P011

Identification of Causes for Yield Decline in Continuous Aerobic Rice System

Honam Agricultural Research Institute : Hong-Kyu Park*, Weon-Young Choi, Min-Gyu Choi, Chung-Kon kim and Kwang-Young Jung

International Rice Research Institute : Shaobing Peng

호기성벼의 연속재배시 수량감소 요인

호남농업연구소 : 박홍규*, 최원영, 최민규, 김정곤, 정광용

국제미작연구소 : S. Peng

Objectives

Yield penalty and yield stability of aerobic rice have to be considered before promoting this water-saving technology. To compare crop performance between aerobic and flooded rice continuously over several seasons, and to identify yield attributes responsible for yield gap between aerobic and flooded rice.

Materials and Methods

Experiment site : Philippines(International Rice Research Institute, IRRI)

Experiment period : '01-'04(dry season ; January-May, wet season ; June-October)

Water treatments : Aerobic rice(soil moisture tension 30 kPa)

Flooded rice(flooded with 5-10 cm of water depth)

Variety : Apo(IR55423-01), PSBRc80, Magat, UPLRi7

Results and Discussion

When the first season aerobic rice was compared with flooded rice, the yield difference was 8-21%.

Among the yield components, sink size contributed more to the yield gap between aerobic and flooded rice than grain filling percentage and 1000-grain weight.

The yield difference between aerobic and flooded rice was attributed more to difference in biomass production than to harvest index.

Yield decline was observed when aerobic rice was continuously grown and the decline was greater in the dry season than in the wet season.

The yield decline of aerobic rice was attributed more to changes in biomass production than in harvest index.

*Corresponding author: (Phone) 063-840-2166 (E-mail) parkhok@rda.go.kr

Table 1. Varietal difference of grain yield in grown under aerobic and flooded conditions. (ton/ha)

Variety	Aerobic	Flooded	Difference
PSBRc80	7.22	7.84	8%
Magat	6.68	8.12	19%
Apo	6.32	7.78	21%
UPLRi7	5.13	6.33	21%
Mean	6.34	7.52	17%
Maximum	7.22	8.12	12%

Table 2. Yield components of Apo grown continuously under aerobic and flooded conditions

Parameters	1st season aerobic rice (A^1st)	7th season aerobic rice (A^7th)	Flooded rice(F)
Grain yield (t ha^{-1})	$6.32^{b\dagger}$	3.77^{c}	7.78^{a}
Total biomass (g m^{-2})	1343^{b}	862^{c}	1604^{a}
Harvest index (%)	45.3^{b}	45.4^{b}	47.1^{a}
Panicles m^{-2}	313^{b}	270^{c}	347^{a}
Spikelets panicle	117^{a}	100^{b}	114^{a}
Spikelets m^{-2} (x1000)	36.5^{a}	26.9^{b}	39.3^{a}
Grain filling (%)	80.9^{b}	79.0^{b}	87.4^{a}
1000-grain weight (g)	20.6^{b}	18.5^{c}	22.0^{a}

†Within a column for each parameter, means followed by different letter are significantly different at 0.05 probability level according to least significant difference test.

Table 3. Varietal difference of grain no. per m^2 in grown under aerobic and flooded conditions

Variety	Aerobic	Flooded	Difference
PSBRc80	30352±4937(78.5%)	32923±2929(80.0%)	92.2%
Magat	31414±2458(74.7%)	35211±3389(73.3%)	89.2%
Apo	29450±3575(80.7%)	34435±3084(87.5%)	85.5%
UPLRi7	25167±3179(85.0%)	21536±3951(75.2%)	116.9%

* ( ) : Percent of filled grain

Table 4. Varietal difference of 1000 grain weight per m^2 in grown under aerobic and flooded conditions

Variety	Aerobic	Flooded	Difference
PSBRc80	20.6±0.5	21.6±0.4	95.4%
Magat	21.1±0.6	21.7±0.3	97.2%
Apo	20.6±0.7	22.0±0.2	93.6%
UPLRi7	23.1±0.4	24.0±0.4	96.3%