

# Development of Naturally Degradable “Rice Polymer” For Organic Weed Management of Red Pepper and Rice

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Key words: Rice Polymer, Organic Weed Management, Red Pepper, Rice

## Abstract

*Among the developed bio-degradable polymer films as compared with transparent film(White), black polymer film was significantly more effective for controlling weeds in red pepper. Also, we found that white and black polymer mulching had 81.8% and 97.9% of managing weed controlling effects in rice, respectively. Compared to non-mulched rice paddy with water supply, the non-mulched rice paddy without any water supply has stopped its growth at 41 days after transplanting, while polymer-mulched rice paddy without water supply had about 60% of normally growing rice plants. This shows the polymer treatment has a remarkable effect on water and power saving, solution of herbicidal resistance, avoidance of herbicidal influence to eco-system etc. When the naturally decomposing polymer was used, a temperature was elevated as high as 4.7°C on maximum and 2.6°C on average. Also the naturally decomposing polymer accelerated rooting by 7 days and lowered a stress level from transplanting. The weed control effect mulched by polymer was remarkable as 98.7%. The polymer now, after 294 days treated on the rice paddy, has been completely decomposed.*

## Introduction

The polyethylene film have been covered for yield increase of upland crops in Korea from the 1980's. The problem come from non-degradable polyethylene film wastes. In an organic weed management of paddy field, duck farming has several problems, such as the avian influenza, decreasing of *Echinochloa crus-galli* weeding, and declining a biodiversity. Also, golden apple snail farming as a designation of harmful pest, and paper mulching having a high price and a rupture in a short period of time are concerned as problems. For these reasons, developing the organic weed management techniques in the rice paddy is urgently needed. This research is about a development of naturally decomposing polymer, examining its potential of controlling weeds and its chance of industrialization.

## Materials and methods

- Crop(Variety) : Red pepper (Jungilpoom) and Rice(Ilpoombye)
- Experimental period : 2006 to 2010 (5 years)
- Experimental place : Osan, Suwon, Cherwon in Korea
- Experimental plot : Randomized block design (3 Rep.)
- Blowing of bio-degradable films : 3 to 5 films
- Blowing method of bio-degradable films : Blowing film of extrusion.

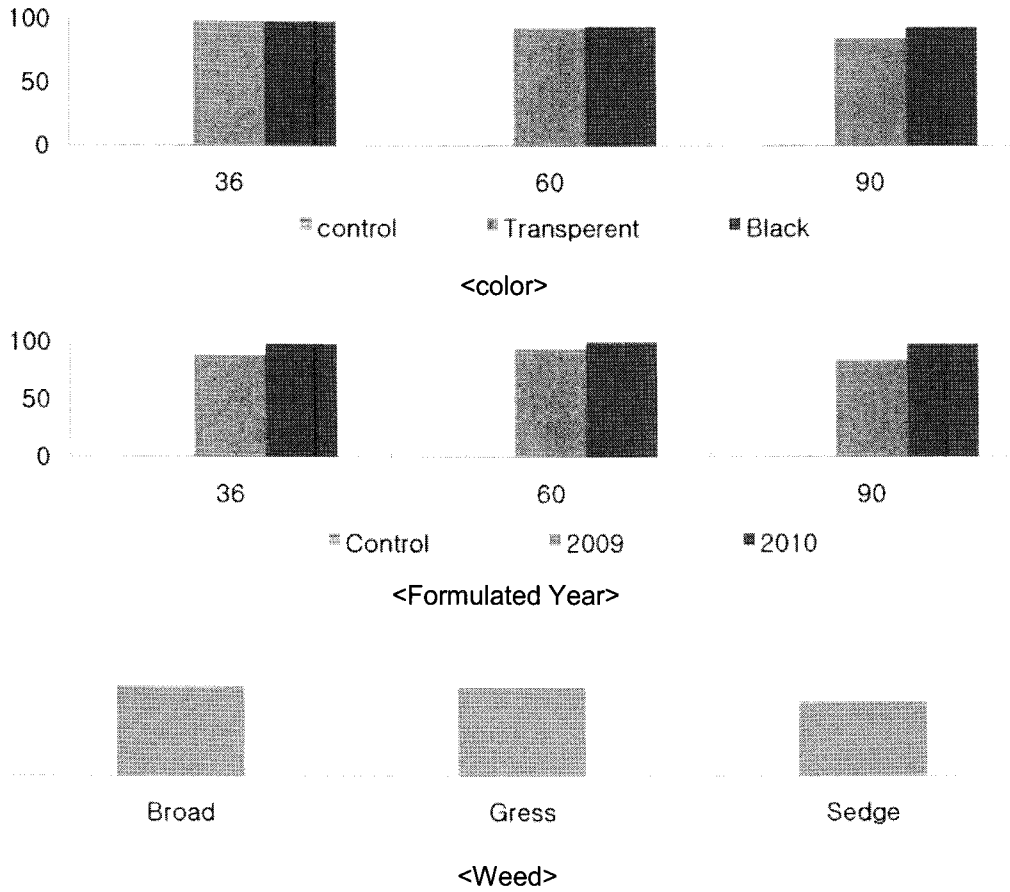
## Results

<Exp. I.> Weed control and physicochemical characteristics as influenced by mulching of newly developed bio-degradable polymer film in red pepper.

