PHYSIO-MORPHOLOGICAL RESPONSES OF CORN (*ZEA MAYS* L.) TO CANOPY MODIFICATIONS, PLANT DENSITIES AND LEVELS OF NITROGEN

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The thesis attached hereto, entitled "PHYSIO-MORPHOLOGICAL RESPONSES OF CORN (ZEA MAYS L.) TO CANOPY MODIFICATIONS, PLANT DENSITIES AND LEVELS OF NITROGEN", prepared and submitted by KRISHNA ADHIKARI in partial fulfillment of the requirements for the degree of Master of Science (Agronomy) is hereby accepted.

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BIOGRAPHICAL SKETCH

The author was born on December 28, 1949 at Lapsibot, Gorkha, Nepal. He is the only son born to Dandapani Adhikari and Tulasi Maya Adhikari.

He completed his primary education at Gyan Jyoti Primary School at Lapsibot in 1964 and School Leaving Certificate (S.L.C.) examination from Amar Jyoti Janata High School, Luetel, Gorkha, Nepal in 1968.

He graduated with a Bachelor of Science degree in Agriculture at Allahabad University, Allahabad UP India in 1974 with a major in Plant Protection under the United Mission to Nepal Scholarship Program.

After graduation, he joined the Boys Boarding School, Lamachaur, Pokhara as a vocational school teacher in June 1974 and worked for one year. Thereafter he joined the Department of Agriculture, His Majestry's Government (HMG), Nepal as Assistant Plant Pathologist and worked on maize research at National Maize Development Programme, Rampur, Chitwan, Nepal. In May 1977, he passed Nepal Public Service Commission Examination and reappointed on National Maize Development Program as an Assistant Production Agronomist and holds this position to date.

In the year 1979 November he was awarded IADS/HMG, Nepal six month training fellowship in Corn Production at the International Maize and Wheat Improvement Center (CIMMYT) Mexico.

While being employed at Rampur, Chitwan, HMG, Nepal, he was awarded the faculty privilege to pursue a Master of Science (Agronomy) degree in the University of the Philippines at Los Baños under the German Foundation for International Development (DSE).

The author is a member of Nepal Agricultural Association and the Crop Science Society of the Philippines. He has four scientific papers published in Nepal Summer Crops Workshop Proceedings.

He is happily married to Uma Devi with whom they are blessed with two sons, Bishnu and Raju and a daughter, Laxchima.

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ABSTRACT

ADHIKARI, KRISHNA. University of the Philippines at Los Baños, November 1987. Physio-Morphological Responses of Corn (Zea mays L.) to Canopy Modifications, Plant Densities and Levels of Nitrogen. Major Professor: Dr. Manuel M. Lantin

A field experiment was conducted to determine the effects of canopy modification treatments at varying plant density and nitrogen fertilization on grain yield and other physio-morphological traits of a corn variety, IPB Var 1, at Central Experiment Station, University of the Philippines at Los Baños, Laguna, Philippines during the 1987 dry season (January to May). The primary purpose of the study was to examine specific effects of each canopy modification treatment on agronomic, morpho-physiological and fresh fodder production potential at three planting densities and levels of nitrogen fertilization. Plant densities used were 53,333, 66,666 and 80,000 plants ha^{-1} at a fixed 75 cm row width and at nitrogen levels of 45, 67.5 and 90 kg N ha^{-1}. The experimental design used was split-split plot with three replications where plant population densities, nitrogen levels and canopy modifications were main plot, sub-plots and sub-subplots, respectively.

Negative linear responses were observed in yield and yield components to increasing planting densities while the responses to increasing nitrogen fertilization was positive. High nitrogen

application increased source and sink capacities, enhanced grain filling rate, and resulted in higher harvest index and higher grain yield. Variations in grain yield came from changes in 1000-kernel weight, kernel number per ear, number of unfilled ears, shelling percentage and percent barren plants count and final grain weight.

Differences among canopy modification treatments on grain yield was associated more with increasing levels of nitrogen and degree of defoliation among the treatment. Detasseling before pollen shed at the ratio of 2:1 corn plant rows increased LAI, CGR and NAR and finally yield and yield components at all planting densities and levels of nitrogen while detopping caused a decrease on all these traits. Removal of green leaves below the ear at 10 days from 50% silking resulted higher grain yield at lower planting density with higher nitrogen. It did not reduce grain yield at all planting densities and levels of nitrogen.

Cost-benefits analysis of thirty six treatments studied, revealed that the highest net income was obtained from detasseling. Tassels had higher crude protein content than the defoliated below ear leaves and detoped tops for fodder. Detasseling therefore, appears to be a sound practice for an integrated corn-livestock farming systems. Detopping yielded the highest fresh fodder but returns from the tops sold for fodder was not enough to compensate the large negative effects of detopping on grain yield.

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