

Dynamics of rainfed lowland rice varieties in Northeast Thailand

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1. Northeast Thailand as marginal land for rice cultivation
2. Ecology of rice varieties
3. RD6 and Khao Dok Mali (KDML)
4. Adoption process
5. Impact on agro-ecosystem

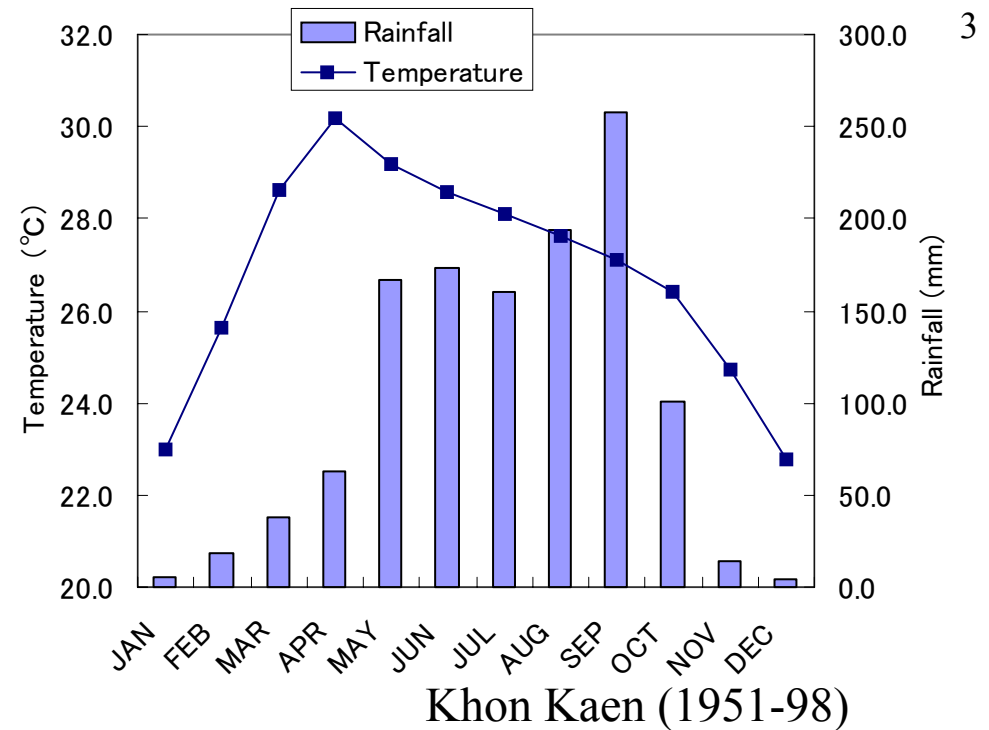
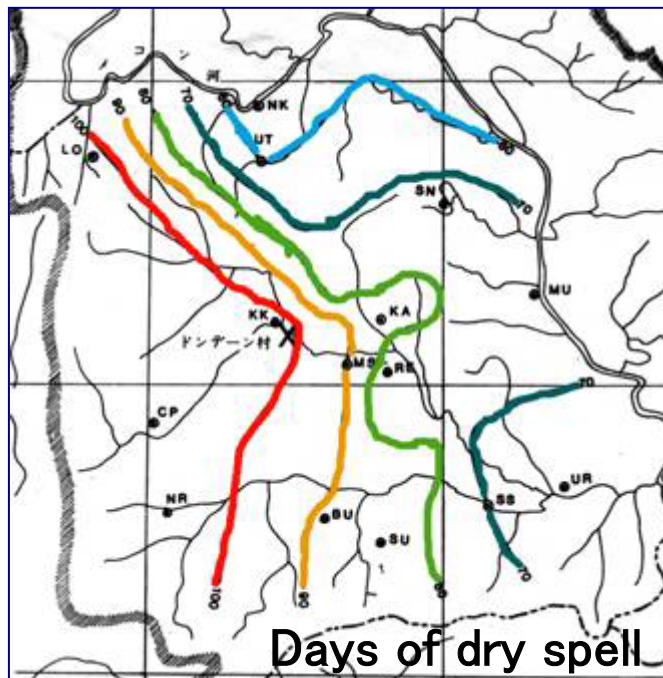
Marginal land ; natural setting

- The Korat Plateau of 100 – 200m above sea level , undulating topography.
- Surface has been heavily weathered and nutrition washed out.
- Paddy fields cover a land area of 600 million ha .
- Source of irrigation is very limited.



Marginal land; “rain shadow”

