# The effect of biochar on soil and rape in a pot experiment

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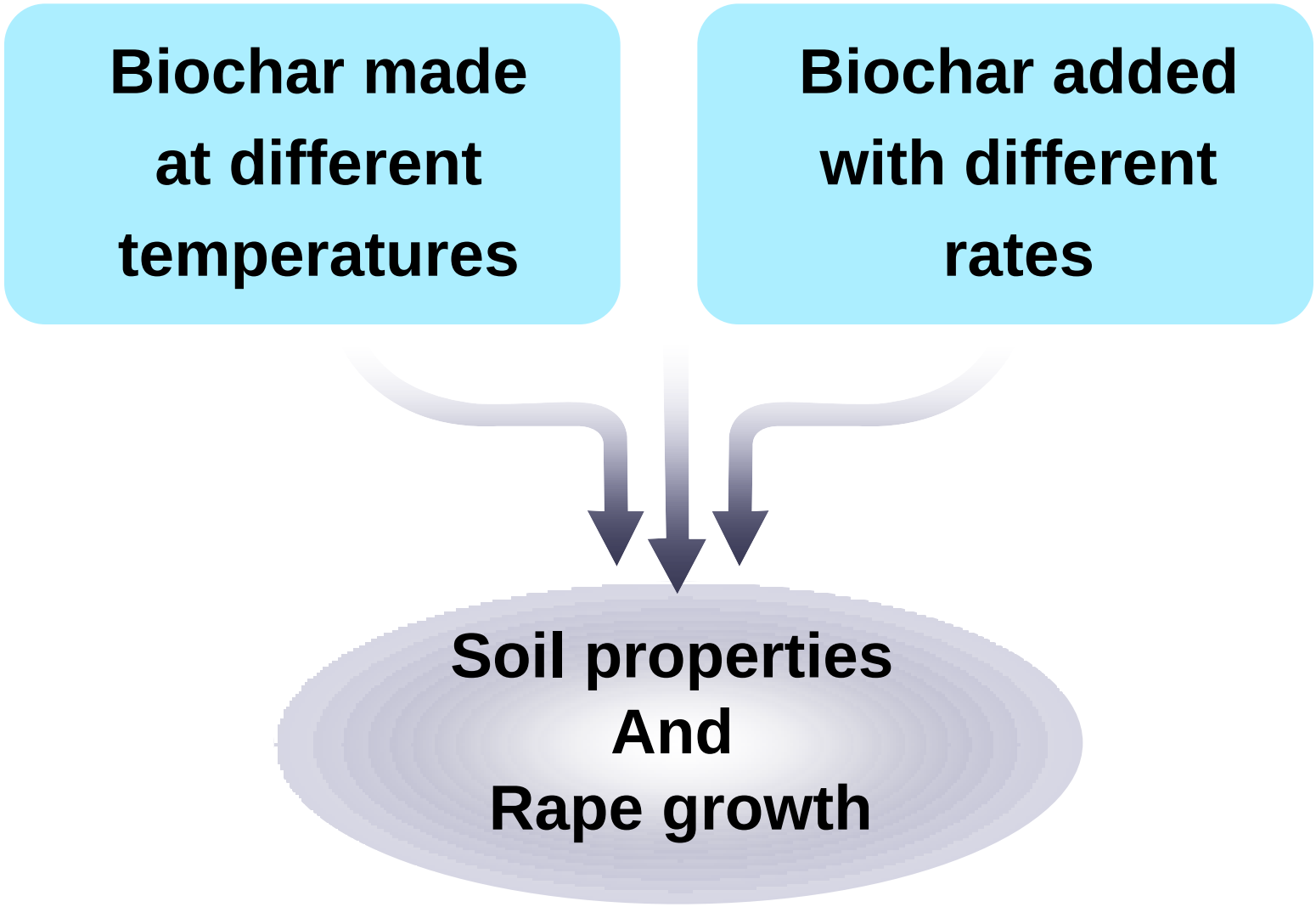

Biochar made at different temperatures
Biochar added with different rates
Soil properties
And
Rape growth

