EVALUATION OF AGRONETS ON MICROCLIMATE MODIFICATION, INSECT PEST CONTROL AND CABBAGE (*Brassica oleracea* var.*capitata*) CROP PERFORMANCE

By

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EGERTON UNIVERSITY

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DECLARATION AND RECOMMENDATION

DECLARATION
This thesis is my original work and has not been submitted in any institution for any other award.

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Date…………………………...

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RECOMMENDATION
This thesis has been submitted with our approval as supervisors.

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DEDICATION

This work is dedicated to my parents Dr. and Mrs Muleke, brothers; Albert Muleke, Price Muleke, the late Elphas Muleke and sister, Christine Muleke.
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ABSTRACT

This study was done to evaluate the effects of agronets on insect pests and crop performance on cabbage production under Kenyan conditions. Two experiments were conducted over a span of two seasons at the Horticulture Research and Teaching Field, Egerton University. The objectives were to determine the effects of agronets on (1) microclimate modification, (2)
insect pest population and damage, and (3) the subsequent effect on seedling performance, crop growth, yield and quality of cabbage. A Randomized Complete Block Design with two treatments and five replications was used for the nursery transplant production experiment, while six treatments and five replications were used for the field production experiment. For the nursery experiment, the treatments comprised of; (i) open transplant production (control) and (ii) production of transplants under a 0.4mm mesh size net cover used permanently. In the field production experiment, the treatments comprised of; (i) covering crop with a net with fine mesh (0.4mm mesh size) used permanently, (ii) covering the crop with a net with large mesh (0.9mm mesh size) used permanently, (iii) covering the crop with a net with fine mesh (0.4mm mesh size) opened thrice a week (iv) covering the crop with a net with large mesh (0.9mm mesh size) opened thrice a week (v) uncovered crop sprayed with chemicals and (iv) uncovered control with no chemical sprays.

Agronet cover increased both temperature and relative humidity, enhanced seedling growth, and reduced pest damage. Seedling emergence was significantly earlier and higher under the net covering, compared to the control. Seedlings grown under the nets had higher stomatal conductance and leaf chlorophyll content. Similarly, in the field experiment, net covering generally modified the microclimate characterized by higher temperatures, relative humidity and volumetric water content compared to the control. However, the amount of photosynthetic active radiation and diurnal air temperature were reduced under net treatments. Crops covered with 0.9mm agronet generally showed faster growth, high plant dry weight and enhanced stomatal conductance and chlorophyll content.

Permanent cover with 0.4mm and 0.9mm nets resulted in significantly lower pest populations and crop damage. Cabbage yield and the number of marketable heads per hectare were highest in the 0.9mm mesh size agronet. Based on the findings of this study, the use of 0.4mm and 0.9mm net for cabbage transplant and crop production, respectively offer a potentially sustainable technology for profitable cabbage production in Kenya.
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