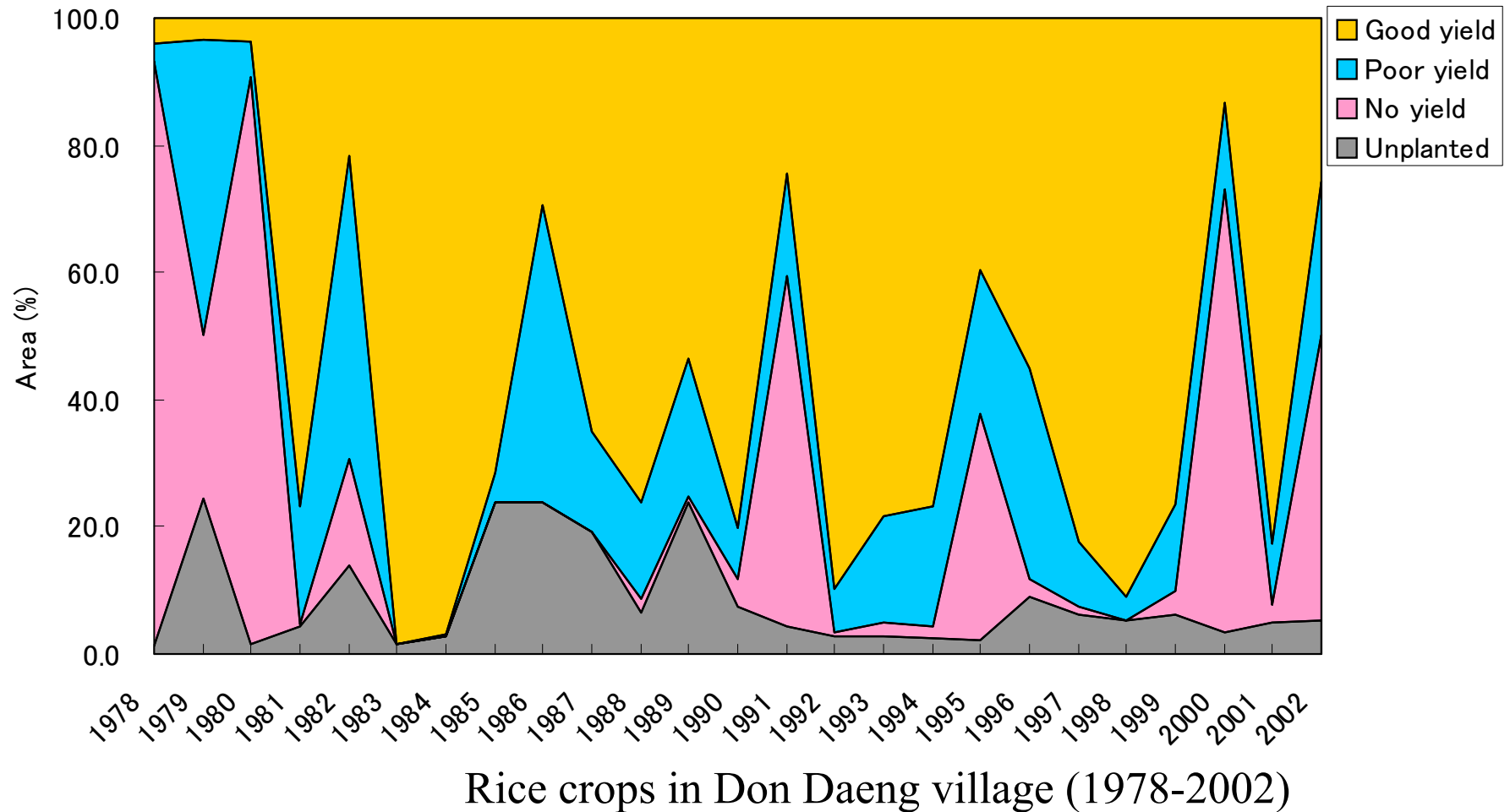
- Monsoon area
- “rain shadow”



- The amount of rainfall is insufficient for rice cultivation.
- Year -to-year fluctuation is large .

Rice and rain

- It is not possible to plant rice in every paddy plot
- The rice is suffered by drought and/or floods



Drought, salinity, flood



Production

- Average yield of Northeast is 1.6t/ha of major rice for 1985-1998
- Rice is consumed in the village generally and seldom sold.

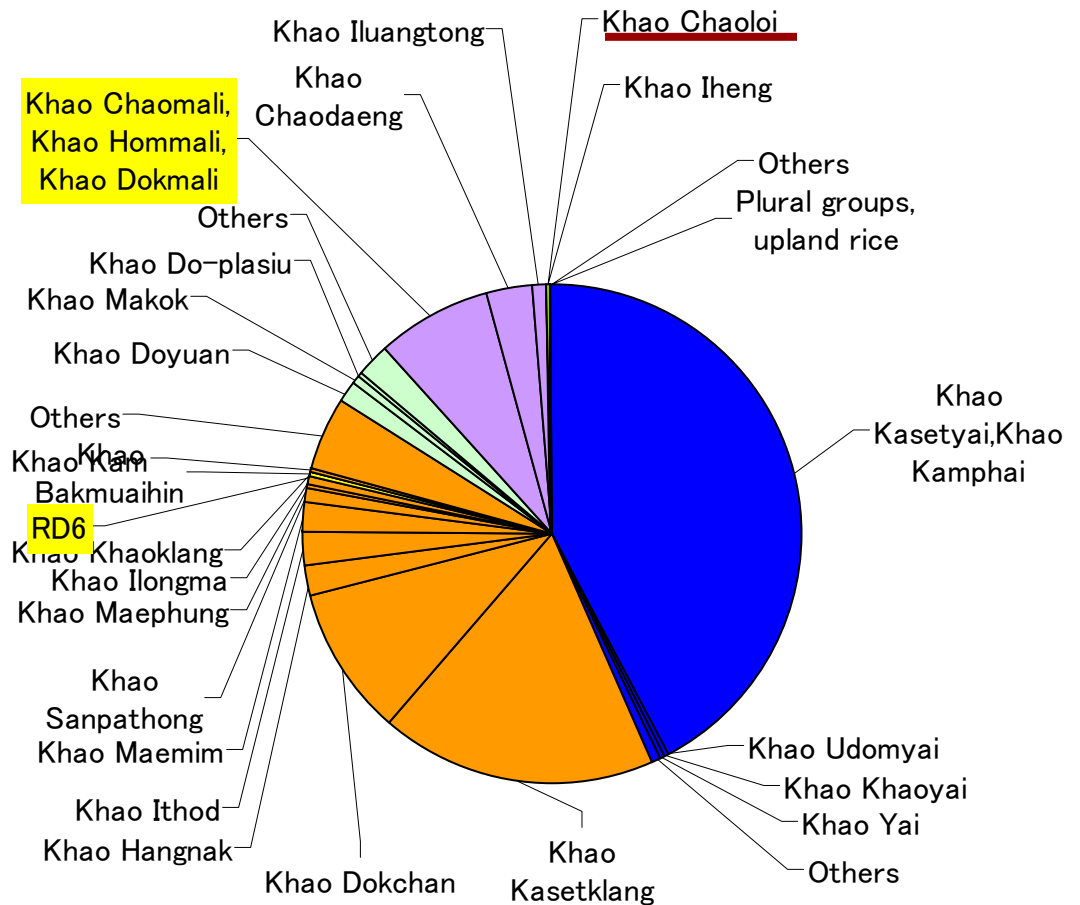
Ecology of rice varieties in early 1980s



- Don Daeng, which is located in the central part of Northeast Thailand
- 30 varieties were usually planted
- Glutinous rice and non-glutinous rice

