Summary Report

of

MicroSoil Evaluation by Field Experiments

Soil and Fertilizer Institute
Shandong Academy of Agricultural Sciences

Report Date: Nov. 30, 1996

1. Experimental objective

To evaluate the fertilizer effects of MS on vegetables by experiments in the fields

2. Material and methods

The chemical properties of soil in the experimental site

Property	Organic matter %	Total N %	Available P ppm	Available K ppm	pH
Cucumber site	0.778	0.107	34.3	143.1	7.3
Celery site	1.945	0.186	32.4	405.3	6.6

Test cultivars: Cucumber is Jinchun 2 and Celery, western celery, both are specially suitable for protective cultivation under plastic film.

Both cucumber and celery experiments were located in Huying town, Shouguang county. Cucumber was sowed on August 27 and transplanted according to a 26 cm plant distance by 80 cm broad row and 40 cm narrow row distance. Maturing stage cucumber and rapidly growing stage celery were used for MS test, when cucumber plant had 21-26 leaves and 2 cucumbers had already matured (35 cm long and 3.5 cm in diameter).

Celery was sown on June 10 and transplanted on August 25 with row distance 20 cm and a population of 16,675 plants. The protective area covered 214 m^2 (9m by 24m), with a ridge coverage of 11.7 m^2 (9m by 1.3m). The check plots received 85 kg compound fertilizer (N-P-K=15-15-15), and the MS-treated plot received 15 liters/mu of 1:50 diluted solution of MS liquid besides the conventional fertilization. MicoSoil was applied twice, once on November 8 and the other on November 15.

3. Results

For cucumber experiment, 10 plants were chosen from each of MS-treated and check plots. The growth progress of cucumber and its leaves above the 17th node were observed and measured every other day. Table 1 to Table 4 give the results.

For celery experiment, also 10 representative plants were chosen from the conventional and MS-treated plots. The plant height was measured before MS application (November 7) and after harvest (November 29). Meanwhile the total plant weight of each plot was weighed (see Table 5).

4. Discussion

4.1. MicroSoil demonstrated marked yield response of cucumber under the test circumstance. The cucumber plants received MS obviously grew fast at a higher growth rate of 0.33 cm/day than that of the untreated.

4.2. The cucumber growth in diameter of cucumber was consistent with that of its length. The MS-treated ones, on the average, grew from 0.68 cm to 2.94 cm in diameter within 10 days after MS application, at a growth rate 0.26 cm/day. However, it was only 0.1 cm/day for the untreated cucumbers.

4.3. In leaf growth, both the length and the width increased from 9.3 cm to 14.3 cm at a growth rate 0.58 cm/day for the treated, while the check's only 0.42 cm per day, a higher growth rate 0.16 cm/day was responded.

4.4. Conclusively, both celery and cucumber significantly responded to MicroSoil. Therefore, it is highly recommended to extent MS application in the areas with the same agricultural conditions as in the test field.

Cucumber Response to MicroSoil

Soil and Fertilizer Institute
Shandong Academy of Agricultural Sciences
Report Date: Dec. 18, 1996

1. Soil nutrient status of the experimental field

The soil contains organic matter 0.778%, total N 0.107%, available P 34.3 ppm and available K (K$_2$O) 143.1 ppm, and the soil pH is around 7.3.

2. Test cucumber cultivar: Jinchun 2.

3. Methods

The experiment was conducted in a protective area (60 by 8=480M^2) covered with plastic film and started with maturing stage cucumber, when the plant had 21-26 leaves and two cucumbers had matured (35 cm long and 3.5 cm in diameter). Three adjacent plots with even growth were arranged in comparisons. The middle one received 15 liters 1:50 diluted solution of MS per mu on Nov. 7, 1996, leaving the other two on its both sides as checks, on the basis of a conventional application of macronutrient fertilizers.

