



Progress in Breeding of Super Hybrid Rice

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Super Rice Breeding Program

Yield standard of the Super Rice in China

| Phase | Hybrid Rice | | | Yield increase |
|-----------------------|---------------------|--------------------|--------------------|----------------|
| | Early season indica | Single season rice | Late season indica | |
| Present level | 7.50 | 8.25 | 7.50 | 0 |
| Phase I 1996-2000 | 9.75 | 10.50 | 9.75 | over 20% |
| Phase II 2001-2005 | 11.25 | 12.00 | 11.25 | over 40% |

* Tons/ha at 2 locations with 6.7 ha each in 2 consecutive years.

P64S/9311



P64S/9311



P64S/E32 created a record yield of 17.1 t/ha in 1999





**Phase III Program
(2006-2015)**

Yield target: 13.5 t/ha



A slide with a logo on the left, text in the center, and a small image of rice panicles on the right.



Technical Approaches

- A . Morphological improvement
- B . Raising heterosis level
- c . By means of biotechnology



A. Morphological Improvement

Plant type of Super Hybrid Rice

- Tall erect-leaf canopy
- Lower panicle position
- Bigger panicle size



Height of canopy:
1.2 m
above



Upper
3 leaves:
long,
erect,
narrow,
V-shape
and
thick

Long-----to increase leaf area
Erect-----to intercept solar radiation from
both sides

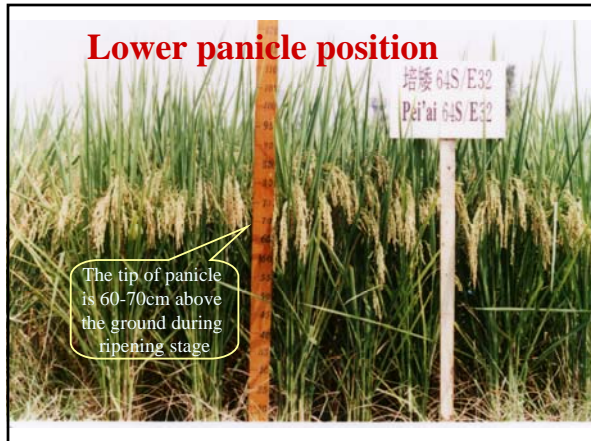
Narrow---to occupy less space, with higher LAI
V-shape--making leaf blade stiffer,
so not prone to droopy