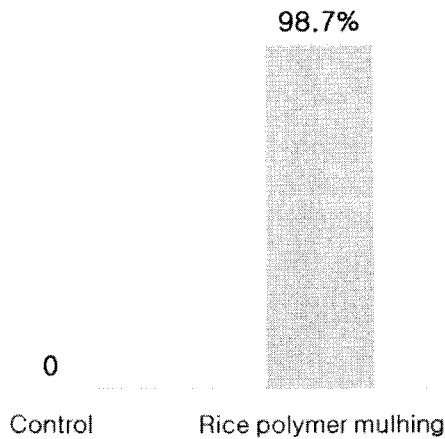
Table 1. Comparison of tensile strength by several bio-degradable films after UV radiation.

HAUVR <sup>z</sup>	Direction	201 (Conventional)	301	401	501
Just after	Hori <sup>y</sup>	53.23	45.45	48.00	47.33
	Vert <sup>x</sup>	66.84	52.56	59.85	58.99
24	Hori <sup>y</sup>	54.23	23.35	40.56	42.30
	Vert <sup>x</sup>	65.75	33.34	59.83	60.00
144	Hori <sup>y</sup>	48.88	2.30	20.14	22.33
	Vert <sup>x</sup>	61.84	3.72	31.11	32.54
250	Hori <sup>y</sup>	46.89	0	0	0.20
	Vert <sup>x</sup>	60.84	0.20	2.10	3.57

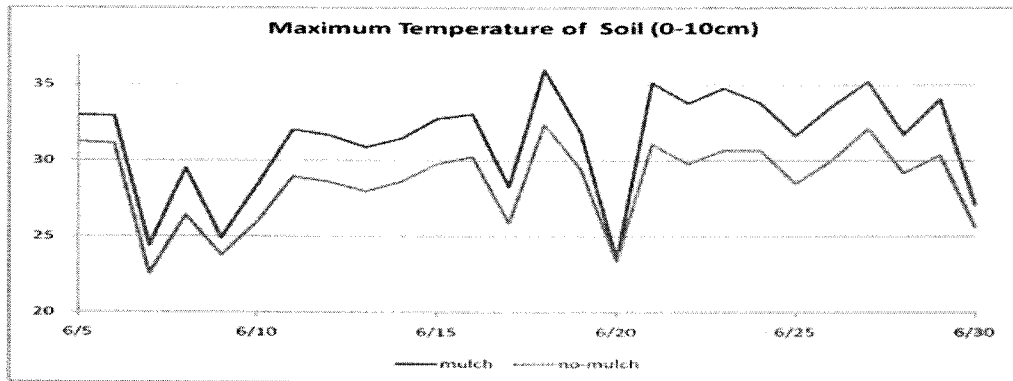
<sup>z</sup>Hours after UV radiation    <sup>y</sup>Horizontal    <sup>x</sup>Vertical



**Fig. 1. Weeding effect as influenced by polymer color, formulated year, and weed species**



**Fig. 2. Weeding effect as influenced by rice polymer mulching in herbicide resistant weeds**



<Temp.>

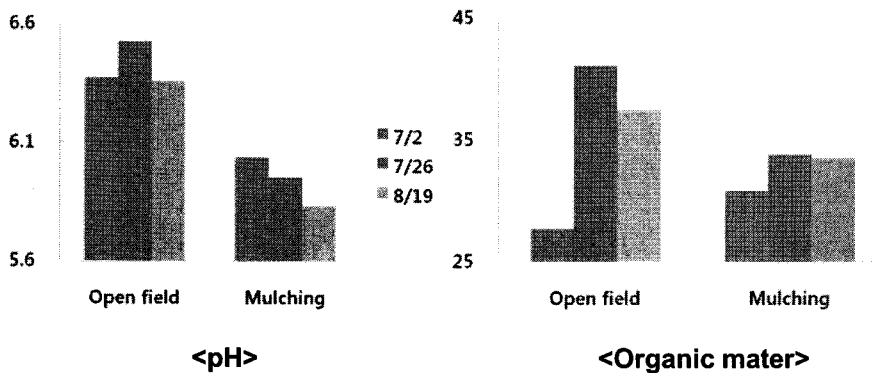


Fig.3. Change of temp., pH and organic matter as influenced by time-dependent mulching rice polymer

### Conclusions

When the naturally decomposing polymer was used, a temperature was elevated as high as 4.7°C on maximum and 2.6°C on average. Also the naturally decomposing polymer accelerated rooting by 7 days and lowered a stress level from transplanting. The weed control effect mulched by polymer was remarkable as 98.7%. The polymer now, after 294 days treated on the rice paddy, has been completely decomposed.

### References

C.K. Kang etc.(2010).: Weeding effect of newly developed natural degrading rice polymer film in paddy field. The Korean Society of Weed Science 30(2):88~89.