# Biochar

- **Material: wheat straw**
- **Production: pyrolyzed at 200℃, 300℃and 500℃ for 2 h in a muffle furnace**
- **Biochar sieved through 1 mm mesh**

| Temperature | C % | N % | H % | Biochar rate% | pH ($H_2O$) | EC (uS $cm^{-1}$) |
|---|---|---|---|---|---|---|
| 200℃ | 44.22 | 1.01 | 5.90 | 78.48 | 6.00 | 633.5 |
| 300℃ | 58.03 | 1.39 | 4.52 | 44.45 | 7.55 | 1040.0 |
| 500℃ | 69.82 | 1.11 | 2.66 | 32.77 | 10.19 | 1293.0 |

# Red Soil

- from Hubei province
- sieved through 2 mm mesh

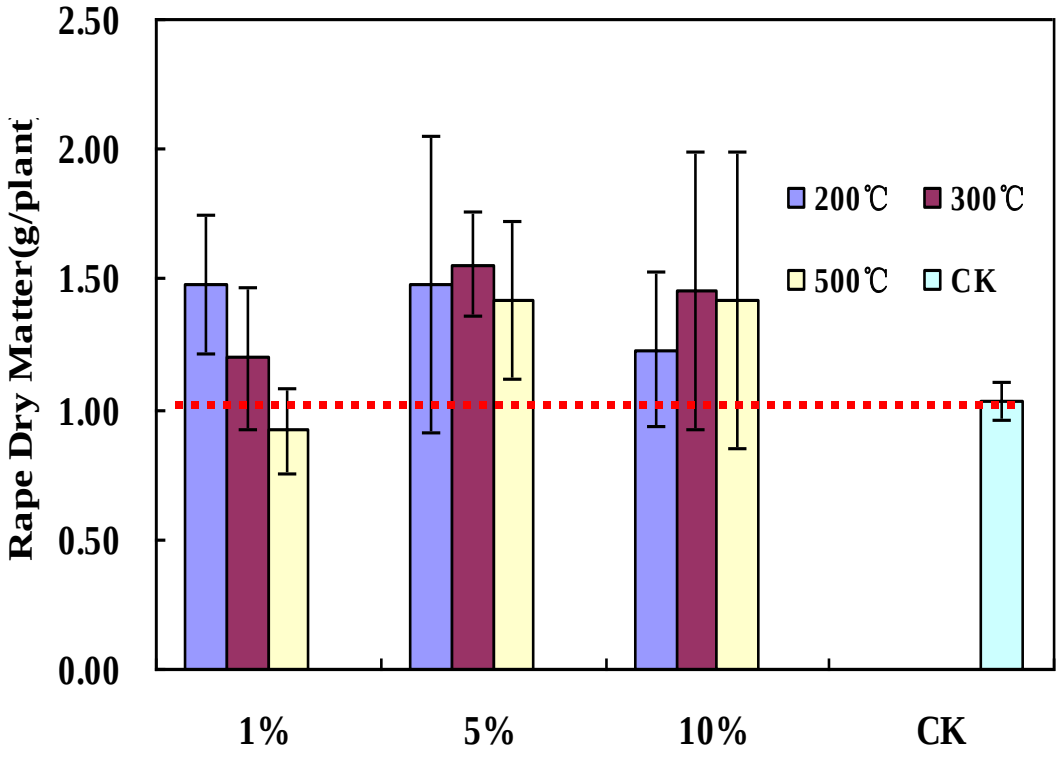
| Soil | pH | OM (g/kg soil) | TN (g/kg soil) | Olsen P (mg/kg soil) | Available K (mg/kg soil) |
|---|---|---|---|---|---|
| Soil | 4.41 | 8.38 | 1.59 | 2.41 | 115.64 |

