

Water Management of Bio-degradable Paper Mulching for Weed Control in Machine Transplanting Cultivation of Paddy Rice

Won-Ha Yang*, Weon-Tai Jeon, Hee-Suk Han, Young-Hwan Yun, Chang-Ihn Yang, Don-Hyang Choi, Jeong-Hwa Park and Jong-Wook Park
National Institute of Crop Science

Objectives

we carried out to establish the reasonable irrigation management of transplanting culture mulched with bio-degradable paper in paddy rice.

Materials and Methods

- o Rice field was mulched with biodegradable paper at the transplanting time of semi-adult seedling by transplanter in 2004.
- o Rice cultivar was Daeanbyeo. Mulching paper consisted of compound paper which was laminated with biodegradable plastics. Mulching paper was produced by SK-Chemicals. Co. The dimension of mulching paper was 10 μ m thick, 190cm wide, and 200m long. Slow release fertilizer was applied as the basal fertilizer rate based on Nitrogen - Phosphorus - Potassium which were 110 - 45 - 57 kg per ha. The 6-row riding type of transplanter (model : RR600GU-PV) attached with mulching paper was produced by KUKJE MACHINERY co. ltd. South Korea.
- o There were three levels of water depth to get the desirable treatment for weed control in the lowland mulched by paper. Irrigation depth was maintained from transplanting to ripening stage excluding non-productive tiller stage.

Results and discussion

- o The missing hill ratio was the lowest in the drained field compared to other water level.
- o Water depth of 1~2cm on mulching paper was the most effective in weed control of the paddy rice. Weed control value of mulching papers showed 82~97% compared with the plot of no herbicide. Weed species of pickerelweed and water chestnut was sprouted. When water depth was comparatively deep, the paper was easily floating by wind. The loose paper promoted the weed growth.
- o Mulching paper also makes a profit on water saving by reducing the receding rate of water in the lowland comparing to no mulching field.
- o Therefore, we could clearly conclude that paper mulching of machine transplanting for paddy rice would be widely useful as the procedure for weed control in friendly environmental cultivation of rice plant

Corresponding Author : E-mail : yangwh@rda.go.kr 번호 : 031-290-6845

Table 1. Transplanting status after mulching paper and transplanting seedling in different irrigation depth.

Irrigation depth(cm)	Missing hill(%)		Transplanting status	
	Paper mulching	No mulching	Paper mulching	No mulching
0	3.2	3.1	Good	Good
1~2	7.8	2.9	Bad	Good
3~4	12.7	3.5	Worse	Good

Table 2. Change of receding rate of water a day at different growth stage of paddy rice

Growth stage	Investigated date	Receding rate of water(mm/day)	
		Paper mulching	No mulching
Early tillering	June 1st	3.43	11.19
Panicle initiation	July 21th	4.72	5.52
Heading date	August 16th	5.70	6.90

Table 3. Weed occurrence in the lowland covered with paper at 54 days after transplanting

Irrigation depth(cm)	Weed control(%)	Weed species
1 ~ 2	96.7	Pickerelweed, Water chestnut
3 ~ 4	90.0	Pickerelweed, Water chestnut
5 ~ 7	82.3	Pickerelweed, Water chestnut

- Weed control value calculated by comparing weed occurrence of no herbicide plot.

Table 4. Milled rice and its yield component of rice cultivated with mulching paper in the lowland.

Item	Water depth(cm)	Culm length (cm)	Panicle length (cm)	Panicle no. per m ²	Spikelet no. per panicle	Ripened grain (%)	1000 grain wt.(brown rice,g)	Milled rice (t/ha)
Paper mulching	1~2	81.1	19.4	379	84.7	91.7	22.4	5.87
	3~4	80.6	20.0	352	87.3	93.7	22.5	5.72
	5~7	82.8	19.3	345	83.6	94.6	22.9	5.58
No mulching	3~4	79.7	19.9	331	84.3	94.4	22.6	5.45