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平衡施肥对大豆产量及土壤-作物系统养分收支平衡的影响

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摘要: 以合理利用黑龙江省土壤养分资源, 避免肥料浪费, 达到大豆高产、优质和高效为目的, 根据李比希最小养分率原理, 设计了最佳处理, 并在最佳处理的基础上做减素处理, 以田间小区试验方法研究了黑龙江省大豆主产区平衡施肥条件下, 大豆产量、各生育期养分吸收规律以及土壤-作物系统中氮磷钾三要素投入-产出平衡状况。结果表明: 平衡施肥对海伦、宝清、克山大豆产量有明显的正效应, 且有利于大豆植株对养分的吸收利用, 开花期~结荚期以及鼓粒期~成熟期是大豆养分需求的关键时期。黑龙江省大豆主产区施N 52.5 kg hm⁻²不足; 施P₂O₅ 75 kg hm⁻²过高; 施K₂O 60 kg hm⁻²中部和西部地区不足, 东部地区基本能满足大豆高产对钾的需要。三地区氮肥利用率分别为37.8%、39.8%和39.3%; 磷肥利用率分别为16.8%、19.7%和18.6%; 钾肥利用率分别为43.5%、40.5%和25.3%。可见, 黑龙江省大豆主产区大豆生产氮钾肥用量还有提高的空间, 磷肥用量过高。

Abstract: According to Liebig principle of minimum nutrient rate, the optimal treatment and nutrient omission treatments were designed in order to make soil nutrient resources used rationally. Soybean yield, the nutrients absorption characteristic at different growing stages as well as the three elements of N, P and K input-output balance in soil-crop system were studied under the condition of balanced fertilization by the method of field trial in the main soybean producing areas of Heilongjiang Province. The results showed that balanced fertilization had a significant positive effect to soybean yield of Hailun, Baqing, Keshan, and was conducive to nutrients absorption and utilization of soybean plants. From florescence to pod-setting and pod-filling to mature stage were the two critical periods of soybean nutrients absorption. The amount of N 52.5 kg ha⁻¹ could not satisfy the demand for high-yielding soybean; P₂O₅ 75 kg ha⁻¹ could be able to meet high yield of soybean. The amount of K₂O 60 kg ha⁻¹ was not enough to soybean for the central and western regions, but could satisfy for eastern regions of Heilongjiang Province. Fertilizer use efficiency of Hailun, Baqing, Keshan were 37.8%, 39.8% and 39.3% for nitrogen; 16.8%, 19.7% and 18.6% for phosphorus; 43.5%, 40.5% and 25.3% for potassium, respectively. The amount of nitrogen and potassium fertilizer should

be improved and phosphorus fertilizer be reduced in the main soybean producing areas of Heilongjiang Province

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