7-4.5</td>
<td>MR- LB, BS, ShR, SB, LF, WM</td>
</tr>
<tr>
<td>CR Dhan 204</td>
<td>2014</td>
<td>Jharkhand and Tamil Nadu</td>
<td>120</td>
<td>LB</td>
<td>4.2</td>
<td>MR-BL, and good grain quality</td>
</tr>
<tr>
<td>CR Dhan 205</td>
<td>2014</td>
<td>Tamil Nadu, Gujarat, Odisha, MP, Punjab</td>
<td>110</td>
<td>SB</td>
<td>3.7-4.5</td>
<td>MR-LB, BS, ShR, SB, LF</td>
</tr>
<tr>
<td>Sachala</td>
<td>2014</td>
<td>Odisha</td>
<td>110</td>
<td>LS</td>
<td>4.05</td>
<td>MR-LB, BS, ShR, SB, LF</td>
</tr>
<tr>
<td>Gopinath</td>
<td>2014</td>
<td>Odisha</td>
<td>115</td>
<td>SB</td>
<td>3.95</td>
<td>MR-LB, BS, ShR, SB, LF</td>
</tr>
</tbody>
</table>
Aerobic Rice
<table>
<thead>
<tr>
<th>Variety Name</th>
<th>Year of Release</th>
<th>CVRC/SVRC</th>
<th>Duration</th>
<th>Grain Type</th>
<th>Yield t/ha</th>
<th>Resistance/ Tolerance to disease and pest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Varshadhan</td>
<td>2006</td>
<td>Orissa</td>
<td>160</td>
<td>LB</td>
<td>3.5-4.0</td>
<td>stiff straw for water logging situation ,MR-NBL, BLB, ShR,</td>
</tr>
<tr>
<td>Swarna Sub1</td>
<td>2009</td>
<td>Orissa</td>
<td>145</td>
<td>MS</td>
<td>5.2</td>
<td>Tolerant to complete submergence between 15-17 days</td>
</tr>
<tr>
<td>CR Dhan 500</td>
<td>2011</td>
<td>Odisha &amp; UP</td>
<td>160</td>
<td>MS</td>
<td>3.5</td>
<td>MS; MR- BL , NBL, BS, GM 1&amp;5, SB, R- LF</td>
</tr>
<tr>
<td>Jalamani</td>
<td>2012</td>
<td>Odisha</td>
<td>160</td>
<td>MS</td>
<td>4.6</td>
<td>MS; tall, . MR- LF, GLH, BL, NBL, BS, GM, SB</td>
</tr>
<tr>
<td>Jayanti Dhan</td>
<td>2012</td>
<td>Odisha</td>
<td>160</td>
<td>MS</td>
<td>4.6</td>
<td>MS; MR- BL, NBL , ShB, SHR, RTV and GM1 R- SB, LF</td>
</tr>
<tr>
<td>CR Dhan 505</td>
<td>2014</td>
<td>Odisha and Assam</td>
<td>162</td>
<td>MS</td>
<td>4.5</td>
<td>submergence tolerance, elongation ability.</td>
</tr>
</tbody>
</table>
Submergence tolerant

- **SWARNA Sub1**
- **VARSHA Dhan**
- **CR Dhan 502 Jayantidhan**
- **Jalamani**
## Salinity tolerant

<table>
<thead>
<tr>
<th>Variety Name</th>
<th>Year of Release</th>
<th>CVRC/SVRC</th>
<th>Duration</th>
<th>Grain Type</th>
<th>Yield t/ha</th>
<th>Resistance/ Tolerance to disease and pest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Luna Suvarna</td>
<td>2010</td>
<td>Orissa</td>
<td>150</td>
<td>MS</td>
<td>3.5-4.0</td>
<td>MS; 135 cm, R- BL, Tolerant- SB, BPH and LF,</td>
</tr>
<tr>
<td>Luna Sampad</td>
<td>2010</td>
<td>Orissa</td>
<td>140</td>
<td>SB</td>
<td>3.6-4.2</td>
<td>R- Blast, Tolerant-SB, BPH, LF</td>
</tr>
<tr>
<td>Luna Barial</td>
<td>2012</td>
<td>Odisha</td>
<td>150</td>
<td>SB</td>
<td>4.1</td>
<td>120 cm, MR-BL, LF and ShB</td>
</tr>
<tr>
<td>Luna Sankhi</td>
<td>2012</td>
<td>Odisha</td>
<td>110</td>
<td>MS</td>
<td>4.6</td>
<td>MR-BL and ShB</td>
</tr>
</tbody>
</table>
Salinity tolerant