Maturity of varieties

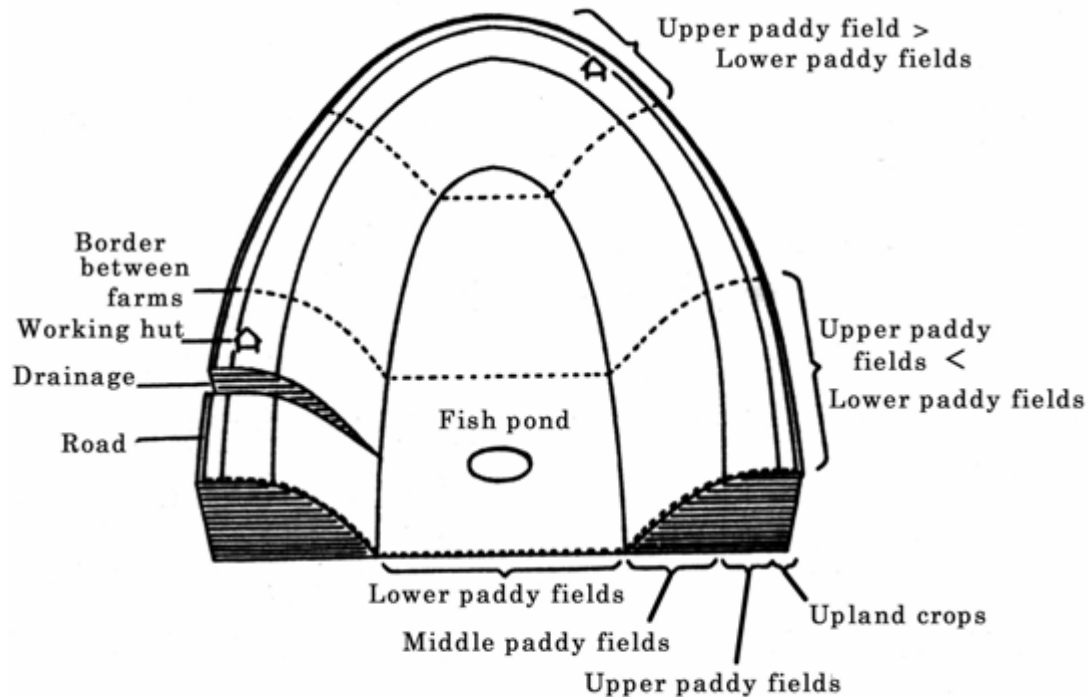
- Early, medium, late and extremely late.
- The medium-maturing variety was the most in terms of the number of cultivars
- The area covered by the late-maturing variety was the largest.



Planted area of varieties (DD, 1983)

nong

- The shallow saucer shaped topography .
- About 20 *nongs* around village compounds.



