施钾量对山东褐土夏玉米产量、效益及钾素平衡的影响

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摘 要: 0 45 90 180 270 kg/hm² 5 :
4.97%~5.59% 90 kg/hm²
180 kg/hm² 270 kg/hm²
174.2 kg/hm² 50.6 kg/hm²
87% -
204 kg/hm²
17.99%~54.28%

关键词: ; ;
中图法分类号: S143.3; S513 **文献标识码:** A **文章编号:** 1000-2324(2015)03-0337-04

Effects of Potassium Levels on the Yield, Economic Benefit and Potassium Balance of Summer-maize in Cinnamon Soil of Shandong Province

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Abstract: The study of different potassium(K) levels was conducted on summer-maize production in cinnamon soil area of Shandong Province. Results showed that the maize yields of K treatments were all increased compared with no K treatment with the amplitude from 4.97% to 5.59%. The difference between the treatment with 90 kg/ha K_2O and no K treatment was very obvious, the differences between the treatments of 180 kg/ha K_2O,270 kg/ha K_2O and no K treatment were obvious, but there were no obvious differences among maize yields of the K treatments.According to calculation, the K_2O level of the highest maize yield was 174.2 kg/ha,the highest economic K_2O level was 50.6 kg/ha. About 87% K_2O accumulated in maize straws according to sample analysis. The K_2O contents in straw and grain increased with the increase of K_2O levels. From the point of potassium balance between soil and crop, 204 kg/ha K_2O was needed to balance the income and output of soil potaasium. But the potassium(K) use efficiency(KUE) was decreased with the increase of potassium level. The KUE ranged from 17.99% to 54.28% in the experiment.

Keywords: K level; summer-maize; Potassium balance

[1]

[2]

21.1% [3]

1 材料和方法

1.1 试验材料

2008 5 2008 10

13.1 641.5 mm

收稿日期: 2013-05-17 **修回日期:** 2013-11-25
基金项目: - (IPNI) (NMBF-Shandong-2008); (2015YQN38)
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0~20 cm

[4] : 1.58% 80.04 mg/kg 33.71 mg/kg 151.50 mg/kg 958 25 cm 60 cm 60000 /hm^2

1.2 试验方法与过程

5 0 45 90 180 270 kg/hm^{2}5 3 40 m^2 1

表 1 玉米各处理肥料用量（kg/hm^2）

Table 1 Fertilizer levels of the treatments of summer-maize

Treatments	Fertilizer levels(kg/hm^2)		
	N	P_2O_5	K_2O
K0	180	75	0
K45	180	75	45
K90	180	75	90
K180	180	75	180
K270	180	75	270

2008 5 26 6 20 50% 50% 7 22

5 80 °C 2 mm H_2SO_4-H_2O_2

Excel DPS

K_2O, kg/hm^2 = + -

= /(+)

(%)=(-)/ ×100[5,6]

2 结果与分析

2.1 经济产量分析

45 kg/hm^2 90 kg/hm^2 90 kg/hm^2

4.97%~5.59% 90 kg/hm^2 377.09 kg/hm^2 5.59% 45 kg/hm^2 90 kg/hm^2 90 kg/hm^2

表 2 不同施钾处理生物产量、经济产量及收益分析

Table 2 Biological yield、yield and economic efficiency analysis of different K treatments

Treatments	Biological yield kg/hm^2	Yield kg/hm^2	Increased yield* kg/hm2	Increased rate* %	Yield increment per kg K_2O(kg/kg)	Output (/hm^2)	Net income (/hm^2)
K0	14045.43bA	6750.10bB	-	-		9450.14	8016.14
K45	14648.22abA	7019.55aAB	269.46	3.99	5.99	9827.38	8091.88
K90	14951.85bA	7127.19aA	377.09	5.59	4.19	9978.06	7941.06
K180	14874.32bA	7097.66aA	347.56	5.15	1.93	9936.72	7598.22
K270	14955.81bA	7085.81aA	335.71	4.97	1.24	9920.13	7280.13

* kg/hm^2 = - K0 * % =[(- K0 / K0]×100 kg/kg

N=4.8 /kg P_2O_5=7.6 /kg K_2O=6.7 /kg =1.4 /kg

*Yield-increasing(kg/hm^2)=Yield of K fertilizer treatment-Yield of K0 treatment * Increased rate(%)= [(Yield of K fertilizer treatment-Yield of K0 treatment)/Yield of K0 treatment] × 100 Yield-increasing of per kg K2O: Increased yield of per kg K fertilizer Fertilizer pieces: N=4.8 Yuan/kg P_2O_5=7.6 Yuan/kg K_2O=6.7 Yuan/kg The price of production (maize)=1.4 Yuan/kg

x y $y = -0.0124x^2 + 4.32x + 6797.2(R^2 = 0.8612)$
174.2 kg/hm^2 1 45 kg/hm^2
1 kg 5.99 kg 1 kg