# Pot Experiment

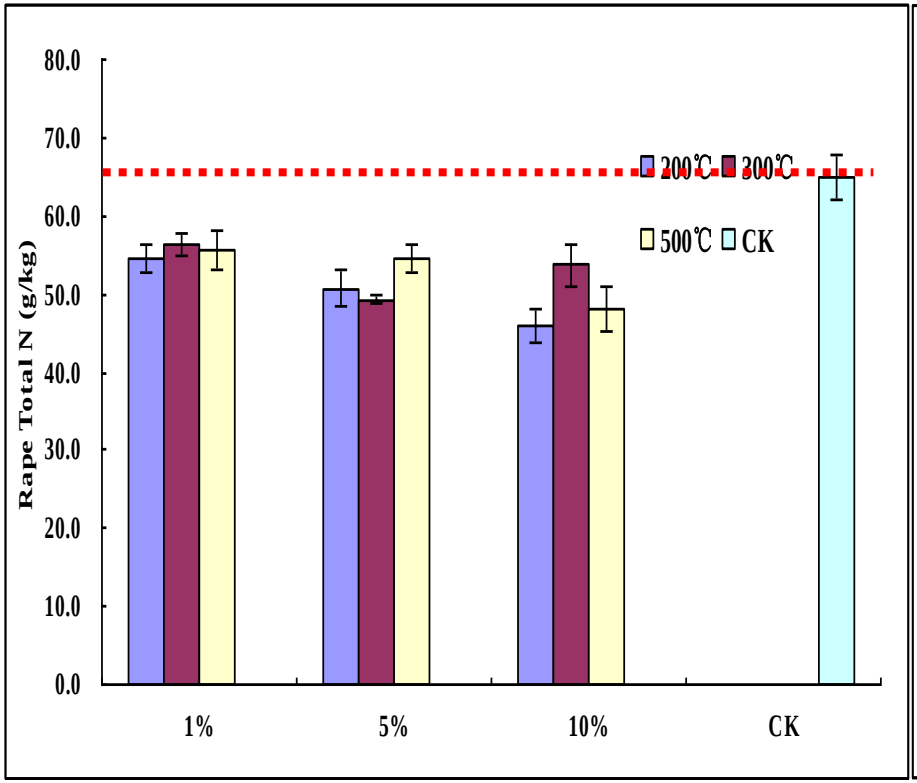
- Control (without biochar)
- Biochar made at 200℃,300℃,500℃
- Biochar added rates (1%,5%,10%)

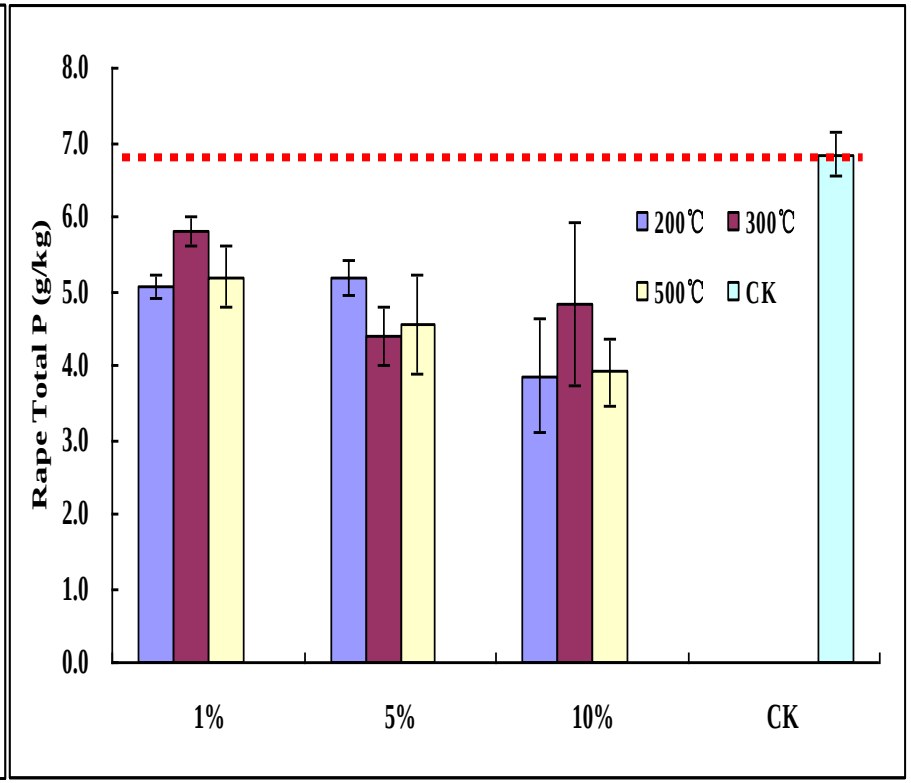
- 3 kg soil per pot, NPK(150 kg, 75 kg and 75 kg $ha^{-1}$).
- 3 rape seedlings, incubated at a greenhouse for 2 months.