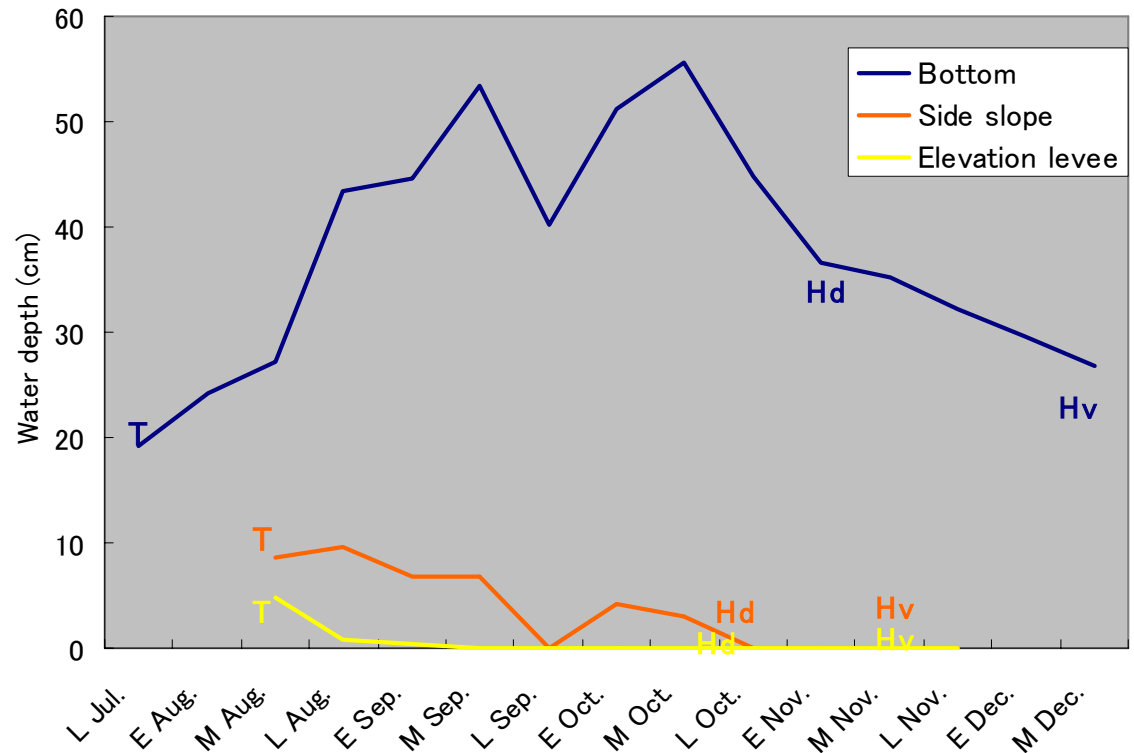
Rice growing systems in *nong*

Topo-sequence

- Lower paddy field
- Middle paddy field
- Upper paddy field

Water dynamics of paddy field

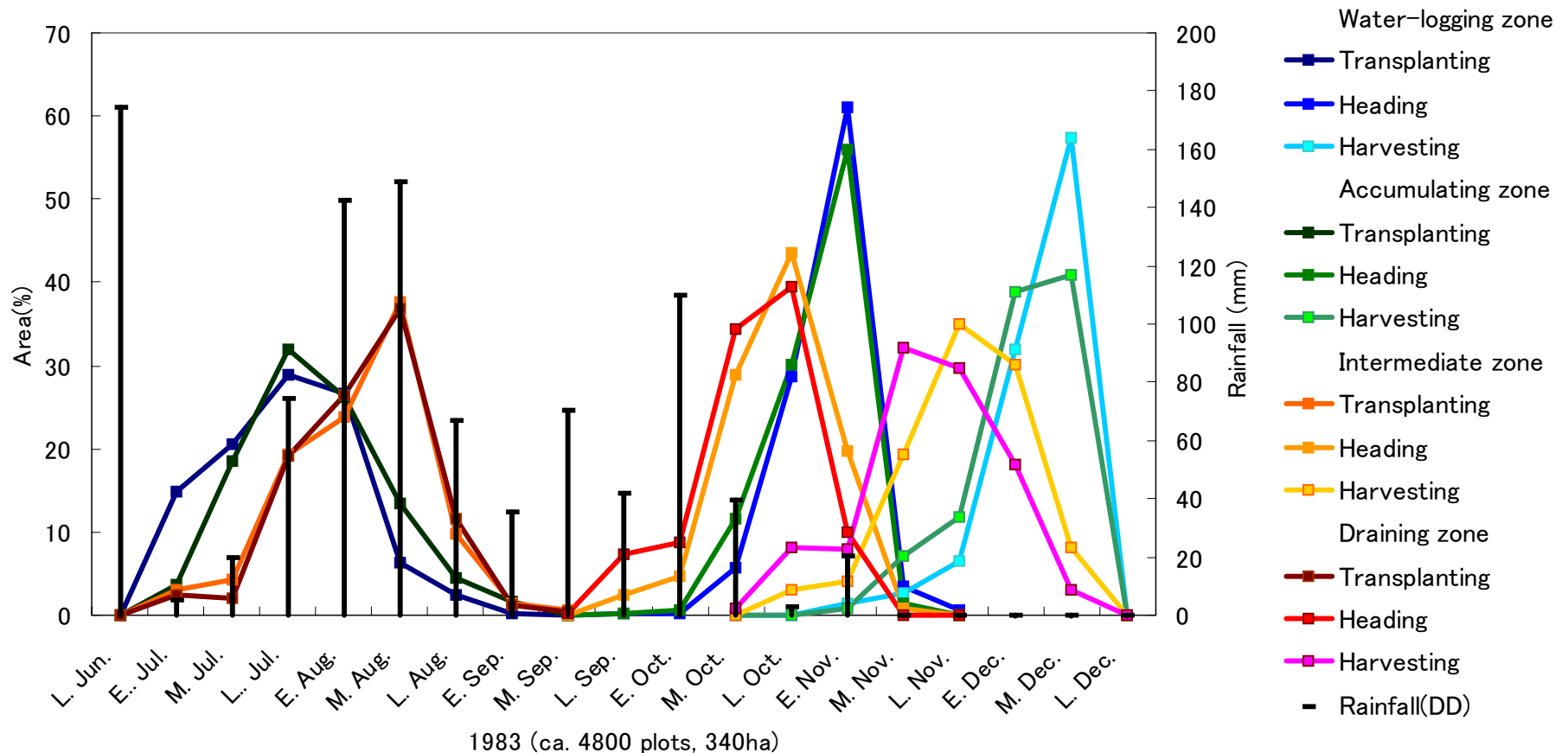
The water in the upper paddy field vanishes sooner but that in the lower paddy field is retained much longer after the end of the rainy season .



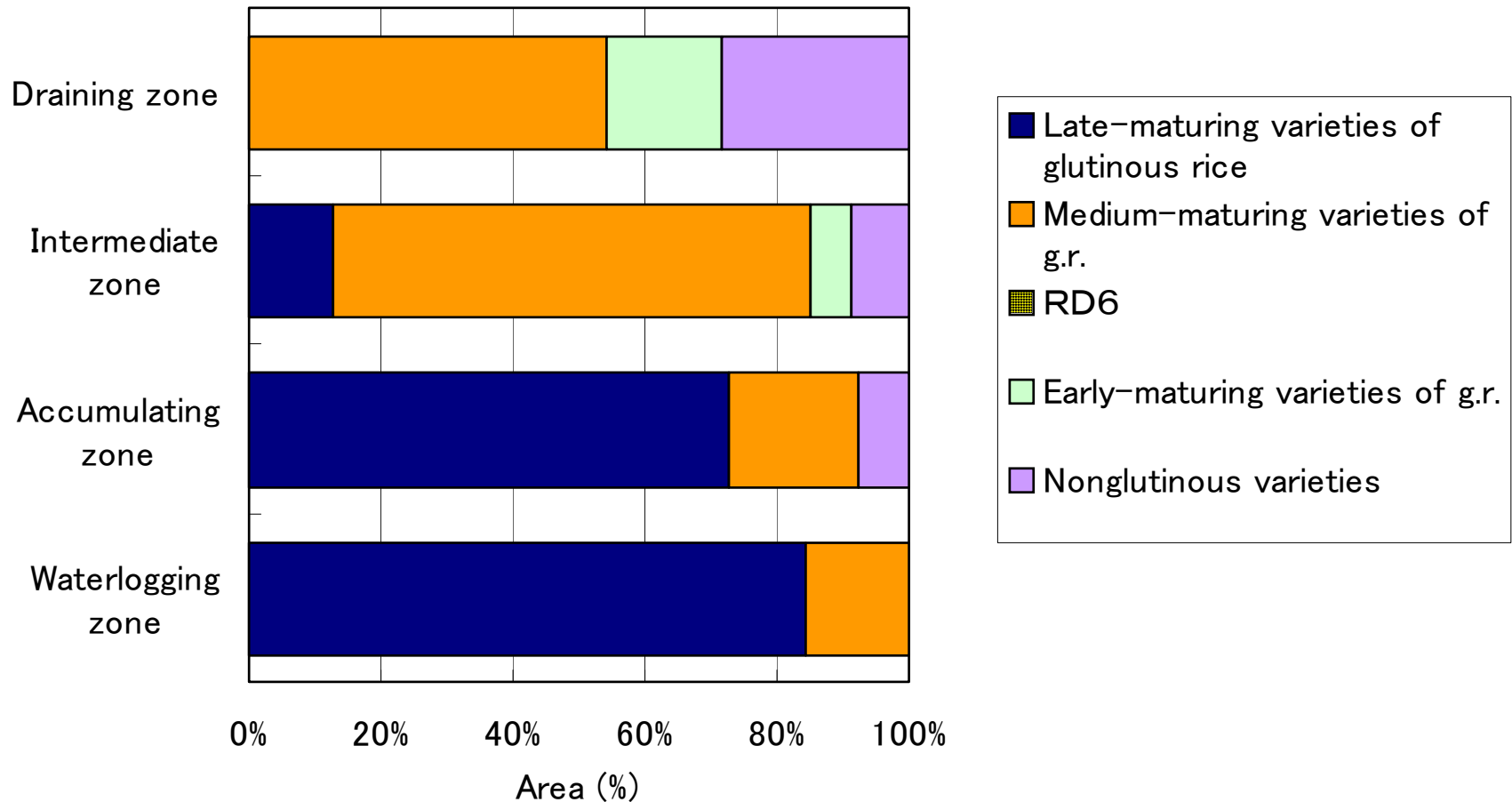
T; Transplanting time, Hd; Heading time, Hv; Harvesting time

