



THE OPTIMIZATION OF NITROGEN DOSAGES ON CUCUMBER PLANTS GROWN IN GREENHOUSE

OZLEM ALTUNTAS¹, H.YILDIZ DASGAN²

¹Inonu University Faculty of Agriculture Department of Horticulture, Battalgazi-Malatya,

²Cukurova University Faculty of Agriculture Department of Horticulture, Balcalı-Adana



3rd INTERNATIONAL SYMPOSIUM ON
ORGANIC GREENHOUSE HORTICULTURE
11 - 14 APRIL 2016 / IZMIR, TURKEY

INTRODUCTION

Nitrogen (N) is one of the most important nutrients affecting the growth, development, yield and fruit quality of plants. The most important missing point in plant nutrition is the nutrition of the nitrogen, which is the mostly-used nutrient by plants, and providing the nitrogen from the certified sources in the market. Ready-made, packaged, and easy-to-find organic fertilizers whose quality and ingredients are under guarantee are needed to be used in wide green houses in producing out-of-the-season organic vegetables in a professional manner.

AIM

In this study, the aim is determining the most proper amount of nitrogen for greenhouse cultivation of the cucumber in spring season by using an organic fertilizer, which may be easily found in the market in packages and which is certified with high nitrogen content.



MATERIAL AND METHODS

The study was conducted in the application greenhouse of the Cukurova University, (36°59'N, 35°18'E, 20 m above sea level) where organic production is applied. Patrone (Powder), originated from legume plant waste and contained 41.33% organic matter, 10.21% N, was used as the organic nitrogen source in the study, and Silyon F1 (Rito Inc.) was used as the plant material. The nitrogen dosages in the study were; 0, 0.5, 1.5, 2.5, 3.5 kg ha⁻¹ pure nitrogen. The study was designed for the spring term, the seeds were planted on February 10, and the seedlings were planted in the greenhouse on March 30. During the study, the height of the plants, the number of the leaves, and the diameter of the stem were measured weekly for 5 weeks to examine the effects of the different nitrogen dosages on plant growth. In addition, 4 and 8 weeks after the planting, the roots of the plants were removed twice, and the green parts (shoot + leaves) dry weight over the soil and the root dry weights were recorded. 3 and 6 weeks after the first application, the nitrogen analyses in the leaves were made according to the Kjeldahl method. The cucumber fruits were compared twice for some fruit parameters such as weight, height and diameter. In addition were also investigated at the end of the experiment total yield.



RESULTS

Table 2. The plant height in the cucumbers (cm) grown with different nitrogen dosages.

Applications	35 days after planting	42 days after planting	49 days after planting	56 days after planting	63 days after planting
0 kg ha ⁻¹ N	79,20 b	126,87	160,93	195,00 b	223,33
0,5 kg ha ⁻¹ N	92,86 a	127,33	161,40	199,66 ab	225,66
1,5 kg ha ⁻¹ N	96,27 a	138,60	176,20	210,33 ab	231,66
2,5 kg ha ⁻¹ N	95,73 a	140,40	184,40	211,66 ab	239,33
3,5 kg ha ⁻¹ N	99,07 a	142,93	181,20	215,66 a	241,33
LSD 5 %	16,71	13,99	6,71	12,41	8,43



Table 3. The stem diameter values of the cucumbers grown with different nitrogen dosages (mm).

Applications	35 days after planting	42 days after planting	49 days after planting	56 days after planting	63 days after planting
0 kg ha ⁻¹ N	9,18	9,80	10,30	9,67 c	10,79
0,5 kg ha ⁻¹ N	9,77	10,23	10,62	10,16 bc	11,14
1,5 kg ha ⁻¹ N	9,91	10,58	10,56	10,35 abc	11,25
2,5 kg ha ⁻¹ N	10,02	10,34	10,67	10,99 ab	11,47
3,5 kg ha ⁻¹ N	10,07	9,62	11,15	11,48 a	11,63
LSD 5 %	0,64	1,02	1,76	2,54	1,12



Table 4. The number of the leaves in cucumbers grown with different nitrogen dosages (number).

Applications	35 days after planting	42 days after planting	49 days after planting	56 days after planting	63 days after planting
0 kg ha ⁻¹ N	13 b	19	27 b	38,33	41,00 b
0,5 kg ha ⁻¹ N	16 ab	22	35 a	43,00	46,33 ab
1,5 kg ha ⁻¹ N	15 ab	20	37 a	43,33	48,66 a
2,5 kg ha ⁻¹ N	15 ab	20	34 a	46,33	49,00 a
3,5 kg ha ⁻¹ N	18 a	24	39 a	48,33	50,66 a
LSD 5 %	2,68	4,34	5,56	5,54	2,64



Table 5. Dry weight (g) of shoots and roots at two measuring dates of cucumbers grown with different nitrogen dosages.

