

**Agrochemical-free, direct sowing culture of a paddy with non-woven fabric mulch
- Effects of sowing date and fertilizer type -**

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不織布マルチングによる水稻直播・有機栽培 — 播種期と肥料の種類の影響 —
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The efficiency of non-woven fabric (mulch) in rice production system has been proven in the different previous studies (Ref. 1&2). An experiment was taken to observe the effects of date of sowing and as well as types of fertilizer in this production system.

Materials and methods:

To obtain the objectives, a field experiment was taken in the year 2004 at the Faculty of Agriculture, Ehime University.

Variety Koshihikari used in the experiment. Mulching (sowing) was done on May 08, 2004 (for early sowing) and June 10, 2004 (for late sowing). The treatments were chemical fertilizer, organic fertilizer (rapeseeds and poultry manure), here mentioned as organic 1 and organic fertilizer (only poultry manure), here mentioned as organic 2 and without fertilizer. The experiment was designed as Randomized Complete Block with two replications. Fertilizers were applied at the rate of 6 gN/m² as basal fertilizer in the time of ploughing and 3 gN/m² as topdressing. Water drained out from the field after 14 days of mulching. Early and late transplanting was done on June 03, 2004 and July 01, 2004 with 3 seedlings/hill, respectively. In transplanting, poultry manure and rapeseed were applied at the rate of 6 gN/m² as basal fertilizer and 3 g/m² as topdressing. Sampling was done 36, 50 DAS (days after sowing), heading and maturity time in early and late sowing time. Heading was came at 85 DAS and 70 DAS in the early and late sowing, respectively.

Results and discussions:

From the experiment, it was observed that leaf nitrogen percentage was higher in early sowing compared to the late sowing mulching plots irrespective of treatments. But, in the transplanting, leaf nitrogen found higher, when it was transplanted in late (Fig.1 & 2). Total top dry weight was also observed higher in the early sowing compared to late sowing. (Fig.3 & 4). In early sowing, organic 1 and chemical fertilizers produced higher dry matter compare to the other treatments (Fig.3). The overall leaf area index (LAI) was also found higher in the early sowing compare to late sowing (Fig.5 & 6). In early sowing, organic 1 produced the highest LAI (Fig. 5). From Table 1, it was observed that, grain yield was found better in early sowing compared to late sowing irrespective all treatments. Organic 1 produced higher grain yield on the both sowing date. Organic 2 performed better than chemical fertilizer in the early sowing time though the result was found reverse in late sowing. Similar to mulch treatments, early transplanting yield was found better than late transplanting. The better grain yield was gained higher in Organic 1, due to its higher panicle and grain numbers.

We can conclude that, early sowing performed better and organic fertilizers especially rapeseeds and poultry manure together are more effective in contrast to chemical fertilizer.

References:

1. Hossain, S.T. *et. al.* 2004. Agrochemical-free, direct sowing culture of a paddy by mulching with non-woven fabric – Effects of amount of basal nitrogen fertilizer and topdressing- Jpn. J. Crop Sci. Vol 73 (extra issue 1): 228-229.
2. Sugimoto, H. *et.al.* 2003. Agrochemical-free, direct sowing culture of a paddy by mulching with non-woven fabric – Emergence of rice seedling and weed – Shikoku J. Crop Sci. 40: 10-11.

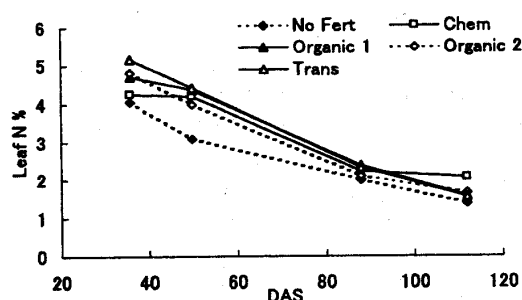


Fig. 1. Leaf nitrogen percentage at early sowing.

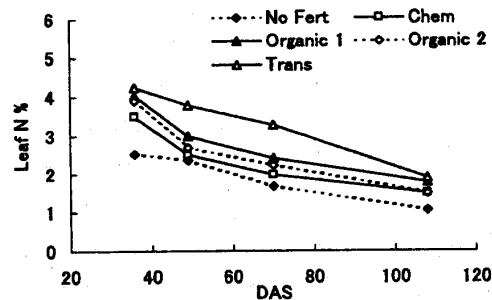


Fig. 2. Leaf nitrogen percentage at late sowing.