- Upper paddy field limits the heading time of rice to the end of October.
- Lower paddy field allow the longer growth duration.

Progress of transplanting and harvesting in Don Daeng (1983)



Planted area ratio of varieties in every water condition of paddy field in Don Daeng (1983)

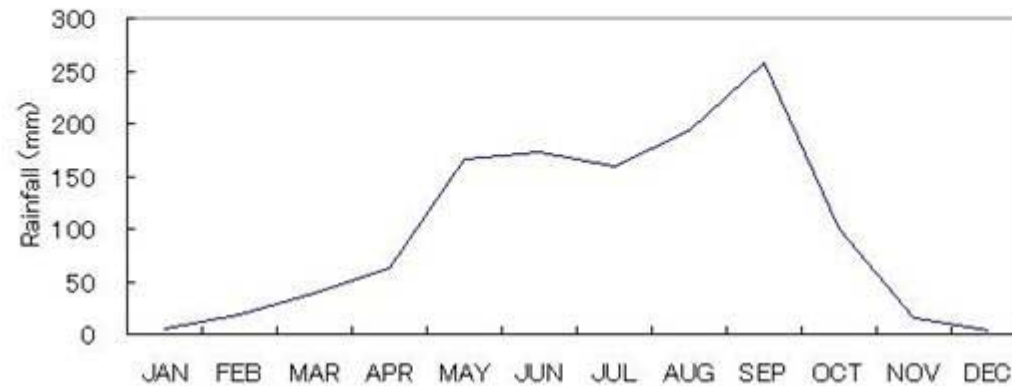


Transplanting and topo-sequence

- Lower → middle → upper paddy field
- From the lower paddy field with late-maturing varieties.
- In the middle paddy field with medium-maturing varieties.
- The upper paddy field with medium and early-maturing varieties.

Harvesting

- Early → medium → late maturing variety
- Farmers harvested the rice in upper paddy field early, then in the middle paddy field and in the lower paddy field at the last.



Upper paddy fields *Early maturing varieties*

Middle paddy fields *Medium maturing varieties*

Lower paddy fields *Late maturing varieties*

Rain - Water - Rice in topo-sequence

Merit of varieties allocation according topo-sequence

- Early maturing varieties : avoidance of drought damage in upper paddy fields.
- Late maturing varieties: higher productivity depending on long growth duration.

