

Research Application Summary

Economic efficiency of mango-based agroforestry systems for improved livelihoods in Buzaya county, Kamuli district

Buyinza, M.¹, Bukenya, M.¹, Nabalegwa, M.² & Byakagaba, P.¹

¹Faculty of Forestry and Nature Conservation, Makerere University, P.O.Box 7062, Kampala, Uganda

²Department of Environmental Geography, Kyambogo University, P. O. Box 1 Kampala, Uganda

Corresponding author: buyinza@forest.mak.ac.ug

Abstract

This study analyzed the economic efficiency of mango (*Mangifera indica*) growers in Buzaya county, Kamuli District, Uganda. It estimated the existing scales of mango growers, their relative resource-use efficiency, the relative profitability of their operations and their determinants using the profit function. Results showed that the identified scales of growers were inefficient in their use of resources, but the potentials existed for increases in their levels of mango output. The hypothesis that the various scales of growers are equally efficient in their resource allocation was rejected at 5% probability level. The hypotheses that there was no significant difference in their level of profitability as well as the factors influencing their operations were also rejected at 5% probability level. It was recommended that micro-financial institutions should give credit preference to the mango growers because of their relatively higher profit margin, which reflected their potentials for repayment. Necessary adjustments however need to be made to enhance levels of resource use for increased mangoes output and profitability.

Key words: Farmers, efficiency, mangoes production, marginal value, Uganda

Résumé

Cette étude a analysé l'efficacité économique des producteurs de la mangue (*Mangifera indica*) dans les districts de Buzaya et de Kamuli en Ouganda. Il estime que les barèmes actuels des producteurs de mangues, de leur efficacité relative d'utilisation des ressources, la rentabilité relative de leurs activités et leurs déterminants en utilisant la fonction de profit. Les résultats ont montré que les barèmes des producteurs identifiés ont été inefficaces dans leur utilisation des ressources, mais le potentiel existe pour une augmentation de leurs niveaux de production de mangues. L'hypothèse selon laquelle les différentes échelles de producteurs sont aussi efficaces dans leur allocation des ressources a été rejetée au seuil de 5% de

probabilité. Les hypothèses selon lesquelles qu'il n'y avait pas de différence significative dans leur niveau de rentabilité ainsi que les facteurs qui influent leurs opérations ont également été rejetées au seuil de 5% de probabilité. Il a été recommandé que les institutions de micro-financière doivent donner la préférence de crédit aux producteurs de mangues en raison de leur marge de bénéficiaire relativement élevés, ce qui reflète leur potentiel de remboursement. Les ajustements nécessaires doivent toutefois être réalisés pour améliorer les niveaux d'utilisation des ressources mangues pour augmenter la production et la rentabilité.

Mots clés: Les agriculteurs, l'efficacité, la production de mangues, la valeur marginale, l'Ouganda

Background

This study analyzed the resource management of mango--based mixed farm growers and more specifically, estimated the existing scales of mango fruit growers, their relative resource-use efficiency, the relative profitability of their operations and their determinants. It was warranted by the recent Uganda government policy emphasis on mangoes production and the need to establish the relative potentials of the various scales of growers towards the achievement of the policy objectives. It was hypothesized that the various scales of mangoes farmers in the area were equally efficient in their resource allocation, that they did not differ significantly in the level of profit from their operations and that their levels of profit were not significantly influenced by the scale of operation, their pattern of use of loans acquired for mango production, the wage rate, cost of capital, cost of such other inputs as fertilizer, planting materials, and insecticides.

Study Description

Kamuli district is part Busoga region and one of the 84 districts of Uganda and is located in the south-eastern part of the country with a population of 552,665 people of which 52% are females (UBOS, 2002). It is located in south-eastern Uganda. It lies at an average altitude of 1083 m above sea level and extends from 00 - 56' North / 330 -05' East up to 01 - 20' North / 330 - 15' East. The district borders River Nile and Kayunga district in the west, Jinja district in the South, Iganga district in the Southeast, Kaliro District in the East and Soroti district and Lake Kyoga in the north. Kamuli District has a total land area of 3,444 km².

The multistage sampling technique was adopted for sample selection. The district was first stratified into three agricultural zones in line with the Plan for Modernization of Agriculture (PMA) zoning. Three parishes of Bugulumbya, Kasambira and Nawandhyo were purposively chosen based on the intensity of mangoes production following a pilot survey of the area.

