

# Soil Management Techniques for High Quality Cucumber Cultivation in Plastic Film Greenhouse



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## Objective

- To induce in best suitability classes of soil for cucumber
- To recommend whole management practices .
  - environmental control in plastics film house, reduced salt accumulation, pest management etc.
- To introduce about high quality cucumber cultivation farm

## Material and Methods

- Analysis area : Gyeongbuk province (Sangju, south part of Korea)
- Analysis of soil, plant, bioassay, yields
  - Soil characteristics : soil survey manual (USDA, 1993)
  - Soil and plant analysis : RDA, 2000
  - Nethod : Sieve & Baermann-funnel Technique
  - Yields and Economics : total yield , RDA(2009)

## Results

Table 1. The characteristics of soil physical and chemical properties.

Soil morphology	Cultivation depth (cm)	Drainage Classes	Texture	Avail. soil Depth (cm)	Flooded	Orientation of Plastic film House	landuse
Alluvial plain	22	Moderately ~ Imperfectly	Coarse loamy	100	Safe area	South-North	Paddy

\* This plastic film house was best suitable area.

Table 2. Before and After experiment of soil

Division	pH (1:5)	EC (dSm <sup>-1</sup> )	OM (gkg <sup>-1</sup> )	Av. P2O5 (mgkg <sup>-1</sup> )	Ex. Cations (cmolkg <sup>-1</sup> )		
					K	Ca	Mg
Before Ex.	5.8	1.3	19	345	0.49	5.1	1.2
After Improving	6.8	1.5	29	390	0.60	6.0	1.3
Range of optimum	6.0~6.5	2.0 이하	20~30	400~500	0.70~0.80	5.0~6.0	1.5~2.0



< Clean crop cultivation : corn >



< Solar disinfection >

Fig.1. Clean crop cultivation and solar disinfection

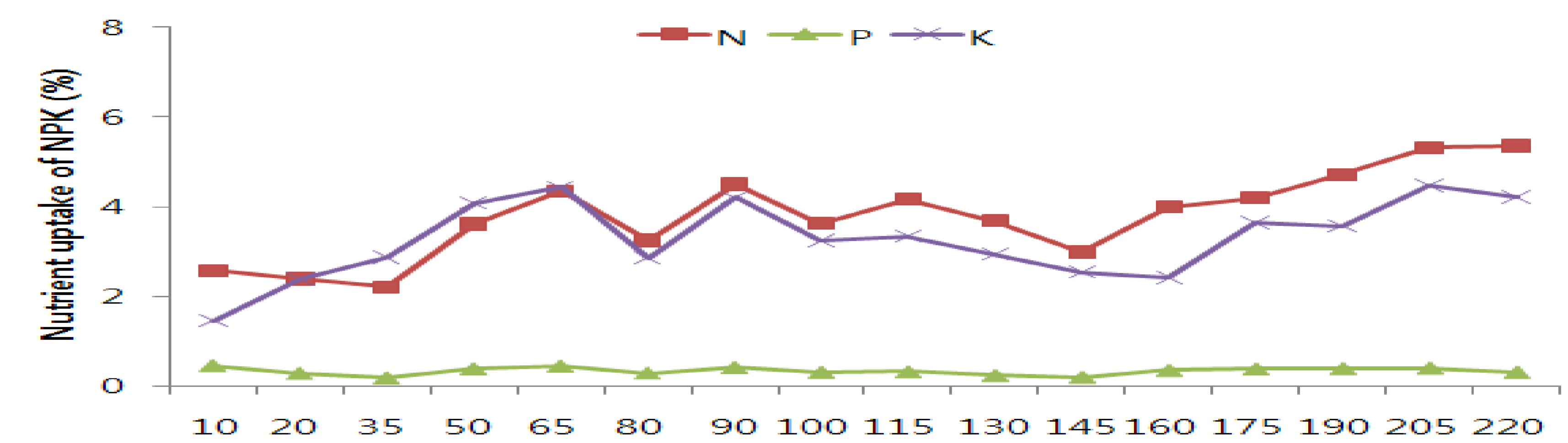


Fig. 2. Seasonal changes of three elements uptake after transplanting.

Table 3. Weight and length of cucumber root.

Division	1	2	3	4	5	6	7	8	9	10	Ave.
Wt. flesh (g)	34.0	33.2	29.8	15.8	39.5	32.2	32.7	35.9	36.0	31.7	32.1±6.33
Wt. Dry (g)	2.67	2.46	2.48	1.38	3.09	2.63	2.51	2.76	2.72	2.65	2.54±0.44
Length (cm)	86	87	91	70	87	158	89	90	91	160	101±31.22