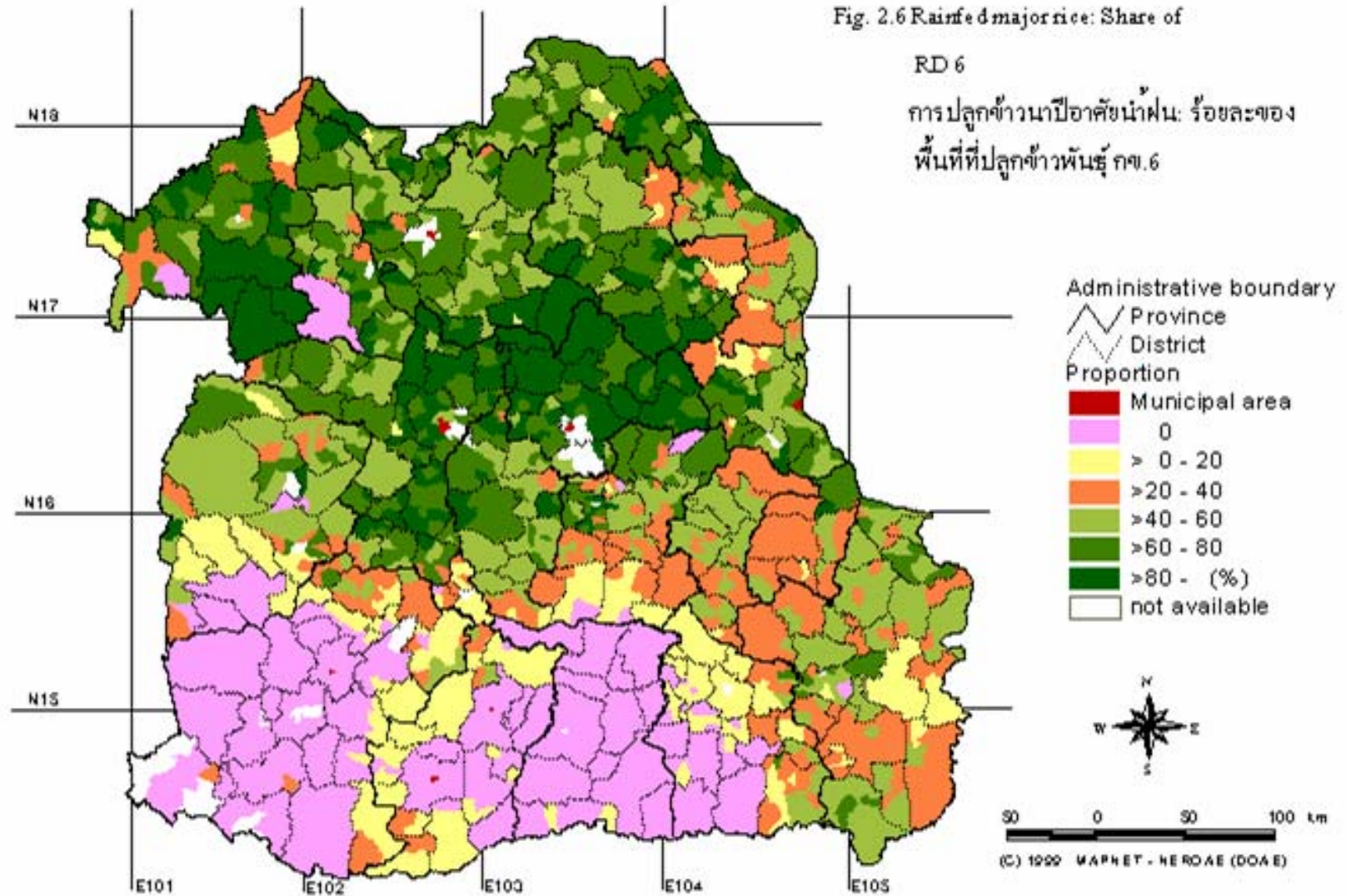
RD6 expansion

- Improved glutinous variety, released in 1977.
- In Don Daeng

Year	1983	1991	1999
Farmers planting RD6(%)	1	89	93
Area planted by RD6 (%)	0.3	75	87

- Agricultural statistics shows that 83% of total glutinous rice area was planted by RD6 in the Northeast in 1995.

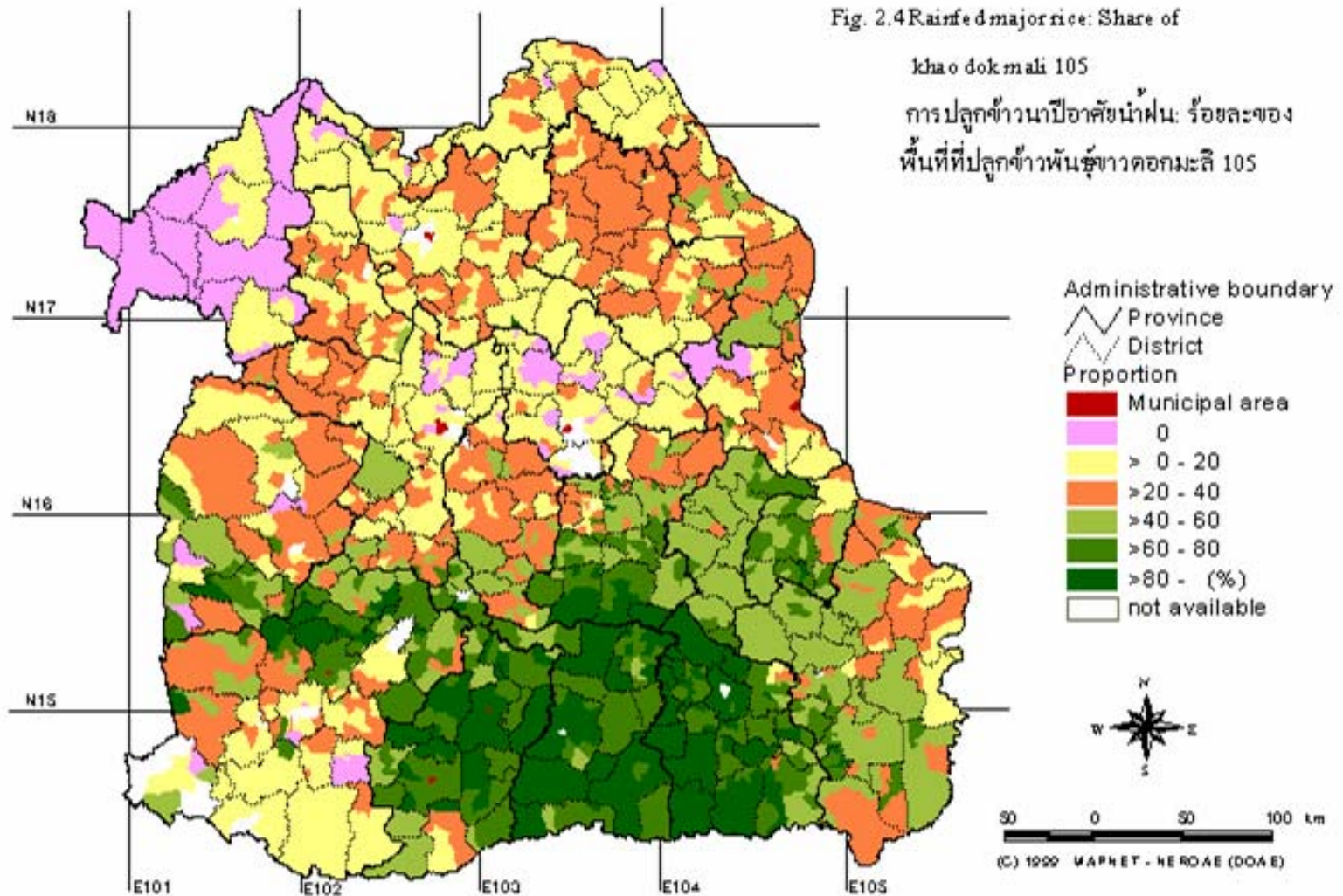
RD6 distribution (1997)



KDML (khao dawk mali)

- KDML105(released in1959), Chao Mali or Hom Mali by farmers' dialect
- In 1995, KDML area reached 71% of the total nonglutinous rice planted area and 37% of the rice planted area of the Northeast.
- Core region; all districts of Buriram, Surin and Sisaket provinces (1997 by MAPNET).
- Expansion in Roiet, Yasothon, Amnat Charoen
- In Don Daeng, 7% in 1983, 15% in 1991, 4% in 1999.