Luna Sankhi

Luna Suvarna
CR2096-71-2
IET 18697

Luna Barial (CR Dhan 406)
IET 19472
Integrated Rice-Fish farming systems

- Entrepreneurial Modules for Commercial (50 acre), and Small (0.5 acre) models.
- The total costs of these projects are Rs 43,99,967 and Rs. 1,43,180, respectively.
- The total working capital requirements are Rs. 12,20,578 and Rs. 71,020, respectively.
- In case of commercial model, BEP is achieved in third year while it is achieved in first year itself in case of small model.
Integrated Rice-Fish farming systems
NRRI Agricultural Implements – Manufacturing

- Manufacturing of CRRI Engineering Implements has biggest opportunity for agripreneurs.
- As rice requires about 800-900 labour hours for cultivating one hectare of land.
- Increase in demand for farm mechanization has led to innovative and cost effective agricultural implements production for the farmer’s field.
NRRI Agricultural Implements – Manufacturing

Entrepreneurial Opportunity

- A model manufacturing unit of CRRI engineering implements would cost around Rs. 4,62,236 and monthly working capital requirement is Rs. 1,36,549.
- At 70% production capacity the net profit would be Rs.9,92,603.
- Low cost technology transfer for cost effective production.
- The breakeven point is achieved at the production of 491 items within 1st year of production.
- MSME support can be availed for setting up the manufacturing unit.
NRRI Agricultural Implements – Manufacturing

Salient Features
- CRRI developed farm implements are cost effective.
- Can be operationalised for small holdings
- R&D support can be provided as & when required.
- Better management and maintenance of agricultural implements is possible.
- Various subsidies are available for farmers to purchase the implements.
- It increases production and productivity of the cultivators.
- It helps in maintaining timeliness of operations.
- It helps in maintaining environmental sustainability.
NRRI Agricultural Implements – Custom Hiring

- Custom Hiring is an entrepreneurial activity by which an entrepreneur sells his services as per requirement of the cultivators.
- This activity plays a pivotal role in introducing costly agriculture technologies like agricultural implements to ordinary farmers with an objective to boost crop production & improve quality of agricultural operations.
- This is a highly profitable venture as demand for this is growing rapidly due to short supply of manual labour.
NRRI Agricultural Implements – Custom Hiring

Entrepreneurial Opportunity

- A model custom hiring unit can be set up with implements like tractor (42HP) with attachments (2 set), Power Tiller (4 nos), Tiller (2 nos), Cagewheel (2 set), trolley (2 nos), Conoweeeder (10 nos), Power Thresher (4 nos), Combine (1 unit) and 3HP Water Pumps with accessories (4 nos) with a total project cost of Rs. 43, 67, 280.

- Gross income from hiring of the implements mentioned above will be Rs. 31, 60, 200 per year with a net profit of Rs. 13, 25, 525 after repaying loan installments.

- Mechanization brings higher benefit to cost ratio to the farmers.

- Govt. subsidies up to 50% are available in selected agricultural implements.

- Break Even point of the hiring unit is achieved in between 2nd and 3rd year of operation.

- The concept of agricultural mechanization is dynamic and situation specific.
NRRI Agricultural Implements – Custom Hiring

Salient Features

- It reduces the total time, input & labour in production.
- The custom hiring can reduce about 20% of the labour cost.
- There is a noticeable drudgery reduction.
- Better management and maintenance of agricultural implements is possible.
- It increases production and productivity of the cultivators.
- It helps in maintaining timeliness of operations.
- It helps in maintaining environmental sustainability.
Customized Leaf Colour Chart (CLCC)

- A five panel customized leaf colour chart (CLCC) for N management in rice for different ecologies is developed on the basis of spectral evaluation of leaves of hundreds of HYVs and local cultivars grown in eastern India under different levels of N applications.
- It is a cheap and easy to use handy tool provided with a folder having N application schedule.
- By using this, farmers can adjust the N application to actual crop demand, achieve higher yields.
- The instructions of CLCC are available in English, Hindi and Odia in simple language which can be easily followed by the farmers.
Entrepreneurial Opportunity

- The CLCC is commercialized and an MoU was signed with M/S Nitrogen Parameters, Chennai for manufacturing and distributing the CLCC. The company has received about 50,000 orders from the IRRI, state government of Odisha and several ICAR Institutions of Odisha, WB and AP.
- CLCC is sold @ Rs 110 per CLCC. Based on the sales for the year 2013-14, Rs 2,55,096 was paid to NRRI as royalty by Nitrogen Parameters.
Thank You