Data were analyzed using descriptive statistical tools such as means, percentages, frequency distribution as well as inferential statistical tools which included production and profit functions. To estimate the allocative efficiency of resource-use for the various scale of mango growers, an efficiency index was used as specified by Bolton and Ockenfels (2000). To test the hypothesis that the various scales of mangoes growers were equally efficient in resource allocation their mean allocative efficiency indices were compared using the Z-test at 1% probability level.

Research Application

Resource-use efficiency of categories of mango growers

The estimated resource-use efficiency of the various scales of growers. In case of the small-scale mangoes growers, the index of allocative efficiency for land, labour, planting materials, capital and other inputs were 2.32, 0.2, 1.38 and 2.28, respectively. For the medium-scale growers, the corresponding index were 5.02, 0.05, 2.31, 2.54 and 1.82, respectively, while for the large-scale producers the respective values were 3.334, 0.6, 1.67, 5.02 and 1.84. These statistics suggested that in terms of allocative efficiency, none of the three categories of growers was efficient in the use of their resources. On a relative basis, however, the small-scale growers were more efficient in the use of land, planting materials and capital, while the medium-scale growers were more efficient in the use of labour and other inputs. These two categories were more efficient than the large-scale growers in the use of each of these specific resources.

To attain the required efficiency, the medium-scale growers need to reduce their use of land, planting materials, capital and other inputs by 402, 131, 154 and 82%, respectively, and increase their use of labour by 95%. The small-scale growers, on the other hand, need to reduce their use of land, planting materials, capital and other inputs by 159, 44, 139 and 114%, respectively and increase their use of labour by 90%.

Mean efficiency indices for the different categories of mango growers. The hypotheses that the various scales of mangoes growers were equally efficient in their resource allocation were rejected when examined in relation to the *Mean Efficiency Indices* (MFI). The computed Z-scores for each pair of growers were significantly different from their critical Z-values at 1% level, leading to the rejection of the null hypothesis in each case.

Although, some degree of inefficiency exists among the three categories of mango growers, the level of inefficiency was least among the medium-scale growers and highest among large scale growers. The present level of resource-use efficiency suggests that the lofty ideals of government in promoting large scale production of mangoes may not be realized by reliance on the present large-scale growers. Medium and small scale growers, as presently constituted, appear to offer a better prospect for the realization of the objectives of this policy. However, the farmers would not attain the best level of efficiency unless they operate at a medium scale. The significant factors that affected profitability of mangoes production included the wage rate for an adult farm worker, the cost of capital, type and magnitude of capital utilized, cost of other input and pattern of loan use.

To attain allocative efficiency, all categories of growers should make some necessary adjustments in their resource-use. The small scale mango growers should reduce their use of land, planting materials, capital and other inputs by 339, 149, 166 and 97%, respectively and increase their use of labour by 91 %. The medium scale growers, on the other hand, should reduce their use of land, planting materials, capital and other inputs by 159, 44, 139 and 114%, respectively and increase their use of labour by 90%. The large-scale growers should reduce their use of land, planting materials, capital and other inputs by 214, 153, 373 and 114%, respectively and increase their use of labour by 60%. More sensitization campaigns should be carried out, with particular reference to the large-scale growers on modern farm management techniques that would enable them improve their performance in resource-use. Further empowerment should be selectively extended to the farmers by way of enhanced loan facilities to enable them acquire more productive farm assets.

Acknowledgement

The authors are grateful to the Monitoring and Evaluation Division of the Plan for Modernisation of Agriculture (PMA)

References

Secretariat, Uganda for their financial support. We acknowledge the helpful discussions and input from Prof. J. Obua, Makerere University.

Boesen, J., Miiro, R. and Kasozi, S. 2004. Basis for poverty reduction? A rich society, farmer innovation and agricultural service provision in Kabale, Uganda. *DCISM Working Paper*. Copenhagen.

Bolton, G.E. and Ockenfels, A. 2000. A theory of equity, reciprocity, and competition. *American Economic Review* 90(1):166-93.

Buyinza, M. 2007. Farmers perception of the relevance of agricultural technologies under Plan for Modernization of Agriculture in Uganda. *Agricultural Journal* 2 (5):544 – 549.

Sauco, V. 2004. Mango production and world market: Current situation and future prospects. *Acta Horticulturae* 645: 107-116.

UBOS (Uganda Bureau of Statistics), 2002. Provisional population census results. UBOS. Ministry of Finance, Economic Planning and Development. Entebbe, Uganda.