Effect of Potash Application on Early Ripening and Yield of Cabbage

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Research from northern China has defined the yield and quality benefits farmers can expect from potassium (K) fertilizer application in cabbage...an increasingly important cash crop.



In the Tianjin area, K application promoted early uniform ripening of cabbage. Due to its cold resistance, short growing time, and rapid biomass accumulation, cabbage has become an important early spring as well as summer vegetable crop grown in north China. The area under cultivation has increased recently. Cabbage is classified as a K loving plant because of its high K requirement. From K fertilization field trials conducted in the Tianjin area of China, it was noted that K application exhibited a significant effect on promoting early uniform ripening and head size as well as increasing cabbage yield.

Effect of K Application on Promoting Early Ripening of Cabbage

Potassium promotes early ripening of cabbage, which allows preferred pricing because of its early entry into the market. It can also increase plant size and form firmer heads than those not receiving adequate K. Based on a harvest of 150 cabbages per treatment plot, data on the early ripening of cabbage are presented (Figure 1). Application of



150 to 300 kg K₂O/ha increased early ripening by 82 to 141 percent, about 0.8 to 1.4 times earlier maturing than cabbage not receiving K. An application of 225 kg K₂O/ha resulted in the earliest maturity. Application of 300 kg K₂O/ha produced the latest maturing cabbage among treatments with K added, but this ripening rate was still 82 percent faster compared to the no K treatment.

Figure 1. Effect of potash application on early maturing rate of cabbage in Tianjin, China.

Effect of K Application on Above Ground Biomass Accumulation

Cabbage exhibited a marked biomass yield increase with increasing rates of K, in particular with the rate of 225 kg K_2O/ha . This application rate gave the maximum biomass yield increase of 14.2 t/ha (14.4 percent) compared to the no K treatment (**Table 1**). Biomass yield showed

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A rate of 225 kg K₂O/ha, with optimum rates of N and P, produced significant increase in cabbage yield.

 Table 1. Effect of K application on average gross
biomass weight (t/ha) of cabbage in Tianjin, China. Mean gross Increase, Treatment¹ weight, t/ha² % NPK. 98.8 0 NPK₁₅₀ 105.0 6.3 NPK₂₂₅ 113.0 14.4 NPK₃₀₀ 107.0 8.3 ¹N and P₂O₂ were applied at rates of 225 and 60 kg/ ha, respectively, to all treatments. 2 LSD (0.10) = 5.05; LSD (0.05) = 6.17

a diminishing trend when additional K (300 kg K_2 O/ha) was applied.

Effect of K Application on Commercial Yield

Potash applied at 225 kg K_2O/ha produced the highest commercial yield increase of 17.4 t/ha (35 percent) compared to no K application. The same rate also resulted in the maximum profit for the farmer

Table 2. Effect of I	(application o	n cappaae	vield and	economic benefit	Tianiin	China
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					Increased income
	Yield,	Yield increase,	Cost of fertilizer,	Net profit,	per kg K ₂ O,
Treatment ¹	t/ha²	%	Yuan/ha	Yuan/ha³	Yuan/kg
K	49.2	0	1,090	0	0
K ₁₅₀	63.0	28.0	1,400	7,960	53.1
K 225	66.6	35.4	1,560	9,970	44.3
K ²²⁵ ₃₀₀	58.1	16.1	1,720	4,710	15.7

 1N and P_2O_s were applied at rates of 225 and 60 kg/ha, respectively, to all treatments. 2LSD (0.05)=9.23; LSD (0.01)=12.8.

³Cabbage price=0.6 Yuan/kg, fertilizer price (Yuan/kg): N = 3.5, $P_2O_5=5.0$, $K_2O=2$.

of 9,970 Yuan/ha (**Table 2**). This is a clear example of the economic benefit of investing in K for cabbage production in the Tianjin area. At 225 kg K_2 O/ha, each Yuan spent on a kg of K_2 O provided a gain of 44.3 Yuan.

Eighty plants were sampled from each treatment to study the average gross weight/plant and the commercial weight of big and small classified cabbage. Results indicate the mean gross weight/ plant increased by 0.2 to 0.5 kg/plant (**Table 3**). The mean commercial weight of representative large cabbages increased by 0.1 to 0.3 kg/plant. Small cabbages increased by 0.1 to 0.2 kg/plant. Therefore, the effect of K application on increasing cabbage weight applies across all size classes.

Conclusions

Potash applied at the rate of 225 kg K₂O/ha supports rapid heading, rapid maturation, improvements in cabbage quality, and higher farm income. In the Tianjin region, the rate of 225 kg K₂O/ha, along with 225 kg N/ha and 60 kg P₂O₃/ha, is recommended for cabbage production on soils represented by this trial. This application should bring the farmer a net profit of 9,000 to 10,000 Yuan/ha, depending on local market prices. **BCI**

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tively, to all treatments.						
3.5, P ₂ 0 ₅ =5.0, K ₂ 0=2.1						
	Table 3.	Effect of K application on cabbage/plant weight (gross kg/plant).				
	Treatment ¹	Mean gross weight, kg/plant²				
	NPK ₀ NPK ₁₅₀ NPK ₂₂₅ NPK ₂₂₅	2.6 2.8 3.1 2.9				
	³⁰⁰ ¹ N and P_2O_5 were applied at rates of 225 and 60 kg/ha, respectively, to all treatments. ² LSD (0.05)=0.30; LSD (0.01)=0.42					

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