

**SMALLHOLDER ADOPTION OF INNOVATIONS FOR MAIZE PRODUCTION IN
THE SEMI-ARID REGION OF KENYA**

By

Lutta Muhammad

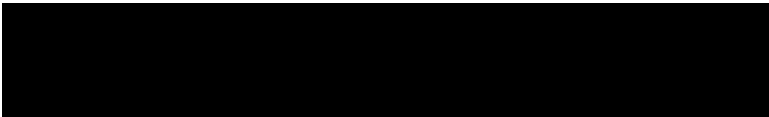
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Armidale, NSW 2351 Australia**

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DECLARATION

I certify that the substance of this thesis has not already been submitted for any degree and is not currently being submitted for any other degree.

I certify that to the best of my knowledge any help received in preparing this thesis, and all sources used, have been acknowledged in this thesis.



Lutta Muhammad

L'envoi

Oars alone can'er prevail
To reach the distant coast,
The breath of heav'n must swell the sail,
Or all the toil is lost.

William Cowper

Abstract

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The research work reported in this thesis is an examination of the use of three innovations (early planting, optimal planting density and use of fertilizers) which seem to offer maize farmers in the Machakos and Kitui districts of the semi-arid Eastern Kenya the highest potential returns. The objectives were: to identify critical agronomic and socio-economic causes of non-adoption of the three innovations. A review of agriculture in the region showed that smallholders operated mixed farming systems that are characterized by low resource productivities and high production risk.

Various methods were used to capture and analyze the data that were needed for the examination of the innovation process. Farm and household characteristics, attributes of the innovations, the position of livestock in the farming system, the non-farm enterprise, and household goals and strategies were assessed. Results showed that relationships between individual farm/household characteristics and adoption levels were weak, suggesting that the influence of factors such as profitability of innovations on adoption behavior should be investigated. The three innovations were shown to increase yield and gross margin, but they were also inherently risky. Livestock and non-farm enterprises (Chapter 6) were also considered. These were shown to be significant components of the operation of many farm households. High risk aversion levels were assessed for the majority of the farmers studied. There seemed to be a hierarchical ordering with, in descending order of importance, three main types of goals: security, growth and development, and self esteem and recreation-oriented goals. Security and growth-oriented goals (e.g., education of children), assumed high profiles.

The three innovations were assessed for impact on household goals in a programming model (Target-MOTAD). Contribution to net revenue after subsistence and farm maintenance requirements are fulfilled was the optimization criterion. The expected value-negative deviation frontier for the farm plans that included this innovation was everywhere superior to the frontier of traditional farm practices. This indicated that the farmers would obtain higher expected returns at each level of risk if they adopted the optimal planting density innovation. However, incremental expected income was generally less than that to be gained from non-farm enterprises.

Conclusions from this research are: that the three innovations considered are economically viable in wetter parts of the region only and that risk reducing options for marginal areas need to be given emphasis in agronomic research if the adoption process is to be accelerated.

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