

研究论文

温度与棉株生理年龄的协同效应对棉纤维发育的影响

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摘要 通过设置播期试验, 使位于棉株不同果枝果节部位棉铃的纤维加厚发育期(铃龄25~50 d)处于不同温度条件下, 研究温度与棉株生理年龄对棉纤维加厚发育及纤维比强度的影响, 结果表明, 温度与棉株生理年龄的影响存在互作效应, 铃龄25~50 d日均温26℃左右时, 棉株中部(7~9果枝)铃纤维蔗糖合成酶活性最高, β-1,3-葡聚糖酶活性最低, 纤维素的累积量和累积速率最高, 纤维超分子结构取向参数最小, 纤维比强度最大; 铃龄25~50 d日均温低于20℃时, 温度是影响棉纤维加厚发育及纤维比强度的首要因子, 当铃龄25~50 d日均温低于16.0℃时, 蔗糖合成酶、β-1,3-葡聚糖酶活性很快稳定到一个极值水平, 纤维素累积量和累积速率极低, 纤维超分子结构取向参数显著变大, 纤维比强度显著下降, 棉株生理年龄对纤维比强度的影响很小。

关键词 [温度](#) [棉株生理年龄](#) [棉纤维](#) [加厚发育](#) [纤维比强度](#)

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Synergistic Effect of Temperature and Cotton Physiological Age on Fibre Development

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Abstract Temperature and cotton physiological age are two important factors affecting the cotton fiber development and they always work together. By setting different cotton seeding dates, fibre developing process of the bolls set on different branches could be put in different temperature conditions, and with this system, synergistic effect of temperature and cotton physiological age on fibre thickening and fibre strength development was studied in this research. Two years' data showed that during fibre thickening and fibre strength development, there exists an interaction between temperature and cotton physiological age. When the mean daily temperature from 25 d to 50 d of boll age was about 26.0℃, the sucrose synthetase activity was the highest and the β-1, 3-glucanase activity was the lowest, cellulose content and cellulose synthesis rate were the highest, the angle indexes of the fibre molecular structure were the smallest, thus leading to the greatest fibre strength of the bolls set on the middle position of plant. When the mean daily temperature from 25 d to 50 d of boll age was below 20.0℃, cotton physiological age was not the key factor while the temperature primarily influenced the fibre thickening and fibre strength development, and the lower the temperature, the less the effect of cotton physiological age. When the mean daily temperature from 25 d to 50 d of boll age was lower than 16℃, sucrose synthetase activity and the angle indexes of the fibre molecular structure enhanced significantly while β-1,3-glucanase activity along with cellulose synthesis rate and cellulose accumulation rate decreased quickly, leading to the strike decrease of the fiber strength. And under this temperature condition little effect of cotton physiological age on fiber strength development could be observed.

Key words [Temperature](#) [Cotton physiological age](#) [Cotton fibre](#) [Fibre thickening development](#) [Fibre strength](#)

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