Thick-----with higher photosynthetic
function and not easy
to senescent

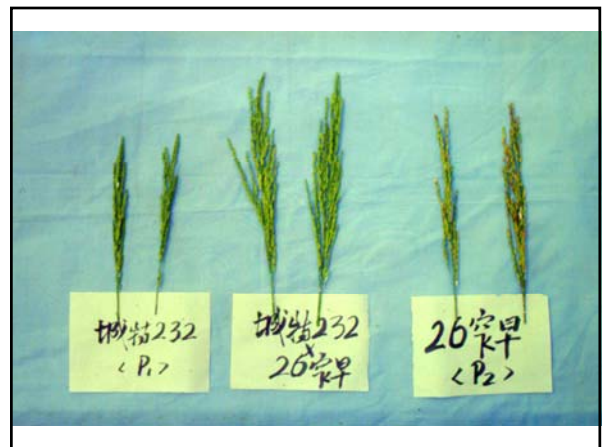
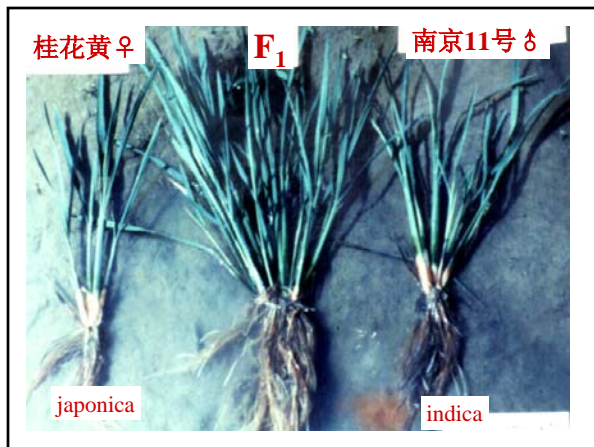
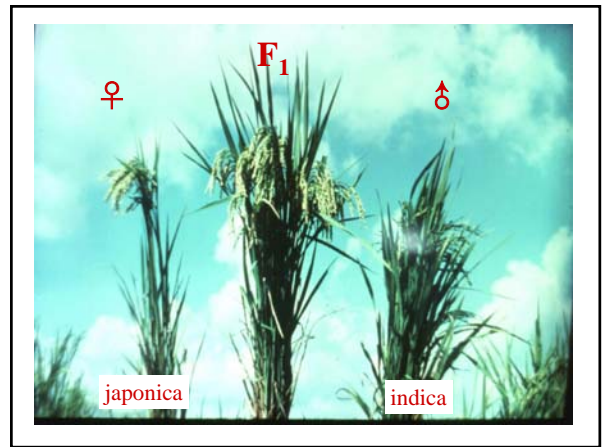
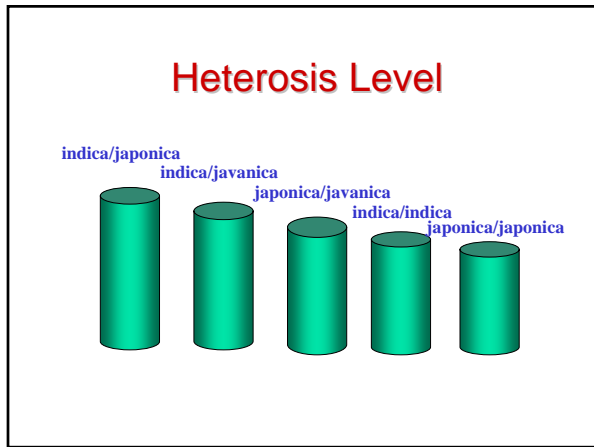
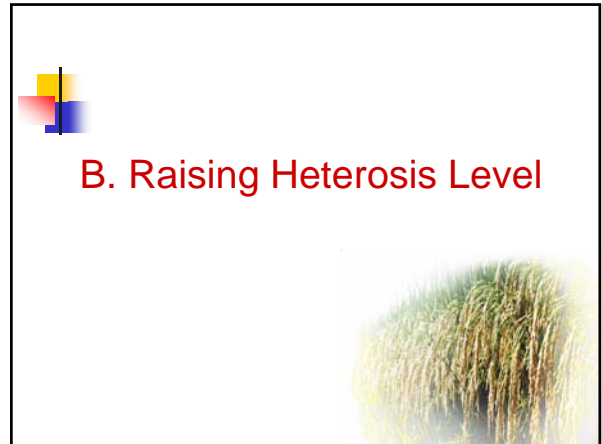