Applications	Shoot dry weight (g) (27.04.2012)	Root dry weight (g) (27.04.2012)	Shoot dry weight (g) (18.05.2012)	Root dry weight (g) (18.05.2012)
0 kg ha ⁻¹ N	17,73 c	0,46 b	24,33 b	0,94 c
0,5 kg ha ⁻¹ N	18,58 c	0,76 ab	28,53 ab	0,92 c
1,5 kg ha ⁻¹ N	22,27 b	0,82 ab	27,13 ab	0,97 c
2,5 kg ha ⁻¹ N	27,05 a	0,81 ab	31,28 ab	1,10 b
3,5 kg ha ⁻¹ N	28,24 a	0,89 a	35,50 a	1,32 a
LSD 5 %	8,24	1,04	6,92	0,04

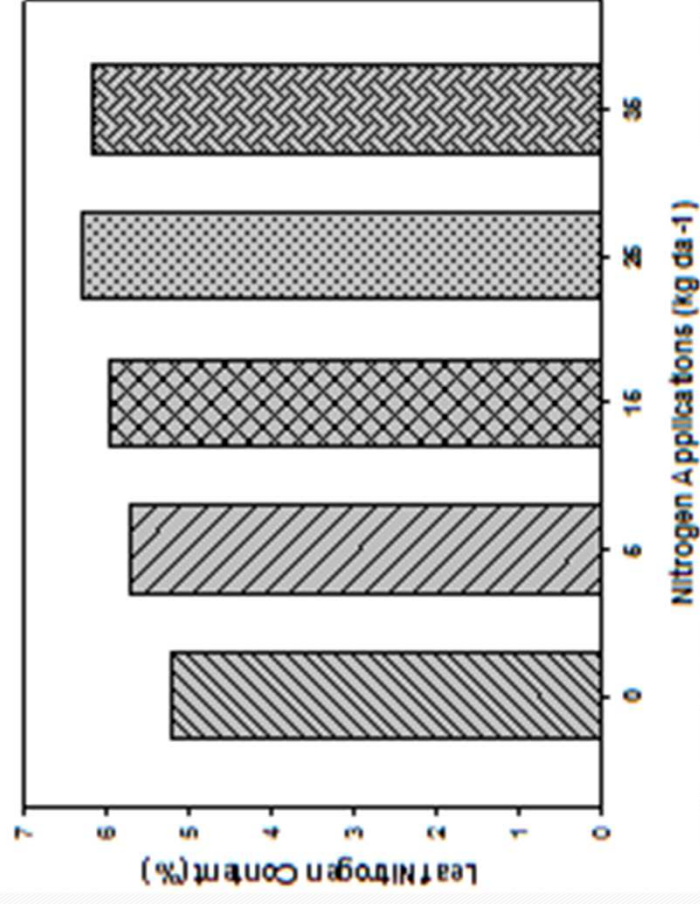


Table 6. The influences of the different nitrogen dosages on the physical properties of the cucumbers received from the harvests at different times.

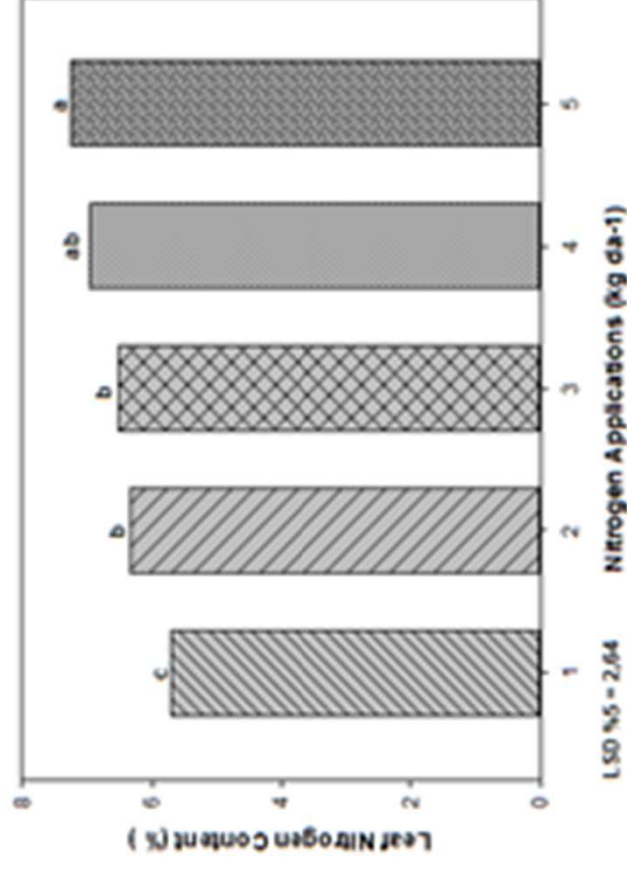
Applications	20.05.2012			03.09.2012		
	Fruit Weight (g)	Fruit Height (cm)	Fruit Diameter (cm)	Fruit Weight (g)	Fruit Height (cm)	Fruit Diameter (cm)
0 kg ha ⁻¹ N	129,86	16,86	32,52	125,75	17,2	33,29
0,5 kg ha ⁻¹ N	134,05	17,03	32,57	128,75	16,35	33,5
1,5 kg ha ⁻¹ N	132,67	16,88	32,63	141,75	17,5	34,63
2,5 kg ha ⁻¹ N	136,21	17,24	33,03	124,5	16,6	31,71
3,5 kg ha ⁻¹ N	140,44	17,37	34,06	121,00	16,25	31,76