# Rape Dry Matter

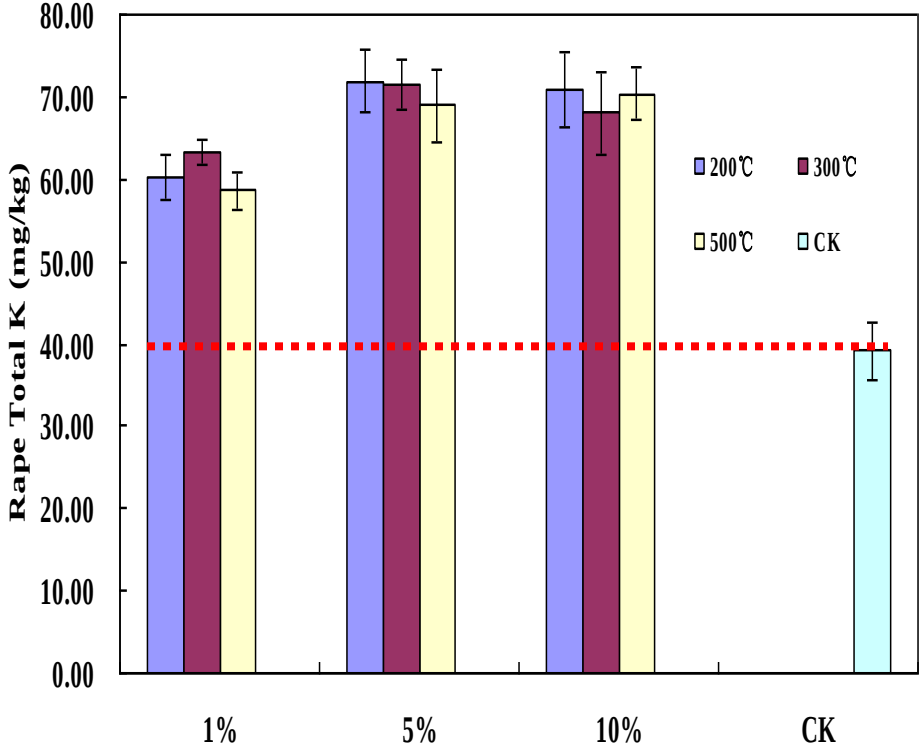



- Rape dry matter in biochar amendment pots was averagely 34.0% higher than that in the control.