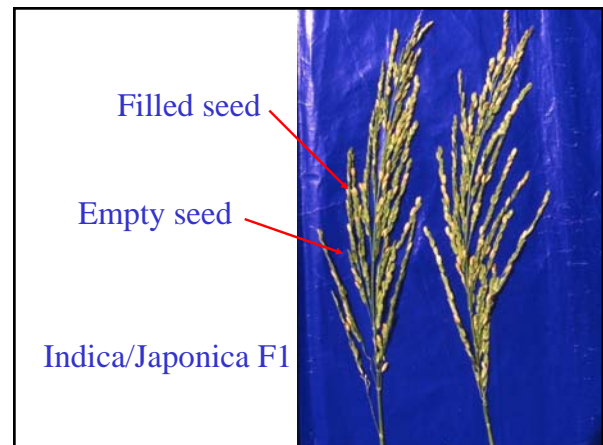
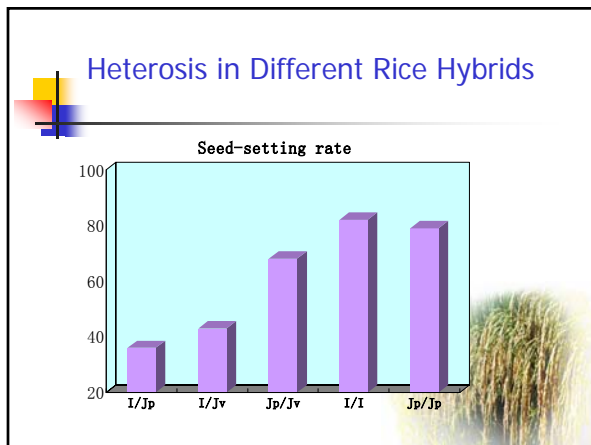
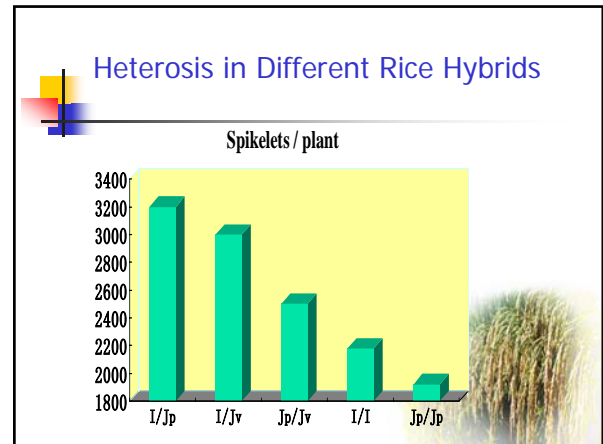
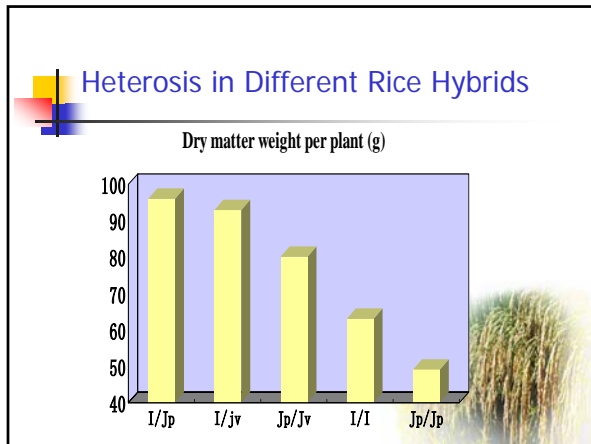
Lower panicle position

The tip of panicle
is 60-70cm
above the
ground during
ripening stage



Highly resistant to lodging





Yield potential of an indica/japonica hybrid

| Combination | Plant height (cm) | Number of spikelets /panicle | Number of spikelets /plant | Seed setting rate % | Actual yield (kg/ha) |
|--|-------------------|------------------------------|----------------------------|---------------------|----------------------|
| Chengte232(japonica) × 26Zhaizao(indica) | 120 | 269.4 | 1779.4 | 54.0 | 8250 |
| Weiyu35 (indica/indica) | 89 | 102.6 | 800.3 | 92.9 | 8625 |
| Increase % | 34.8 | 162.8 | 122.4 | -41.9 | -4.3 |

Strategy of developing *indica/japonica* hybrids

I . Using wide-compatibility (WC) gene to overcome seed-set problem

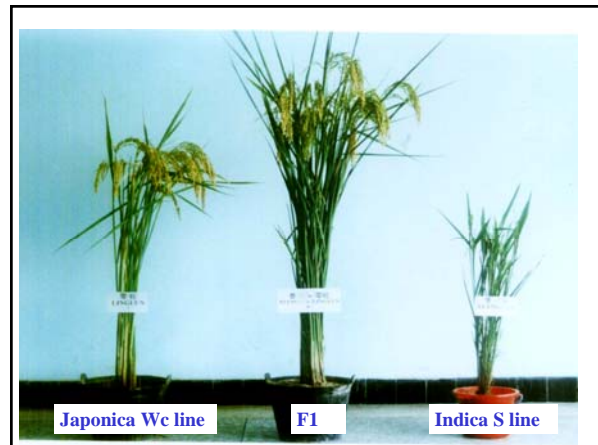
- Indica — $S_{.5}^1$
- Japonica — $S_{.5}^1$
- WC varieties — $S_{.5}^n$



- $S_{.5}^1 / S_{.5}^1 \longrightarrow$ sterile F_1
- $S_{.5}^1 / S_{.5}^n$ or $S_{.5}^1 / S_{.5}^n \longrightarrow$ fertile F_1



II. Select intermediate indica or japonica rice cultivars as parental lines instead of typical indica or japonica



C. By means of biotechnology

Still in tentative stage



Conclusion

Accelerating the development of super hybrid rice worldwide will play a key role for food security and world peace.





Thank you