YIELD AND QUALITY RESPONSE OF FOUR WHEAT CULTIVARS TO SOIL FERTILITY, PHOTOPERIOD AND TEMPERATURE

BY

LEWIS AMOLLO METHO

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The nation with too much bread has many problems
the nation with too little bread has only one problem

Fifth Century Byzantine Proverb

TO MY WONDERFUL MOTHER PENINAH YOGA
(MAA:NYAKWAR ONYANGO)

DAA (JI): ***Maureen Akinyi, Carole Achieng, June Amondi, Valary Adhiambo, Nickole Amollo, Fay Achieng, Penisoh Dimpho, Ian Rading and Wayne Aréche (Teddy, Fred and James Omondi)***

HERA MAR RUOTH YESU KENDE, JOKA MAMA!!!

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Last but not least, may the Almighty God bless the University of Pretoria as an excellent learning centre, its achievements and to continue prospering, and to the people of this beautiful nation of South Africa "SIMUNYE".

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SUPERVISOR: Prof PS Hammes
CO-SUPERVISOR: Prof JRN Taylor

DEPARTMENT: Plant Production and Soil Science

DEGREE: PhD

ABSTRACT

The effects of soil nutrient status on the performance of four South African wheat genotypes were investigated in a long-term fertilization experiment. The objective was to quantify the effects of soil fertility on yield, yield components, grain nitrogen content, grain protein yield, grain protein content, flour yield and bread-making quality. The relative contribution of main stems and tillers, as well as the contribution of first, second and third kernels in the spikelets to grain yield and grain protein content were determined. The interactive effects between photoperiod, temperature and vernalization on grain yield, yield components and grain protein content were also quantified. Increasing soil fertility increased grain yield and most components of yield, grain nitrogen content, grain protein yield, aboveground biomass and harvest index, but depressed mean kernel mass. Significant interactions between cultivar and soil fertility were observed for grain yield, grain number, kernel mass, protein yield, biomass and harvest index, indicating differences in cultivar ability to produce yield and quality.

Within a cultivar, the main stem, first tiller and second tiller did not differ in mean grain protein content, indicating that late-maturing tillers do not affect the grain protein content of wheat.
Grain protein content, flour yield, loaf volume, water absorption and mixograph peak mixing time varied with soil fertility. The interaction between cultivar and soil fertility was significant for the above mentioned parameters with the exception of mixograph peak mixing time, indicating wheat genotypes differences in bread-making quality potential. The potential ability of wheat cultivar Kariega to produce higher grain yield, protein yield and loaf volume in the K and P limiting soil fertility situations deserve further investigation.

In a growth chamber study, the low temperature regimes and long photoperiod conditions resulted in the highest grain yield, number of grains, largest mean kernel size and highest grain protein content.

Key words: Bread-making quality, grain protein content, photoperiod, soil fertility, wheat yield and yield components.