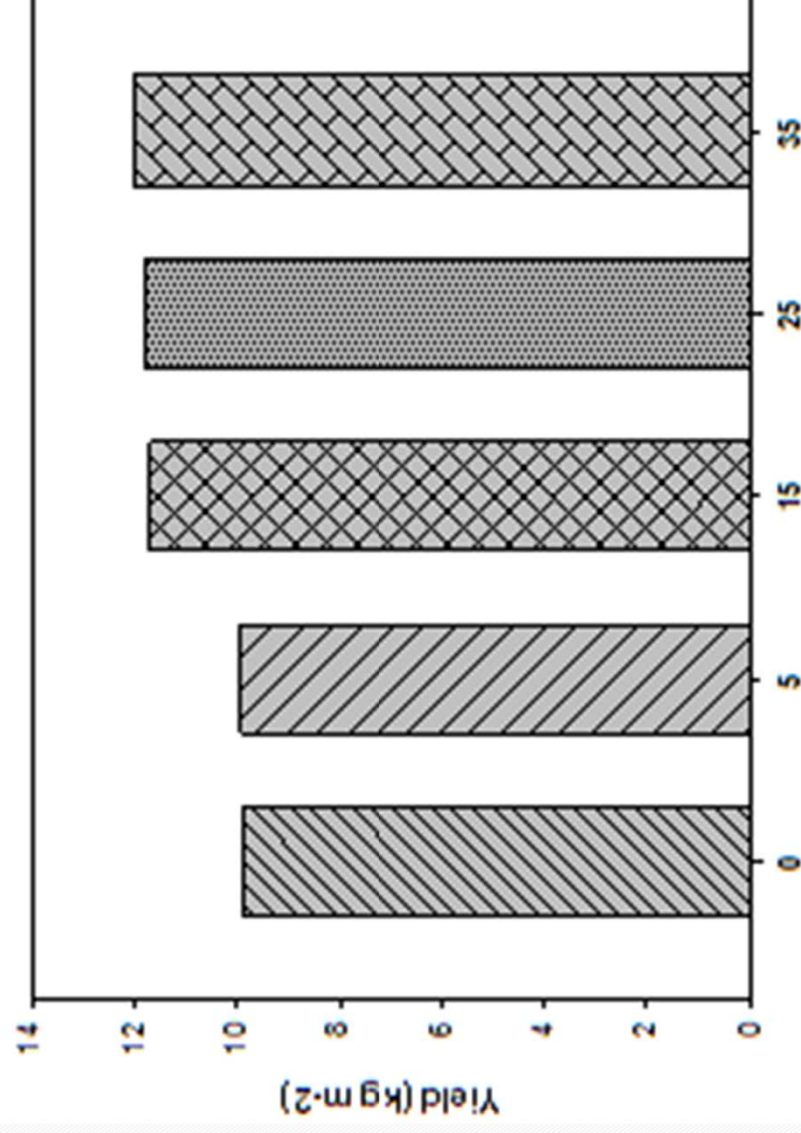
3 Weeks After the Nitrogen Applications



6 Weeks After the Nitrogen Applications



Yield (kg m⁻²)



Nitrogen Applications (kg da⁻¹)



CONCLUSION

According to the results obtained, the highest 2 nitrogen dosages (2,5 and 3,5 kg ha⁻¹) increased the vegetative growth in terms of plant height and the number of the leaves. The vegetable characteristics were not influenced much by different nitrogen dosages, and it was determined that the dosages were influential on the weight more than the height and diameter of the cucumbers. When the yield results are considered it is observed that although the highest yield was obtained from the 3,5 kg ha⁻¹ dosage; in practice, the 1,5 kg ha⁻¹ nitrogen dosage may be sufficient for increase in the yield.