KDML distribution (1997)



Adoption process

RD6

- In the late 1980s, as investment in rice growing increased, RD6 spread rapidly in short.
- Two steps.
- In the first extension stage, the planted area of RD6 expanded with the introduction of modern growing technology to raise yields.
 - a better yield response to fertilizer than other varieties.
- In the second stage, the RD6 explosion was aided by its cooking quality.
 - once steamed in the morning, RD6 rice can maintain its soft quality until evening.

KDML expansion (Yasothon)

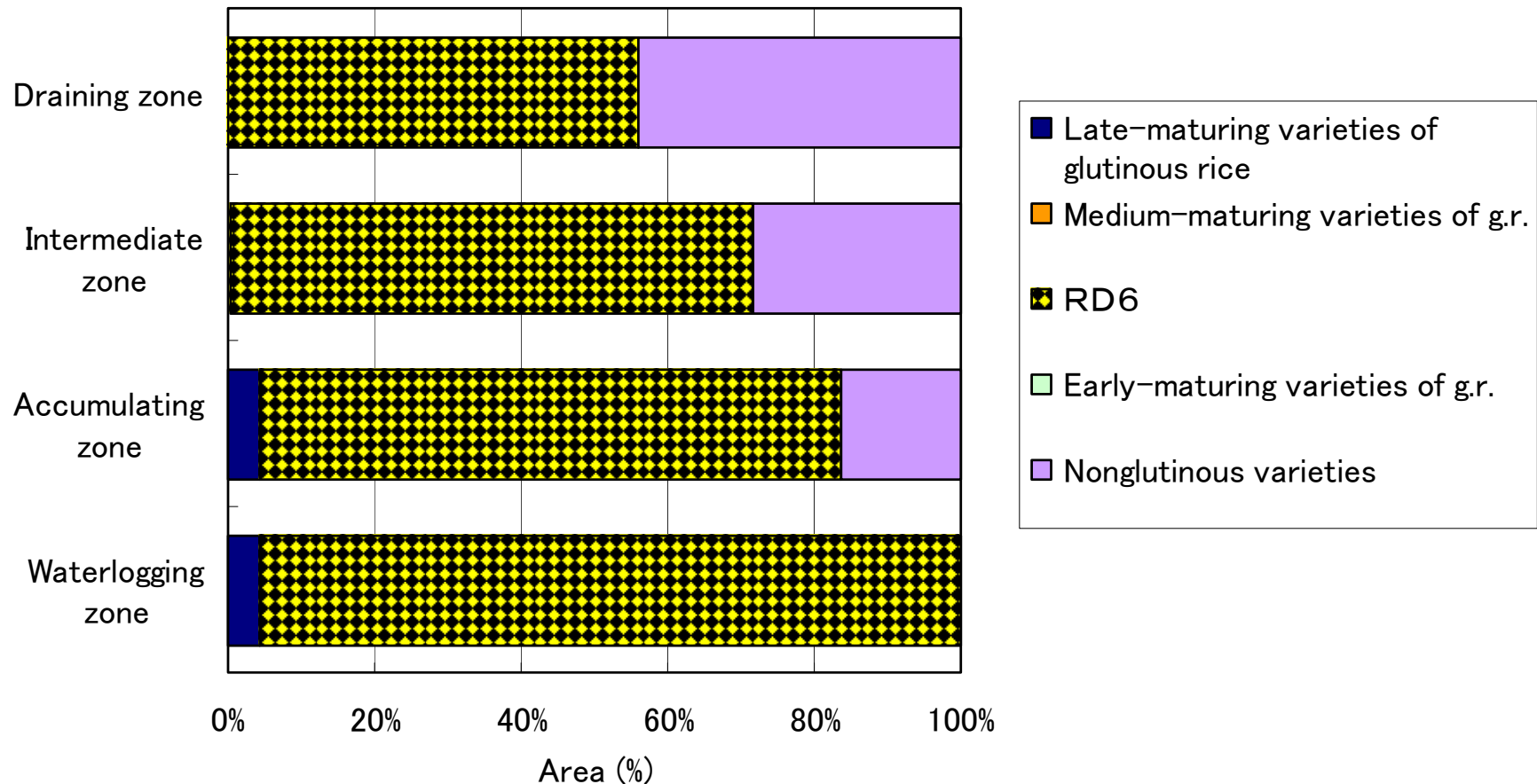
- To seek new cash income source .
 - the price merit compared with glutinous rice.
- KDML planting could be possible after raising the yield of glutinous rice (as staple food) by introduction of RD6 and much manuring.
- Year-to-year variation of rice production was very small owing to favorable rainfall.
- Farmers can expect to get certain crop from rice.

Impact on agro-ecosystem

In Don Daeng,

- All paddy fields on topo-sequence were occupied by RD6 and KDML belonging to medium-maturing varieties.
- The role of early -maturing varieties was replaced by irrigation .
- Yielding ability of long growth duration was replaced by fertilizer.

Planted area ratio of varieties in every water condition of paddy field in Don Daeng (1991)