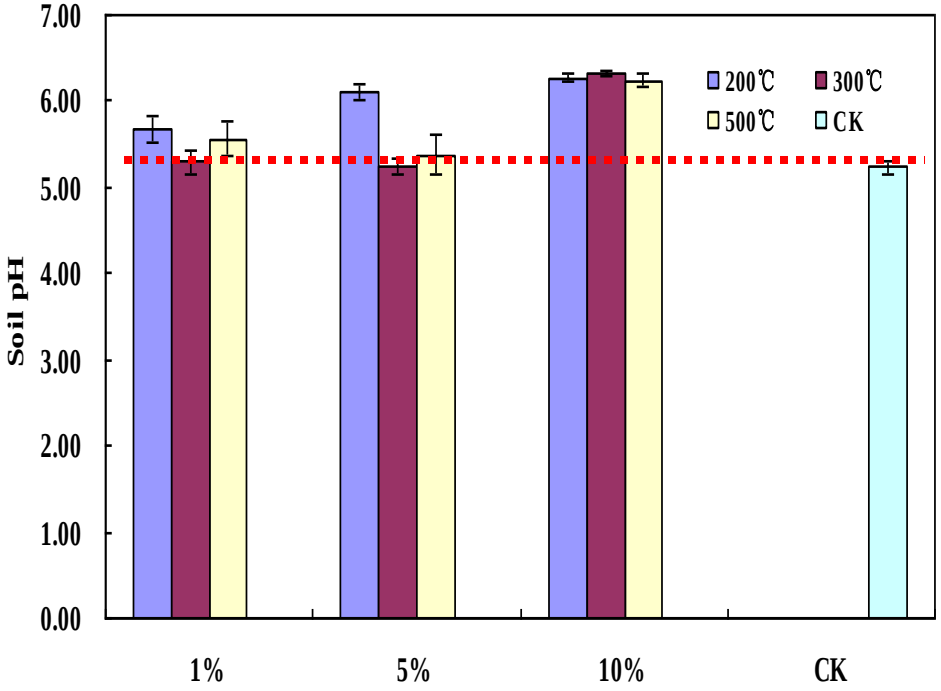




**N and P contents of the biochar amended treatments decreased.**

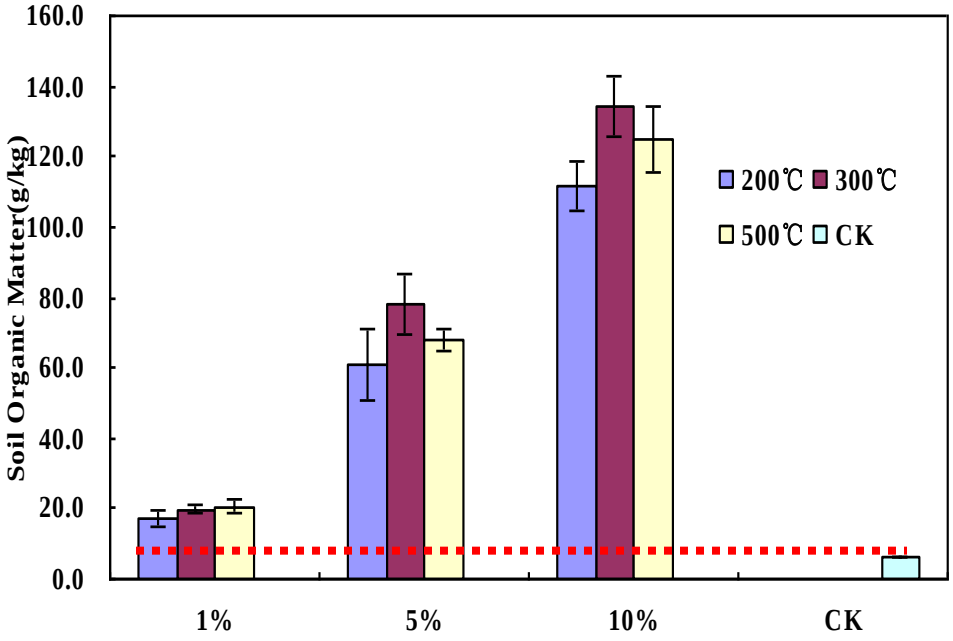



- **K content of rape significantly increased.**
- **Be related to the high concentration of available K in the wheat straw biochar?**

