

# NUTRIENT BALANCES AND ECONOMIC PERFORMANCE IN URBAN AND PERI-URBAN VEGETABLE PRODUCTION SYSTEMS OF THREE WEST AFRICAN CITIES

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## SUMMARY

Urban and peri-urban (UPA) cultivation supplies fresh vegetables and employment for the increasing number of urban inhabitants. It is characterized by the use of large nutrient inputs to increase productivity and often associated with negative environmental risks. For these reasons, this study quantified nutrient (nitrogen, N; phosphorus, P; and potassium, K) flows and economic performance of UPA gardening of the three West African cities of Kano, Nigeria; Bobo Dioulasso, Burkina Faso; Sikasso, Mali, during a 2-year period using the **Monitoring for Quality Improvement (MonQI)** toolbox considering inflows and outflows sources. Average annual N, P and K balances were positive for all gardens in the three cities with N balances of 279, 1127 and 74 kg N ha<sup>-1</sup> in Kano, Bobo Dioulasso and Sikasso, respectively, except for annual K deficits of 222 and 187 kg K ha<sup>-1</sup> in Kano and Sikasso, respectively. Nitrogen use efficiencies were 63%, 51% and 87% in Kano, Bobo Dioulasso and Sikasso, respectively, with poor P use efficiencies due to excess application in all three cities. However, a high K efficiency was observed in Bobo Dioulasso (87%) while applications of K were lower than required in Kano and Sikasso with efficiencies of 121% and 110%, indicating possible K mining. The average annual gross margins from gardening indicated a statistically higher ( $p < 0.05$ ) return of US\$3.83 m<sup>-2</sup> in Bobo Dioulasso than returns obtained in Kano (US\$0.92 m<sup>-2</sup>) and Sikasso (US\$1.37 m<sup>-2</sup>). Although an economically vibrant activity, intensive UPA vegetable production needs to be reviewed for strategic planning towards improving N and P use efficiencies in order to maintain its productivity as well as safeguard the environment. Appropriate K fertilization is necessary to avoid long term K depletion in Kano and Sikasso UPA gardening.

## INTRODUCTION

Rapid urbanization and population surge, especially in the developing world, has led to increasing food demand and subsequent cultivation of arable lands in and around cities. Urban and peri-urban vegetable production is a common practice that has received a lot of attention in the past decade with regard to food production under critical water-scarce semi-arid conditions of sub-Saharan West Africa (Barry, 2002). In many developing regions of West Africa, urban cultivation is found on fallow land in cities either under a legal contract or on free land, situated along the course of city drainage canals or waterways (Drechsel *et al.*, 2006). These sites and plots serve

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