

Biochar and nitrogen fertilizer change the quality of waxy and non-waxy broomcorn millet (*Panicum miliaceum* L.) starch.

Miaomiao Zhang , Bauyrzhan Mukhamed , Qinghua Yang, Yan Luo, Lixin Tian, Yuhao Yuan, Yani Huang, Baili Feng*

(^{β5}Northwest A & F University, Yangling 712000, China)

Abstract: **【Objective】** Fertilization had significant effect on the quality and function of starch. However, there are rarely studies on the effects of biochar and its combined application with nitrogen fertilizer on starch quality. Therefore, research on the effects of biochar, nitrogen fertilizer, and their combination on the starch quality of waxy and non-waxy broomcorn millet was conducted in response to the rising demand for natural starch in the food industry. **【Method】** The morphology, particle size distribution, light transmission, amylose content, pasting properties, thermal properties and correlation analysis of broomcorn millet were measured and analyzed to illustrate the effects of biochar and nitrogen fertilization on the starch properties of waxy and non-waxy broomcorn millet. **【Result】** The results showed that, in comparison to the control, all treatments decreased amylose and gelatinization temperature, and enhanced starch transparency and swelling power, without substantially altering the morphology and short-range ordered structure of starch. Also, biochar can improve the water solubility of starch and the gelatinization enthalpy. Consistently, the combination of biochar and nitrogen fertilizer increased proportion of A-granules, final viscosity, setback viscosity and peak viscosity. Importantly, nitrogen or biochar alone improved the starch breakdown viscosity and final viscosity of the waxy broomcorn millet type. **【Conclusion】** The N150+B treatment showed the most significant improvement in the quality of broomcorn millet starch of both varieties. The results of this study lay a foundation for the application and popularization of millet starch in food and non-food industries.

Acknowledgements: Shaanxi Province Minor Cereals Industrial Technology System (NYKJ-2021-YL [XN] 40)
Miaomiao Zhang, E-mail: qzmmool63.com