4. Yield results

On December 16, randomly choosing adjacent 24 plants from each of the three test plots to count the numbers of harvested cucumbers for both treated and check areas. One cucumber from every representative plant was weighed (totally 24 from each plot). Compared to the check plots, the yield and the increase rate were obtained as listed in the following table.

	Cucumbers /24 plants	Cucumbers /plant	Cucumbers /mu	Weight g/24 plants	Weight g/cuc.	Yield kg/mu
Check	69	2.88	12096	4038	168.25	2035.2
MS-treated	73	3.04	12768	4642	193.42	2469.6
Increase	4	0.16	672	604	25.17	434.4
Increase rate (%)	(2469.6-2035.2)/2035.2 = 21.34%					

Note: Plant density = 4,200 plants/mu.

5. Conclusion

The results shown that under the experimental circumstances, MS application had an effect of increasing cucumber yield by 21.34% on the basis of the conventional fertilization and management.

MicroSoil observations in the field

Table 1 Cucumber length (cm)

Check

Date/No.	Days	1	2	3	4	5	6	7	8	Mean
Nov. 8	1	4.0	5.0	9.0	6.0	7.0	4.0	8.0	9.0	6.5
Nov. 10	2	9.5	10.0	13.0	10.0	9.0	9.0	14.0	16.0	11.3
Nov. 12	4	13.0	13.0	17.5	14.0	13.5	13.0	18.0	23.0	15.6
Nov. 14	6	18.0	18.5	27.0	19.0	17.0	17.0	24.0	30.0	21.3
Nov. 17	9	26.0	27.0	32.0	26.0	24.5	24.0	31.0	35.0	28.2
Growth rate (cm/day)		2.40	2.40	2.71	2.23	1.97	2.18	2.54	2.96	2.43

MS treated

Date/No.	Days	1	2	3	4	5	6	7	8	Mean
Nov. 8	1	9.0	6.0	5.0	9.0	7.0	4.0	10.0	7.0	7.1
Nov. 10	2	13.0	10.5	10.0	15.0	10.0	9.0	15.0	14.0	12.1
Nov. 12	4	19.5	16.0	17.0	22.0	16.0	14.0	24.0	15.0	17.9
Nov. 14	6	28.0	23.0	23.0	31.0	19.5	19.5	31.0	18.0	24.1
Nov. 17	9	36.0	31.0	32.0	37.0	27.0	28.0	36.0	25.0	31.5
Growth rate (cm/day)		3.42	3.09	3.31	3.50	2.46	2.89	3.29	1.95	2.99

Table 2 Diameter of cucumber

Check

Date/No.	Days	1	2	3	4	5	6	7	8	Mean
Nov. 8	1	0.40	0.50	0.80	0.60	0.60	0.40	0.80	0.80	0.61
Nov. 10	2	0.80	1.00	1.00	1.10	1.00	0.80	1.10	1.30	1.01
Nov. 12	4	1.00	1.10	1.50	1.20	1.20	1.00	1.50	1.70	1.28
Nov. 14	6	1.50	1.50	2.20	1.50	1.30	1.40	2.00	2.00	1.68
Nov. 17	9	1.90	2.00	2.50	2.00	1.20	2.00	2.20	2.80	2.08
Growth rate (cm/day)		0.18	0.17	0.23	0.16	0.07	0.19	0.18	0.23	0.17

MS treated

Date/No.	Days	1	2	3	4	5	6	7	8	Mean
Nov. 8	1	0.80	0.60	0.40	0.70	0.60	0.50	1.20	0.60	0.68
Nov. 10	2	1.20	1.20	1.20	1.40	0.90	0.80	1.40	1.40	1.19
Nov. 12	4	1.60	1.40	1.40	2.10	1.80	1.10	2.10	1.70	1.65
Nov. 14	6	2.50	2.20	2.40	3.00	2.00	1.70	3.00	2.00	2.35
Nov. 17	9	3.50	3.00	3.10	3.50	2.60	2.00	3.50	2.30	2.94
Growth rate (cm/day)		0.34	0.29	0.32	0.35	0.25	0.19	0.31	0.19	0.28

