

Study on Total Control of Tomato 2 + X Nitrogen Fertilizer in Luanzhou City

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Abstract: Tomato is the main planting variety of facility cultivated vegetables in Luanzhou City. In order to continuously optimize the appropriate amount of tomato nitrogen fertilizer, different total amount control tests of nitrogen fertilizer are set on tomato crops to explore the optimal amount of tomato nitrogen fertilizer in this region and provide a theoretical basis for greenhouse tomato production in the future.

1. Roreword

Luanzhou city is located in the eastern part of Hebei province, at the southern foot of Yanshan Mountain and on the west bank of the Luanhe River. The cultivated land area of 56666.67 hm, of which 24000 hm of contiguous sandy land, is the largest sand area in Tangshan city. The soil is mainly sandy loam, which has poor fertilizer and water retention capacity. Tomato is a deep root crop, with good drought tolerance. Planting in sandy land can significantly improve the quality, and can make full use of the light and thermal resources of Luanzhou city, with high planting benefits. The climate of Luanzhou city is a warm temperate semi-humid monsoon continental climate, which is characterized by dry and windy in spring, sultry and rainy in summer, warm and cold at night in autumn, and cold and less snow in winter. The annual average temperature is 10.5°C, the annual average sunshine is 2651.5 hours, the annual average precipitation is 714.5 mm, less rain and snow in winter and spring is suitable for the development of facility vegetables.

At present, Luanzhou city has more than 3333.33 hm of protected land facilities such as greenhouses and greenhouses, and a sown area of more than 5333.33 hm, forming a cultivation mode of "the first crop of melon crops (cucumber, melon, watermelon) -the next crop of tomato". This paper studies the optimal amount of tomato nitrogen fertilizer, which provides a basis for verifying the soil and plant nutrient test indexes, and provides a reference for further correcting and improving the optimized fertilization technology.

2. Trial design

The design is based on the Technical Specification for Soil Testing and Formula Fertilization (revised in 2011),

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using the "2 + X" scheme, "2" refers to the comparative fertilization test study based on conventional fertilization and optimized fertilization; this test scheme "X" specifically refers to the further study on nitrogen nutrients. ^{[1][2]}Conventional fertilization is the fertilization technology used by most local farmers in vegetable production, and optimized fertilization is the local recent high-efficiency or high-yield or suitable vegetable fertilization technology; "X" treatment involves organic fertilizer, phosphorus and potassium fertilizer dosage, fertilization period should be close to optimal management. ^{[3][4]}

2.1. Test variety: Beautiful pink 15 (Beijing)

Medium variety, unlimited growth form, fruit round or slightly oblate, fan jiang color, single fruit weighs 180-200 grams, are of good quality. highLeaf mildew resistance and viral disease of aphids and whitefly has certain ward off. Suitable for protected area and flourish.

2.2. Test soil: Sandy loam

Sandy loam soil particle composition of clay, silt and sand content of soil, sand mean sediment concentration 80%, about 20% of clay soil and sandy loam is between loam and sandy soil.

2.3. Test fertilizer:

46.4% Large particle urea in Hebei Ruifeng

51% Potassium Sulfate State Investment Xinjiang Lop Nur Potash Co., LTD

12% Hyperphosphate Tangshan Bonli Jinyin Chemical Co., Ltd

2.4. Layout diagram of the test community

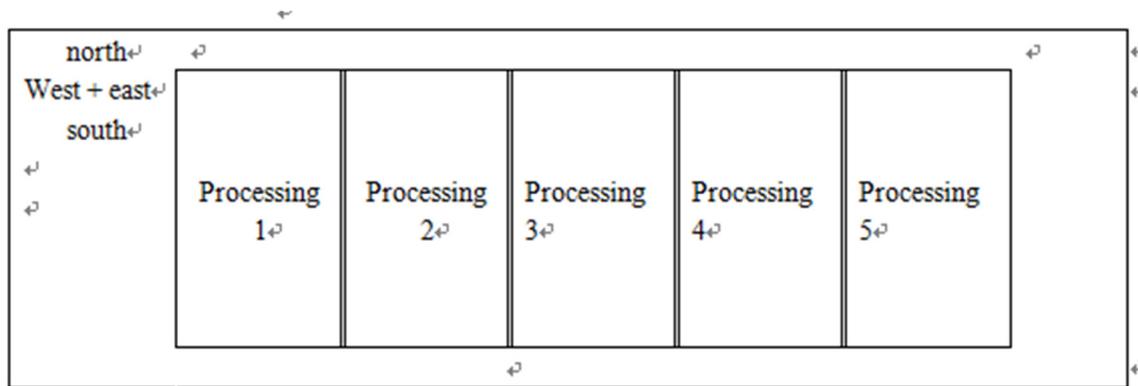


Figure 1 Layout diagram of the test community

Each small area is 8 meters long, 8.5 meters wide, and an area is 68m². A total of 5 beds and 10 rows.

2.5 Test treatment

The test was carried out on the basis of proper machine fertilizer, organic fertilizer 167kg / 667m². Using a complete random block group design, the design of 5

treatments, the plot area of 68 m². There is no repetition. The test treatment contents are as follows: (1) nitrogen-free area; (2) 70% optimized nitrogen application area; (3) optimized nitrogen application area; (4) 130% optimized nitrogen application area; and (5) conventional fertilization. See, for details, [5][6] Table 1 below for each treatment:

Table 1 Control Test Scheme of Total Nitrogen Fertilizer in Tomato

Test processing	Test content	handle	N	P	K
1	No nitrogen zone	N ₀ P ₂ K ₂	0	2	2
2	70% of optimized nitrogen regions	N ₁ P ₂ K ₂	1	2	2
3	Optimize the nitrogen zone	N ₂ P ₂ K ₂	2	2	2
4	The 130% optimized nitrogen zone of the	N ₃ P ₂ K ₂	3	2	2
5	Regular fertilization	NPK	-	-	-

Description: 0 level: no such nutrient is applied; 1 level: 70% of the recommended value suitable for local production conditions; 2 level: suitable for local production conditions; 3 level: excessive fertilization level, 1.3 times the appropriate recommended amount of

2 level nitrogen fertilizer.