K45>K0>K90>K135>K270 50.6 kg/hm^2

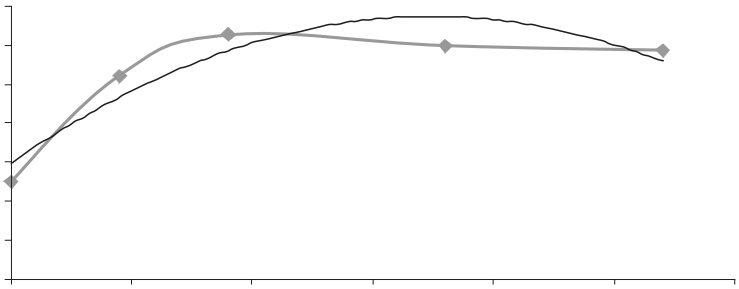

图 1 钾肥产量效应
Fig.1 Effect of Potassium fertilizer on yield

2.2 土壤钾素平衡及钾素利用率分析

3
6~7
- K270
160.44 kg/hm^2
180 kg/hm^2 20.64 kg/hm^2 270 kg/hm^2 61 kg/hm^2

204 kg/hm^2 2
17.99%~54.28%

表 3 不同施钾处理土壤钾素平衡及钾素利用率分析
Table 3 Potassium balance and KUE analysis of different K treatments

Treatments	Stem		Grain		Potassium levels (kg/hm^2)	Profit and loss of K_2O(kg/hm^2)	Equilibrium coefficient of K_2O	(KUE)%
	Percentage of K_2O	K_2O adsorption kg/hm^2	Percentage of K_2O	K_2O adsorption kg/hm^2				
K0	2.12	141.21	0.31	19.23	0	-160.44	0	-
K45	2.33	162.28	0.35	22.58	45	-139.86	0.24	54.28
K90	2.37	169.31	0.37	24.23	90	-103.55	0.47	36.79
K180	2.44	173.24	0.42	27.40	180	-20.64	0.90	22.33
K270	2.51	180.35	0.44	28.65	270	61.00	1.29	17.99

K_2O K content using K_2O meter

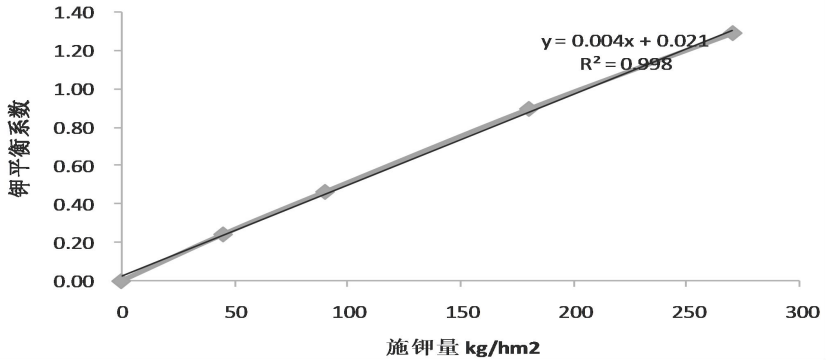

图 2 施钾量与钾平衡系数关系
Fig.2 The relationship of potassium and potassium balance coefficient

3 讨论与结论

6 87% , [6~8]

0~90 kg/hm^2

90~270 kg/hm^2

45 kg/hm^2

174.2 kg/hm^2

50.6 kg/hm^2 204 kg/hm^2

2001

75~225 kg/hm^2[9]

,

150~200 kg/hm^2

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勘 误：

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1. 原文 1.3.3 Jaccard Index *c* *a* *b*

更正为：1.3.3 Jaccard Index $I = c/a+b-c$ *c* *a* *b*

2. 原文：1.3.4 overlap $I = c/a+b-c$ match degree

更正为：1.3.4 overlap match degree

3. 原文：

C	1522	224	436	538	540	60	48	96	0	12

更正为：

C	1522	224	436	538	540	60	48	96	0	0	12

4. 原文： Sigma Plot Biodap R

更正为： Sigma Plot Biodap R