Table 3 — Length of cucumber leaves (cm)

Check

Date/No.	Days	1	2	3	4	5	6	7	8	Mean
Nov. 8	1	8.4	10.0	11.5	11.0	10.5	8.0	10.0	11.0	10.1
Nov. 10	2	10.0	12.0	13.0	12.0	11.0	10.5	12.0	12.5	11.6
Nov. 12	4	12.5	13.0	14.0	12.5	12.0	11.0	13.0	13.0	12.6
Nov. 14	6	13.0	13.0	14.0	13.0	13.0	12.5	13.0	14.0	13.2
Nov. 17	9	14.0	14.0	14.5	13.5	14.0	14.0	13.5	14.0	13.9
Growth rate (cm/day)		0.67	0.42	0.32	0.28	0.44	0.67	0.36	0.34	0.44

MS treated

Date/No.	Days	1	2	3	4	5	6	7	8	Mean
Nov. 8	1	10.0	7.0	8.0	11.0	10.0	7.5	11.0	10.0	9.3
Nov. 10	2	11.5	12.0	12.0	12.0	12.0	10.0	12.5	12.5	11.8
Nov. 12	4	13.5	13.0	13.0	13.0	14.0	13.0	14.0	13.0	13.3
Nov. 14	6	14.0	14.0	14.0	14.0	15.0	13.0	15.0	14.0	14.1
Nov. 17	9	14.0	14.5	14.0	14.5	17.0	13.5	16.0	14.0	14.7
Growth rate (cm/day)		0.48	0.76	0.62	0.43	0.82	0.68	0.60	0.43	0.60

Table 4 — Width of cucumber leaves (cm)

Check

Date/No.	Days	1	2	3	4	5	6	7	8	Mean
Nov. 8	1	8.0	10.0	11.5	11.0	10.5	8.0	10.0	11.0	10.0
Nov. 10	2	10.0	12.0	13.0	12.5	11.0	10.5	12.0	12.5	11.7
Nov. 12	4	12.5	13.0	14.0	12.5	12.0	11.0	13.0	13.0	12.6
Nov. 14	6	13.0	13.5	14.0	13.0	13.0	12.5	13.0	14.0	13.3
Nov. 17	9	14.0	14.0	14.5	13.5	14.0	14.0	13.5	14.0	13.9
Growth rate (cm/day)		0.70	0.44	0.32	0.25	0.44	0.67	0.36	0.34	0.44

MS treated

Date/No.	Days	1	2	3	4	5	6	7	8	Mean
Nov. 8	1	10.0	7.0	8.0	11.0	10.0	7.5	11.0	10.0	9.3
Nov. 10	2	11.5	12.0	12.0	12.0	12.0	10.0	12.5	12.5	11.8
Nov. 12	4	13.5	13.0	13.0	13.0	14.0	13.0	14.0	13.0	13.3
Nov. 14	6	14.0	14.0	14.0	14.0	15.0	13.0	15.0	14.0	14.1
Nov. 17	9	14.0	14.5	14.0	14.5	17.0	13.5	16.0	14.0	14.7
Growth rate (cm/day)		0.48	0.76	0.62	0.43	0.82	0.68	0.60	0.43	0.60

Table 5   Recordings of celery experiment

No.	Height (cm)				Weight (kg/10 plant)	
	Check (conventional fertilization)		MS application			
	Before application	After appl.	Before application	After appl.	Check	MS-treated
1	70	72	65.5	70		
2	69	71	69.5	73		
3	69	71	70	74		
4	68	70	67	71.5		
5	73	75	68	74		
6	71	73	69	74		
7	70	72	66	70		
8	69	71	68	73		
9	71	73	66	71		
10	73	75	69	76		
Mean	70.3	72.3	67.8	72.7	6.5	6.7
Increase		2		4.9		0.2