

## 用于无公害蔬菜生产的氮素平衡推荐决策系统

### Strategic system to control N balance for sustainable non-polluted vegetable production

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中文摘要:

氮肥是无公害蔬菜生产中首要控制的肥料品种, 发展推荐准确、输入参数较少, 并且易于被广大农户所接受的氮肥推荐系统对于维持农业的可持续发展具有很重要的作用。根据蔬菜适宜生长的养分需求目标及菜田土壤氮素供应的特点, 通过引入经验性模型, 考虑了作物氮素吸收、必需土壤 $N_{min}$ 缓冲值、氮素损失、播前土壤氮素存留、土壤有机氮矿化、作物残体氮素矿化等组分, 依据养分平衡推荐的原则实施无公害蔬菜生产氮素推荐, 并以此研制开发了无公害蔬菜生产的氮素平衡推荐决策系统。系统的设计采用三层体系结构, 充分利用ADO(ActiveX Data Objects)和ODBC(Open Database Connectivity)对后台数据库的处理与管理能力, 实现数据的访问。采用Visual Basic 6.0作为程序设计语言, 实现人-机交互界面。在过去的两年时间里, 采用系统软件对京郊地区露地蔬菜进行了应用推广。结果表明: 和传统施肥措施相比, 在保证产量的前提下, 采用开发系统推荐的氮肥施用量比传统施用量降低了30%~60%, 减少了养分资源的浪费, 从而降低了对环境污染的风险。

英文摘要:

Nitrogen fertilization is usually regarded as the main factor to control nutrient supply in order to produce non-polluted vegetable. It is very significant to build up an advisory N recommendation system, with simple parameter input, friendly interface and multi-function, as a useful tool in the maintenance of sustainable vegetable production. A new strategic N recommendation system was developed to balance N fertilization through the empirical model prediction in crop N uptake, N loss, N release from soil organic pool and crop residue, and determination of soil  $N_{min}$  safety margin, soil  $N_{min}$  residue at preplanting. Three structural layers were selected in the design of advisory system program to be easy to acquire data through ADO (ActiveX Data Objects) and ODBC (Open Database Connectivity). A friendly human-machine interaction interface was built using Visual Basic 6.0, one of advanced program language. The system program was extended in the vegetable production in the open-field of Beijing suburb. From the results of several field experiments with different vegetable varieties, it was showed that in most cases there was no yield reduction from the recommended treatments in comparison with conventional fertilizer practice. However about 30%~60% of nitrogen fertilizer was saved in the recommended treatment using the developed program. It means that using the balancing fertilization strategy, it can not only reduce the fertilizer waste, but also maintain the sustainable vegetable production.

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