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不同地理尺度下综合施肥模型的建模与验证

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Modeling and validation of transfer model covering different geographical scale

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摘要 在新疆北疆采用包含正交设计的方案进行了多点肥料试验,建立了不同地理尺度下的综合施肥模型和肥料效应函数方程,通过校验试验对综合施肥模型与肥料效应函数方程施肥推荐施肥效果进行了比较研究。试验采用相同的试验设计在2000-2002年间进行,每年试验点数为31个。研究结果表明,通过趋势系数可以建立包括地点变量的综合肥料效应方程,回归方程各参数有明确的肥料学意义。不同地理尺度下建立的综合施肥模型都可以有效地进行施肥推荐。和传统的肥料效应函数方程相比,综合施肥模型的氮素推荐量与土壤碱解氮或有机质含量呈显著负相关,表明方程可以根据土壤供氮能力调节施氮量,在小尺度下尤其如此。综合施肥模型磷肥推荐量显著低于肥料效应函数方程推荐量,其推荐质量高于肥料效应函数方程。小尺度下综合施肥模型的推荐量比大尺度下综合施肥模型精确度更高,但两种施肥模型都优于肥料效应函数方程。

关键词: 综合施肥模型 不同地理尺度 建模 验证 综合施肥模型 不同地理尺度 建模 验证

Abstract: Transfer model is an approach of fertilizer recommendation that takes plant growth affecting factors into an integrated account and makes all-sided fertilization recommendation. It has proved that transfer model is superior to traditional fertilizer response function in fertilizer recommendation, but its adaptability in different geographic scale is not clear. This paper studied the adaptability of transfer model in different geographic scale by comparing with fertilizer response function by a calibration trial. The study was conducted during 2000-2002 in north Xinjiang, and orthogonal design included experiment scheme was put into practice in 31 dispersed spots each year. In all experiment plots, crop cultivation measures , such as cultivars (cotton, Xinluzao 6) , date of sowing, density of plants, irrigation, pest control and chemical regulation was uniformed strictly to overcome environmental side-affects. Cotton lint yield, soil organic matter content, soil total N content, soil alkali hydrolysable N content, soil available P content and soil available K content were analyzed and taken as site variables to simulate transfer model in different geographic scale. The results indicated that transfer model could be established between site variables and fertilizer response trend coefficients in high statistical critical. Though empirically, these regression parameters are meaningful in fertilization. Compared with traditional fertilizer response function, fertilizer suggestion released by transfer model is significantly negatively correlative to soil alkalihydrolysable N content or soil organic matter content, which suggests that transfer model could adjust N application rate according to soil N supplying capability, especially in small-scaled transfer model. Both large and small geographic-scaled transfer model is feasible in fertilizer prediction. However, the precision of fertilizer predication is higher in small geographic-scaled transfer model than in large geographic-scaled transfer model. Even so, the precision of fertilizer suggestion released by both small and large geographic-scaled transfer model is better than in fertilizer response model.

Keywords:

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