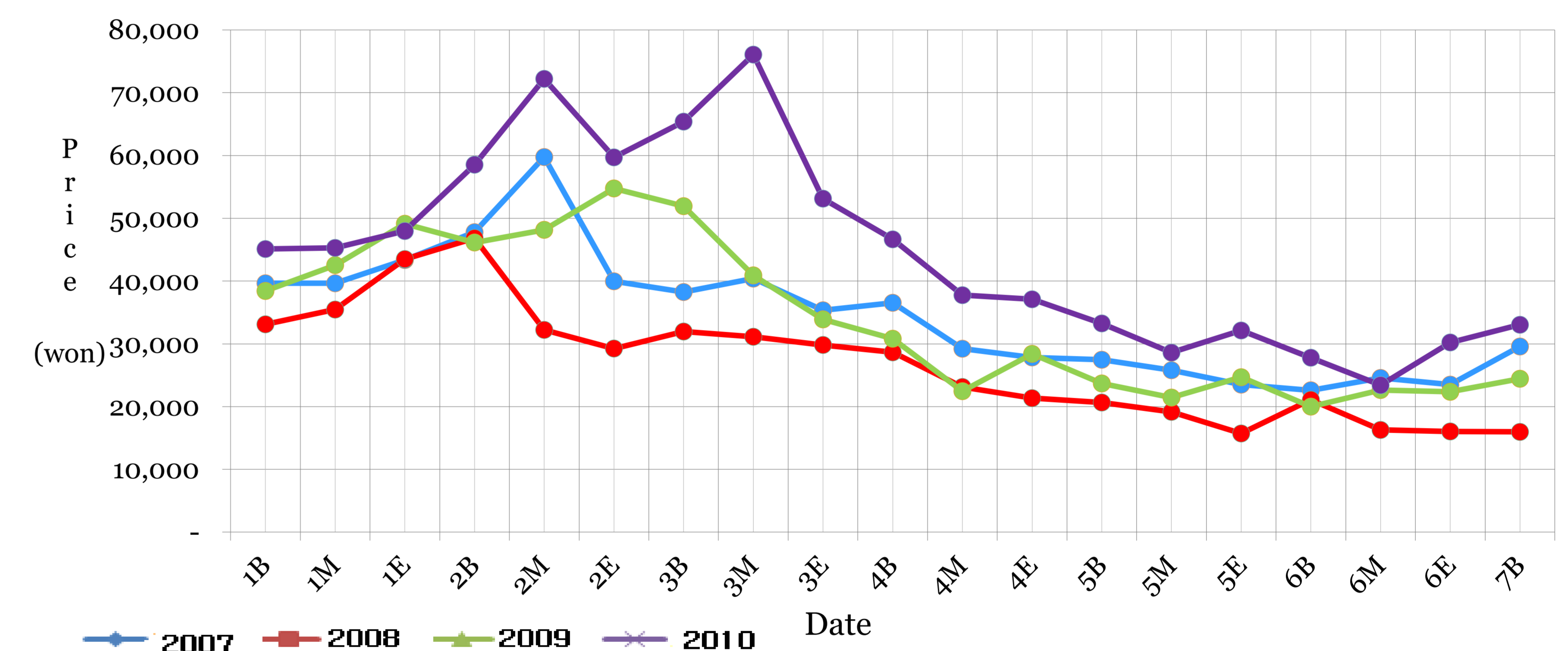


Fig. 3. Seasonal changes in four years the price of cucumber.

Table 4. Cucumber yield and economic analysis.

(unit : one cultivation per year ha<sup>-1</sup>)

Division	Yield (Mg ha <sup>-1</sup> )	Raw income (Won)	Operating cost (Won)	Income (Won)	Income rate* (%)
Improved plot	158.4	416,511,690	200,834,970	215,676,720	51.8
Injury by successive cropping plot	140.3	343,072,830	211,423,410	131,649,420	38.4

\* In the income rate, improved plot is 13.4 percents higher than injury by successive cropping plot.

## Conclusion

More than 90 % of the plastic film greenhouse was installed on paddy soil. Because of expensive initial investment, considering the soil characteristics is more important than any other conditions. Generally after the four years of cultivation, soils tend to increase in EC value, nutrient unbalance and pests. As a result, degradating of the quality and quantity in agricultural products occurred, therefore it is necessary to improve soil conditions. To produce high quality cucumber, soil needs to improve environmental, nutrient, and pest management. In this study, roots, quantities and economic cost of cucumber were analyzed. The best soil conditions for cucumber cultivation were alluvial or valley in soil topology, moderately or imperfectly drainage in soil-water drainage classes, coarse loamy soil in texture, and more than 100cm available soil depth. In addition, rich - sunlight and - groundwater area without flooding would be perfect for the cucumber cultivation. The optimum range of soil nutrient contents were soil pH 6.0~6.5, EC less than 2 dSm<sup>-1</sup>, OM 20~30 gkg<sup>-1</sup>, available phosphorus 400~500 mgkg<sup>-1</sup>, Ex. K 0.7~0.8, Ex. Ca 5.0~6.0, and Ex. Ca 1.5~2.0 cmolkg<sup>-1</sup>. Good environmental managements of plastic film greenhouse were as follows. The temperature needed to be adjusted three times. The optimal daytime temperature could be 22~28°C, the one from 12 until night could be 14~15°C, and the temperature from 12 to sunrise could be 10~12°C. During plant growth period, soil moisture content was as low as 10~15%, and it needed to be maintained as 15~20% during reproductive growth period. To remove the pest, clean crop cultivation and solar disinfection were carried out. Therefore, EC was reduced and the root-knot nematode was controlled also. As a result of improved soil managements, cucumber yield from the plot with improved soil managements increased by 15,840 kg10a<sup>-1</sup>, but plot with successive cropping injury yielded 14,025kg10a<sup>-1</sup>. The income from the plot with improved soil managements was 21,568 won10a<sup>-1</sup>, the plot with successive cropping injury was 13,165 won10a<sup>-1</sup>. Income rate of each plot was 51.8% and 38.4% respectively.