中国农学通报 2011, 27(第17期7月) 234-239 DOI: ISSN: 1000-6850 CN: 11-1984/S

农村发展—生态资源环境

豫北地区冬小麦生产对气温变暖的响应

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摘要:

利用豫北地区沁阳市农气站1981—2010年气温资料和1984—2010年冬小麦观测资料，采用统计和相关性分析方法，研究该地区冬春季极端气温、冬小麦物候期和产量构成因素的变化以及该区域冬小麦生长对冬春季极端气温变化的响应。结果表明，近30年来，豫北地区冬、春季平均最低气温增温速率分别为1.4℃/10年和1.3℃/10年，冬季增温速率较高；冬季平均最高气温的变化趋势不明显，春季平均最高气温升高显著，其增温速率为0.7℃/10年。冬小麦返青期的年际变化趋势不明显，抽穗期和成熟期分别以4.0天/10年和2.9天/10年的趋势显著提前，抽穗期提前的趋势较大，全生育期天数以4.6天/10年的趋势显著缩短。冬小麦有效穗数的变化趋势不明显，但穗粒数以4.4粒/(穗?10年)的速率显著减少，千粒重以4.9 g/10年的速率明显增加。相关性分析表明，冬季平均最高气温每升高1℃返青期提前2.7天；春季平均最高气温和最低气温每升高1℃抽穗期分别提前2.8天和3.4天，成熟期分别提前2.6天和2.5天，全生育天数分别缩短3.5天和3.6天。冬季平均最低气温每升高1℃有效穗数和穗粒数分别减少20.5穗/m2和2.4粒/穗；春季平均最高气温每升高1℃千粒重增加2.0 g；千粒重与春季平均最低气温呈抛物线关系，当最低气温超过13℃时，千粒重开始下降。豫北地区近30年来冬春季极端气温变暖的趋势明显，该区域极端气温变暖对冬小麦生产的影响较为显著。

关键词: 产量构成因素

Response of Winter Wheat to Temperature Warming in Northern Regions of Henan Province

Abstract:

The effects of maximum temperature and minimum temperature on winter wheat phenology, yield components in northern regions of Henan province. The trend of the extreme temperature in winter and spring, winter wheat phenology and yield components in northern regions of Henan province and the impacts of climate change on winter wheat growth were analyzed by the method of statistics and person relation based on the data of temperature between 1981 and 2010 and the observed winter wheat data between 1984 to 2010. The results showed as follows. The minimum temperature respectively increased significantly as 1.4℃/10 years and 1.3℃/10 years in winter and spring, which increased more in winter. The maximum temperature didn’t changed obviously in winter, however increased significantly as 0.7℃/10 years in spring. The regreening date of winter wheat didn’t changed obviously, the heading date and maturity date respectively advanced significantly as 4.0 days/10 years and 2.9 days/10 years. The heading stage advanced more. The growth stage significantly shortened as 4.6 days/10 years. The number of spikes of winter wheat didn’t change obviously, the number of kernels per spike of winter wheat decreased significantly as 4.4 kernels/(spike?10 years), 1000-kernels-weight of winter wheat increased significantly as 4.9 g/(1000-kernels?10 years). The results of person relation analysis showed that. The regreening date advanced 2.7 days while the maximum temperature increased 1℃ in winter. The heading date respectively advanced as 2.8 days and 3.4 days, maturity date respectively advanced as 2.6 days and 2.5days, the growth stage respectively shorten as 3.5 days and 3.6 days while the maximum and minimum temperature increased 1℃ in spring. The number of spikes and kernels per spike of winter wheat respectively decreased as 20.5 spikes/m2 and 2.4 kernels/spike when the minimum temperature increased as 1℃ in winter. 1000-kernels-weight of winter wheat increased 2.0 g/1000-kernels when the maximum m temperature increased as 1℃. 1000-kernels-weight of winter wheat increased with the increased minimum temperature in spring, however, decreased when minimum temperature extended 13℃. The extreme temperature warmed obviously during the past 30 years in winter and spring in northern

regions of Henan province and its impacts on the winter wheat production also were obvious.

Keywords: yield components

收稿日期 2010-12-17 **修回日期** 2011-03-02 **网络版发布日期** 2011-07-15

DOI:

基金项目:

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