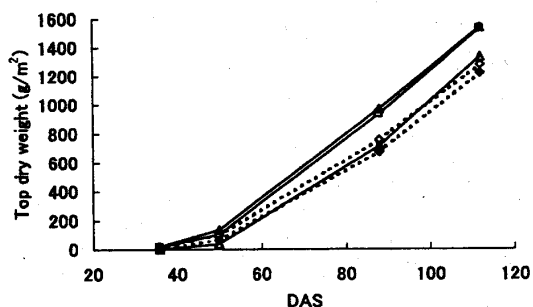
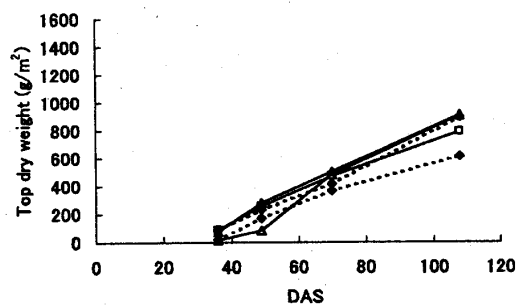
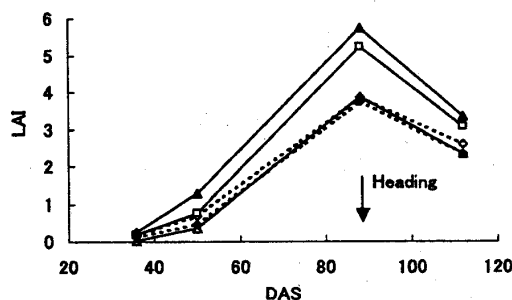
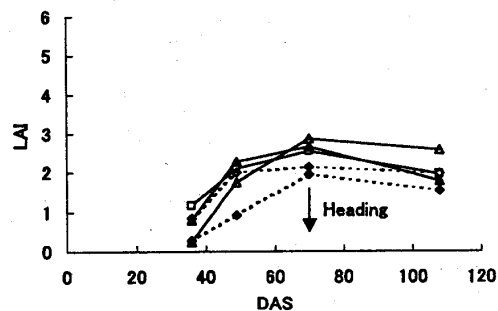
Fig. 3. Total top dry weight at early sowing.
(Symbols are same as Fig. 1)Fig. 4. Total top dry weight at late sowing.
(Symbols are same as Fig. 1)Fig. 5. Leaf area index at early sowing.
(Symbols are same as Fig. 1)Fig. 6. Leaf area index at late sowing.
(Symbols are same as Fig. 1)

Table 1. Yield and yield components.

Sowing date & method	Fert type	N application g/m ²	Planting density hill/m ²	Panicles /hill	Panicles /m ²	Spiclets /panicle	Grain No. /m ²	Ripening ratio %	1000 grain weight# g	Yield# g/hill	Yield# g/m ²
Transplanting											
Early	Organic 1	6 + 3	16.7	20.4	340	75.2	24717	73.0	25.6	27.5	458
Late	Organic 1	6 + 3	16.7	17.7	295	76.4	22342	74.6	25.7	25.5	425
Mulch											
Early sowing	No. Fert.	0 + 0	101.4	4.0	401	46.7	17962	74.9	25.1	3.3	337
	Chem.	6 + 3	95.1	4.7	447	62.9	27221	71.8	24.9	5.2	485
	Organic 1	6 + 3	96.5	4.9	471	60.2	28431	74.1	25.3	5.3	534
	Organic 2	6 + 3	96.2	4.4	423	60.4	26435	75.1	25.3	5.4	502
Late sowing	No. Fert.	0 + 0	94.8	2.8	259	61.4	15680	77.5	24.6	3.2	296
	Chem.	6 + 3	96.4	3.2	311	63.1	19478	85.4	25.0	4.2	415
	Organic 1	6 + 3	95.3	3.7	355	60.3	21885	77.6	25.0	4.5	424
	Organic 2	6 + 3	92.2	3.3	306	66.1	20127	80.3	24.9	4.3	401
F	Sowing Date (a)		0.52	141.5**	244.9**	2.02	343.7**	42.5**	0.60	55.9**	95.0**
	Fertilizer (b)		0.36	7.12*	13.41**	1.83	11.02**	2.10	0.28	0.79	3.88
	a × b		0.66	1.26	0.65	1.64	1.44	7.52*	0.31	0.15	1.61

#: Rough rice with 15% moisture content. *: Significant at the 0.05 level. **: Significant at the 0.01 level.

Transplanting: 30cm × 20cm 3 Seedlings/hill

Mulch: Row interval 24cm.

Organic 1: Rapeseeds + poultry manure, Organic 2: Only Poultry manure