Land consolidation

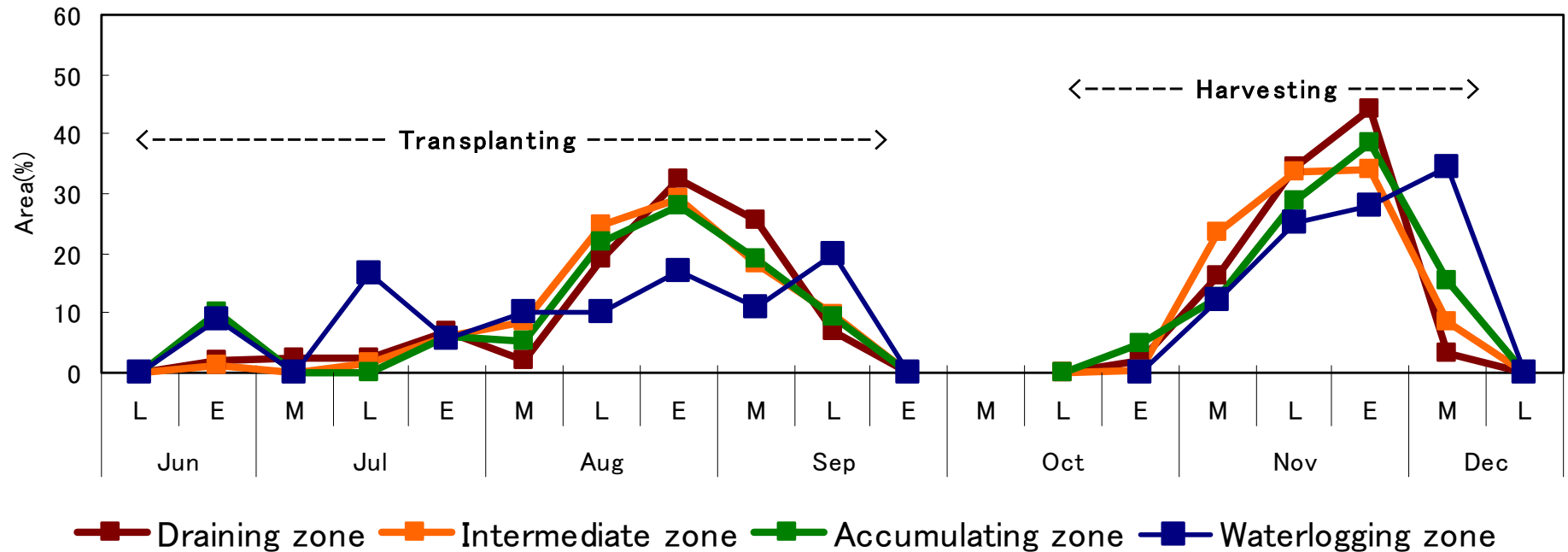


- For introduction of machinery
- Simultaneous events of variety change, input of chemicals.

Problems

- Submergence of grains in lower paddy fields.
- Active irrigation for upper paddy field leaded long time inundation in lower paddy fields after the rainy season.
- All paddy field had to be harvested at the same season.

Progress of transplanting and harvesting in Don Daeng (1991)

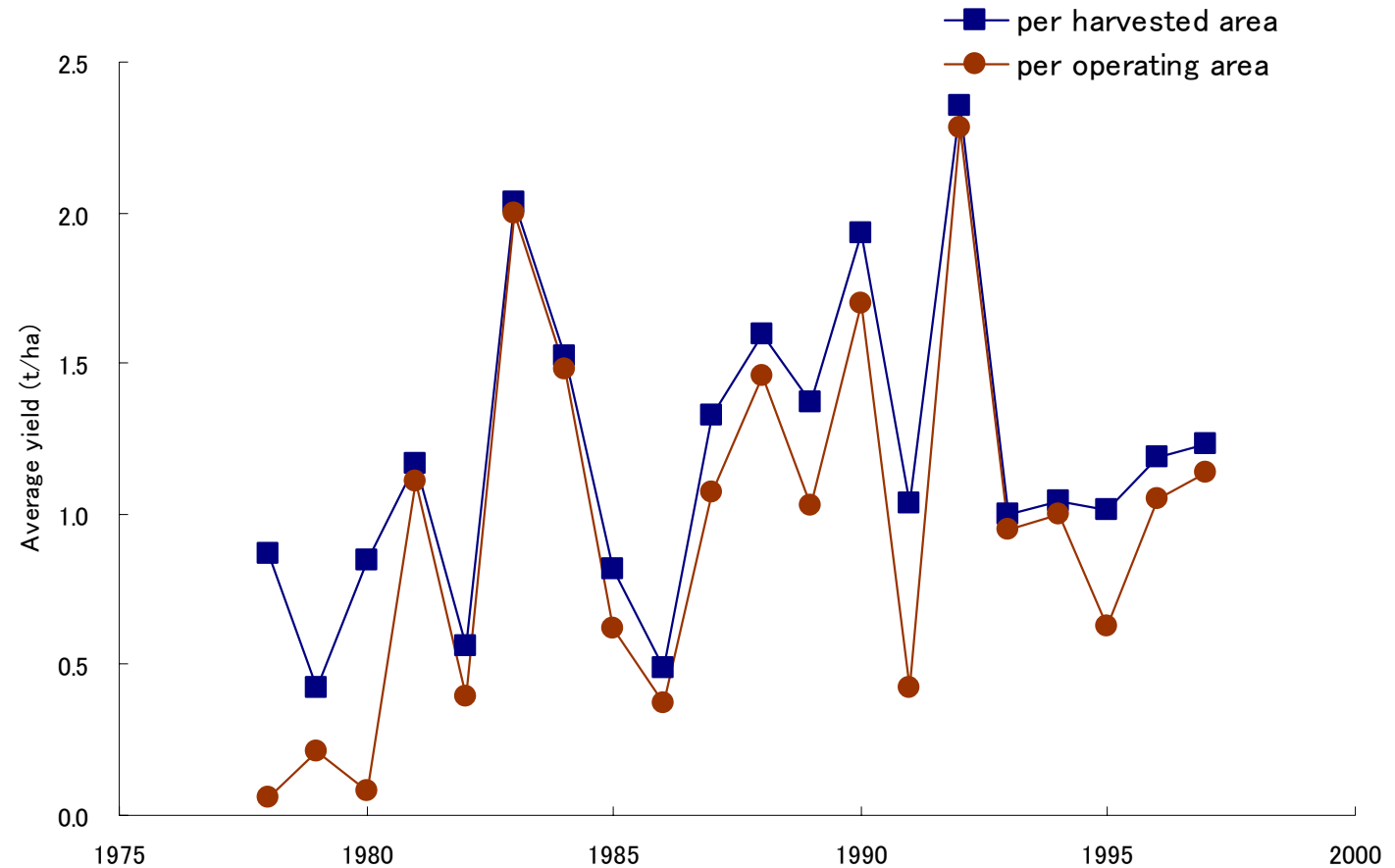


Escape from labor competition

- Employment (transplanting, harvesting, threshing machine)
- Decrease area operated by one household
- Power tiller, direct seeding

Results

- Yield are still very low and unstable in Don Daeng.
- There is a gradual increase in rice yield per harvested area .



Sustainability of rice growing

- Rice growing contributes only to 2% of the total cash income .
- The system is sustained by off-farm jobs of farmers.