# Soil pH (1:2.5)

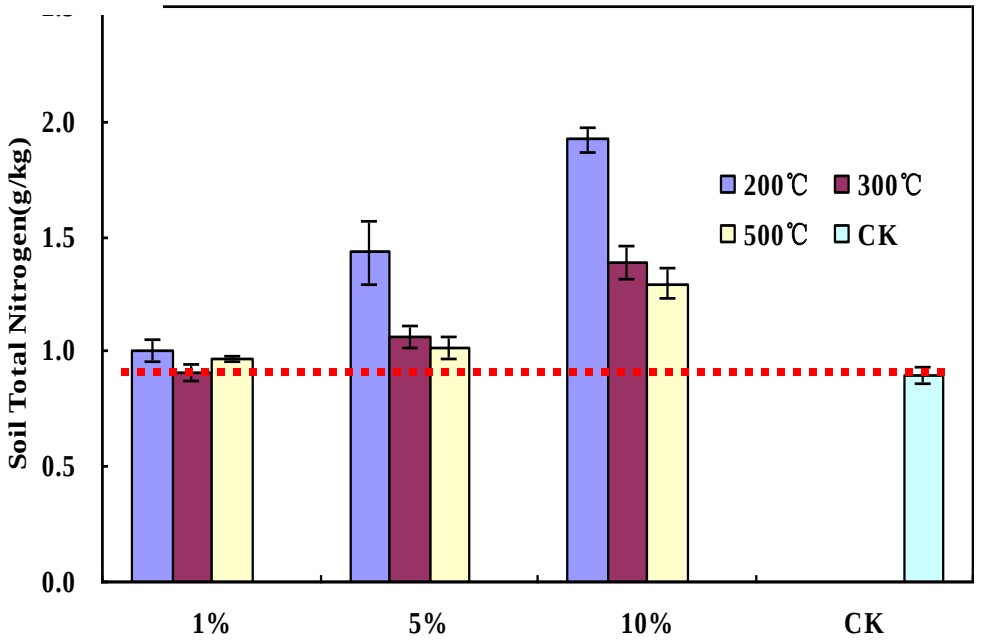


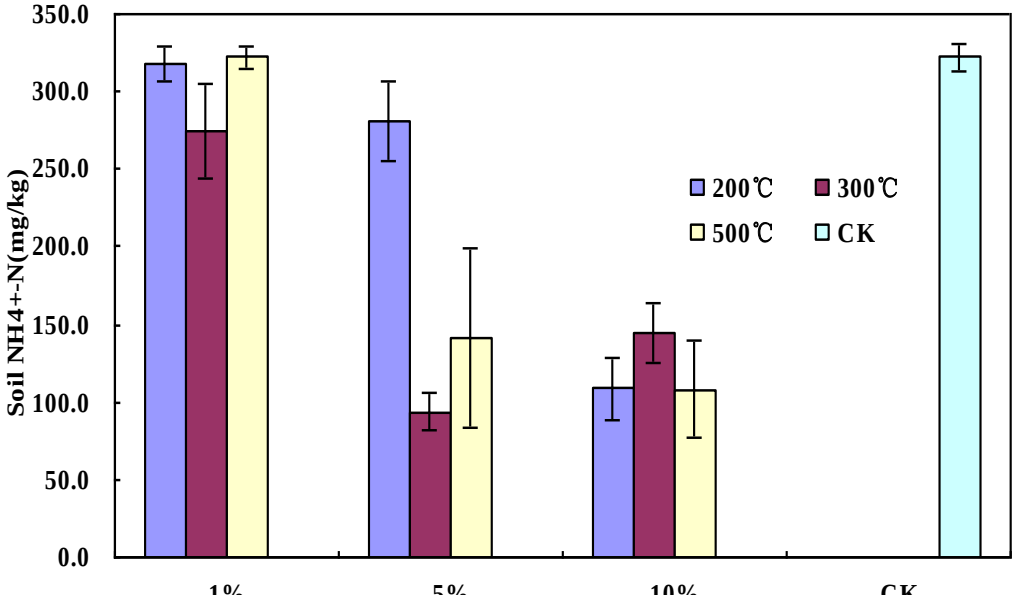

**Biochar addition enhanced soil pH by 0.56 units.**

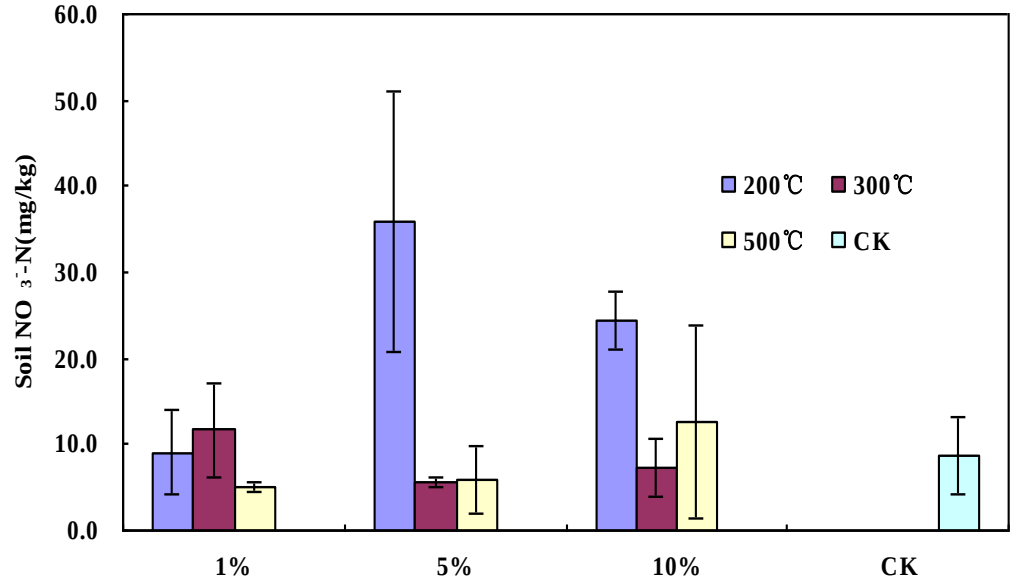



● **The OM and TN of the biochar-amended soil increased.**

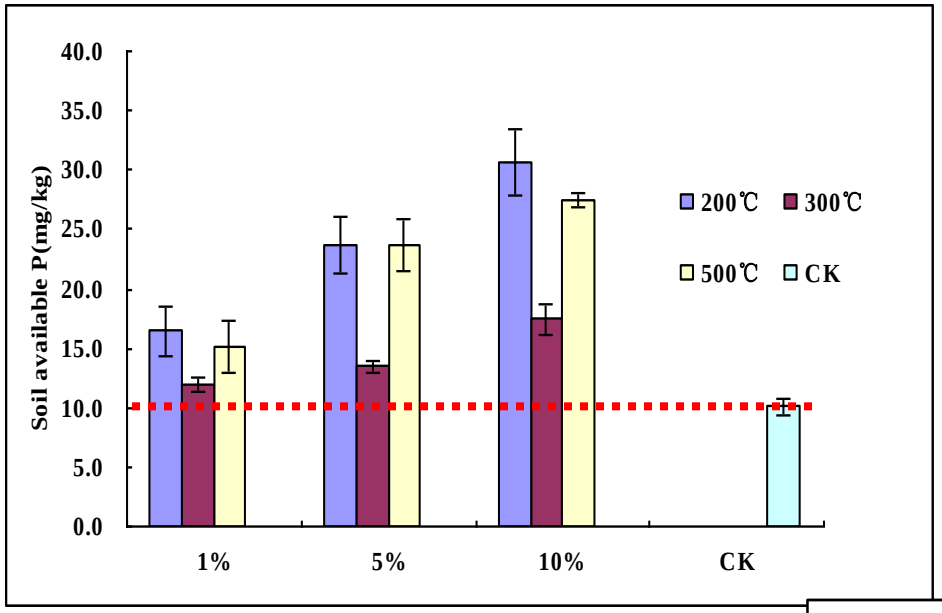
● **Soil TN of 200℃ was higher than that of other treatments.**






- $NH_4^+$-N decreased with increasing biochar rates.
- Biochar reduced the ammonification?(Gundale and Deluca, 2006)
- $NH_4^+$ was adsorbed by biochar? (Berglund et al., 2004)
- $NO_3^-$-N

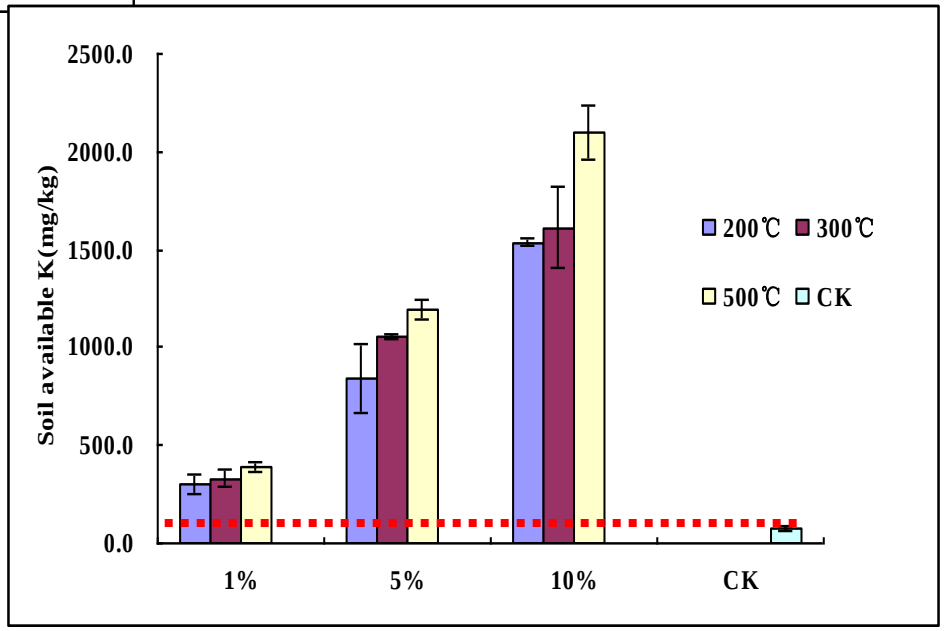



● Available P of the biochar-amended soil increased.

● Available P of 300℃ was significantly lower.

● Available K increased with increasing biochar added rates.

● Be a direct nutrient addition.

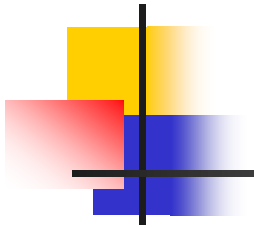


# Conclusions

1. **Biochar addition enhanced rape dry matter by 34.0% on average and K by 71.6% .**
2. **But, decreased N by 19.7% and P by 30.4%.**

# Conclusions

3. **Biochar addition increased soil pH by 0.56 units, enhanced total N by 37.0%, available P by 97.9% and K by 12.6 fold.**
4. **But, decreased soil $NH_4^+$-N with increasing biochar added rates.**



# Thanks for your attention!