2.6 Fertilization formula and fertilization amount in each community

Table 2 Fertilization formula

	Fertilization method	make up a prescription	The amount per mu is kg	Equivalent to kg per mu dosage			The number of fat chasing
				urea	superphosphate	glazier's salt	
Optimized fertilization	base fertilizer	15-18-13	80	25.86	120	20.39	-
	top application	15-5-35	10	3.23	4.17	6.86	Four times, the 1-4 times.
	base fertilizer	17-17-17	89	32.61	120	29.67	-
Regular fertilization	top application	20-20-20	10	4.31	16.67	3.92	Four times, 1,2,3 and 5.
	top application	12-8-40	10	2.59	6.67	7.84	Three times, 4,6 and 7

2.7 Specific fertilizer treatment are shown in Table 3 in kg / 68m²

Table 3 Fertilizer of nitrogen, phosphorus and potassium for each treatment

Test processing		1	2	3	4	5
Test content		No nitrogen zone	70% of optimized nitrogen regions	Optimize the nitrogen zone	130% Optimize the nitrogen zone	Regular fertilization
Fertilization level		N ₀ P ₂ K ₂	N ₁ P ₂ K ₂	N ₂ P ₂ K ₂	N ₃ P ₂ K ₂	NPK
bottom fertilizer	urea	0	1.85	2.64	3.43	3.32
	superphosphate	12.23	12.23	12.23	12.23	12.23
	glazier's salt	2.08	2.08	2.08	2.08	3.02
chase after fertilizer	urea	0	0.23	0.33	0.43	0.44
	superphosphate	0.42	0.42	0.42	0.42	1.7
	glazier's salt	0.70	0.70	0.70	0.70	0.4
chase after fertilizer	urea	-	-	-	-	0.26
	superphosphate	-	-	-	-	0.68
	glazier's salt	-	-	-	-	0.8

Target yield of optimized fertilization: 4000-5000kg / m²

3. Test implementation

3.1 Application method

All treatment and test fertilizers are composed of urea, calcium perphosphate and potassium sulfate according to the test requirements. Base fertilizer before artificial mixing, ditch fertilization, topdressing with watering fertilization. In addition to the different amount of fertilization, other management measures are the same. [7][8]

3.2 Field implementation

Prepare the land on April 1st and apply base fertilizer. On April 6th, 275 trees were transplanted in each community and completed on the same day. Treatment 4 topdressing fertilizer 4 times, respectively May 14, May 24, June 3, June 12; treatment 5 topdressing fertilizer 7 times respectively May 14, May 24, June 3, June 3, June 7, June 12, June 18, June 25, each with watering fertilization. Picking began on July 2nd. [9][10]

4 Test results

4.1 Table4 Treatment output and income per mu

Table 4 Treatment output and income per

handle	Community yield (kg)	Kos per kg/667m ²	Unit price (Yuan)	Income per (Yuan/667m ²)
1	336.51	3300.8	2	6601.6
2	247.38	4342.2	2	8684.4
3	509.27	4995.4	2	9990.8
4	470.74	4614.8	2	9229.6
5	480.23	4710.5	2	9421

1: Nitrogen-free area 2:70% optimized application area 3: optimized nitrogen application area 4:130% optimized nitrogen application area 5: conventional fertilization area

Table5 Fertilizer input for each treatment
 (Urea 2.2 / kg, calcium perphosphate 1.25 / kg, potassium sulfate 3.6 / kg)

han dle	urea (kg /667m ²)	put into (Yuan Yuan / 667m ²)	superphosph ate (kg/667m ²)	put into (Yuan Yuan / 667m ²)	Potassium sulfate (kg / 667m ²)	put into (Yuan Yuan / 667m ²)	Total input of fertilizer (Yuan Yuan / 667m ²)
1	0	0	136.68	170.85	47.83	172.19	343.04
2	24.15	53.13	136.68	170.85	47.83	172.19	396.17
3	38.78	85.32	136.68	170.85	47.83	172.19	428.36
4	50.41	110.9	136.68	170.85	47.83	172.19	453.94
5	57.62	127.76	206.68	258.35	68.87	247.93	634.04

1: Nitrogen-free area 2:70% optimized application area 3: optimized nitrogen application area 4:130% optimized nitrogen application area 5: conventional fertilization

5 Conclusion

Influenced by different amount of nitrogen fertilizer on tomato yield. Optimized fertilization (46.4% urea 29.09 kg / 667 m², 51% potassium sulfate, 27.25 kg / 667 m², 12% calcium superphosphate 124.17 kg/m²) 667 the highest yield, nitrogen area than 70% increase of 653.2 kg / 667 m², increase rate of 15%; Than 130% optimized nitrogen area increase 380.8 kg / 667 m², increase production rate of 8.25; Than conventional fertilization (46.4% urea 39.51 kg / 667 m², 51% potassium sulfate, 41.43 kg / 667 m², 12% calcium superphosphate 143.34 kg/667m²) by 284.9 kg / 667 m², increase rate of 6.05%; Is not the lowest nitrogen production. Compared to the conventional fertilization mu optimized fertilization increase 775.48 yuan.

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